

Report on the 119th SMPTE Technical Conference & Equipment Exhibit

Century Plaza Hotel, Los Angeles, 16-21 October 1977 By RODGER J. ROSS

Overview: Responsive to changing technologies in the motion-picture and television industries, the Society's Technical Conferences expand year by year. This year's conference in Los Angeles was the largest ever, not only in the equipment exhibits but in the papers program as well. Three large showrooms were needed to accommodate 135 companies exhibiting. Over 4000 visitors (in addition to the 1325 registrants and 1000 exhibitor personnel) flocked in during the week to see the comprehensive range of motion-picture and television equipment on display. Particularly noticeable was the much expanded exhibition of television equipment. Over 100 technical papers were presented in five days of papers sessions, many of which were concurrent, and three panel discussions on topics of major concern also took place during the week. The papers were presented in 18 sessions in the Century Plaza Theatres 1 and 2, across the street from the hotel

in the new ABC Entertainment Center. Attendance for the papers sessions continued at a high level throughout the week, right up to the closing papers on Friday afternoon. This was particularly encouraging for the authors and all those responsible for organizing the Papers Program.

Program Chairman Robert G. Buckley, assisted by Co-Chairmen Charles E. Anderson for television and John C. Lakotas for motion pictures, put together an outstanding papers program, two special presentations, and three panel discussions. The papers reflected in a striking manner current trends in these industries and the advances in technology that are now taking place at an ever increasing rate. Of special interest was a remark by Co-Chairman Anderson made while introducing the panel discussion on Television Technology that this would be a continuation of a panel

during the last television conference at Montreux, where they ran out of time.

The opening address Monday morning set the stage for the week's deliberations — a paper on "Technology and the Consumer" by Sir Charles Curran, Director General of the British Broadcasting Corp. In this address it was predicted that motion pictures and television would eventually merge until they lose their separate identities and become a single versatile tool for the program maker. The emphasis throughout the week, in paper after paper, was on the development and improvement of electronic picture-making technology to emulate film production techniques, and it was quite clear that a great deal of progress is being made in that direction.

Particular attention was directed towards the users of motion-picture and television technology that is, how modern technology can be utilized by the creative

people in the production of motion pictures and television programs. Motion-picture sound attracted renewed interest. One observer, commenting on the session held in the Samuel Goldwyn Theatre, said: "Never before in a single afternoon have so many different photographic sound systems been described." Developments in 1-in videotape recording technology were described in papers and demonstrated in programs produced with this format and shown on a large number of television monitors set up in the theater. Particularly noticeable were the flawless presentations on monitors, carefully adjusted to show uniform color balance, brightness and contrast. An outstanding example of 1-in videotape production was the program *California* shown at the Television Production session. This is the first in a series of 50 being produced for PBS. The production techniques were described by Ray

Edit Note: We are fortunate to have had the capable services of Rodger J. Ross again this year as Conference Reporter. Selected for this assignment by Editorial Vice-President K. Blair Benson, Mr. Ross has had experience in both the film and television industries. He is a co-author of the paper "The Potential of Super 8 in Television — A Progress Report," published in the *Journal* in April 1975.

Currently a consultant, Mr. Ross is retired from the Canadian Broadcasting Corp. He is a recipient of the Society's Progress Medal and, in 1975, of the Agfa-Gevaert Gold Medal Award.

Mr. Ross was assisted in this work by many members of the Society who provided informa-

tion about the concurrent sessions he was unable to attend and about the Equipment Exhibit. In particular, we would like to thank the following people for their time and expertise: A. A. Goldberg, CBS Technology Center; Roderick T. Ryan, Eastman Kodak Co.; C. Russell Dupree, Color Film Corp.; Gary Borton, Eastman Kodak Co.; David Fibush, Ampex Corp.; David Degenkolb, DeLuxe General Inc.; Richard Stumpf, Universal City Studios; Frank P. Gloyns, Rank Film Laboratories Ltd.; Daan Zwick, Eastman Kodak Co.; Richard Marcus, Rombex Productions Corp.; Herbert E. Farmer, University of Southern California; Robert Blumofe, American Film Institute — West; and Joseph Roizen, Telegen.



Consulting with Program Chairman Robert Buckley is Conference Programs Secretary Lynne Robinson.

Piper, Unlimited Productions, Inc.

During the week agreement was reached in the SMPTE Working Group on Continuous Field 1-in Helical Scan Type C Videotape Systems, and a final draft was forwarded to the Committee on Video Recording and Reproducing Technology. Several speakers emphasized that 1-in videotape recording is here and will eventually replace the older 2-in quadruplex format. However, some members of the audience at the papers sessions said they expected to be able to go home after the conference to report that agreement had been reached on a single 1-in videotape format, and they expressed disappointment that this has not happened.

In three papers sessions covering Laboratory Practices and Ecology for Labs, a subject that received much attention was effluent management. At the opening of Wednesday's session, R. B. Schaffer of the Environmental Protection Agency presented a paper on "National Effluent Guidelines Development for the Photographic Processing Industry." In addition several other papers on this subject from motion-picture laboratories and manufacturers were given. The subject of water management and conservation also received attention in several papers.

Digital television came in for a great deal of attention in the papers program. This technology is now well advanced, and there were predictions that digital techniques and equipment would be utilized increasingly in many ways in the television industry.

It was clear from the papers presentations in the motion-picture and television production sessions that there is a marked trend towards direct participation by creative people in the use of the equipment and an awareness on the part of equipment manufacturers and designers of the importance of this trend. Simpler and more reliable equipment is being developed making this approach possible, and production people are responding with enthusiasm. This was noticeable particularly in the utilization of portable television picture-making equipment and facilities. One speaker commented that the time is rapidly approaching when there would be no need to know what goes on inside the most complicated equipment.

Professional motion-picture and television production techniques were dealt with in several papers sessions. The emphasis is on simplification and cost reduction, and more versatile methods. In a well illustrated slide presentation, Joe Roizen of Telegen, Palo Alto, Calif., made a plea for greater utilization of teletext technology, already in use in the U.K. and well advanced in Germany, France and Japan. Developments in motion pictures and television in other parts of the world were described in a number of papers, including one by James Redmond, Director of Engineering, British Broadcasting Corp., on "New Techniques in Television Drama Production."

Another subject of considerable interest was Corporate Communication utilizing motion pictures and television for internal

corporate training, sales, information, and promotion by business and industry. Paul Lowry, AT&T, New York, showed how a large company makes use of equipment and techniques in his paper "A Corporate Television System and its Hardware."

The session on Unconventional Imaging Systems included several papers of considerable interest including two on methods for archival preservation of color motion-picture films. Another paper presented by F. P. Gloyns of Rank Film Laboratories in England described and demonstrated tape-to-film transfer by the LaserScan method.

Two panel discussions on Television Post Production attracted a great deal of attention. In these sessions different interests and concerns were represented and a wide range of views were expressed. Ken Lauk of the Canadian Broadcasting Corp. made a plea for improved communication between engineers and management. Another panel took up the subject "Is Technology Killing You?" Panel members included representatives of manufacturers and users, and there was a good deal of participation by the large audience also. It was agreed that there was no way to stop advancing technology, but some concern was expressed that these advances may be taking place too rapidly. One panel member questioned whether the new technology is making better programs.

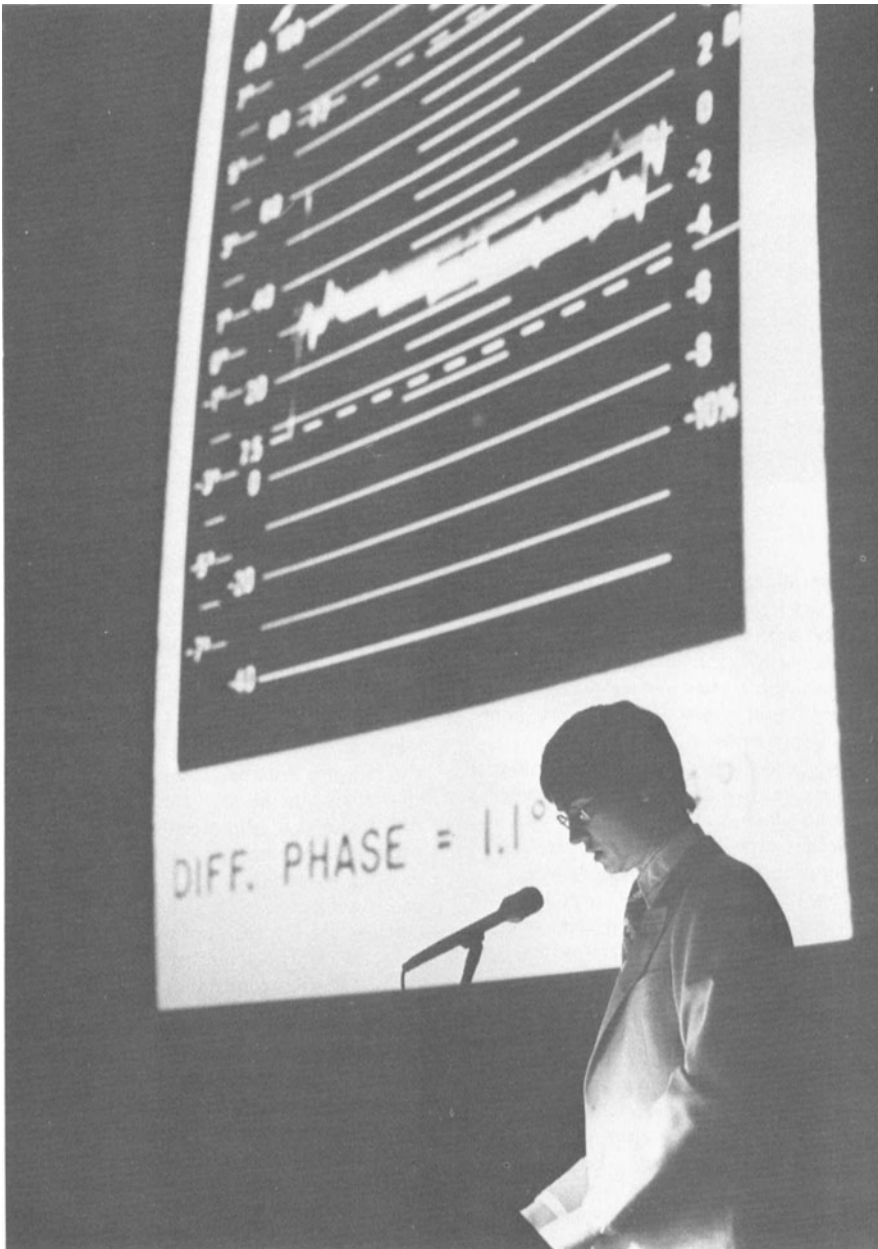
An example of the leading edge of a new technology and a probably significant trend in television was seen in the paper "Microprocessor Stabilization of Picture Monitors" by Benson Ackerman. By using a microprocessor as a kind of built-in computer, many systems will be able to signal what is wrong if any component goes out of adjustment; others will be able to compensate or correct the adjustment so that the overall system continues to operate within specifications.

Conference Committees

The 119th SMPTE Conference attracted a larger number of people than any other of the Society's conferences. An important factor in this high attendance was the well planned and timely Technical



The papers sessions were held in the two Century Plaza Theatres located across the street from the hotel.



Program under the direction of Program Chairman Robert G. Buckley of Technicolor, Inc.

A great deal of work went into the planning of the program and these efforts were rewarded by drawing 1321 registrants to the technical sessions. Mr. Buckley was assisted in his task by Program Co-Chairman for Television, Charles E. Anderson (Ampex Corp.), and Program Co-Chairman for Motion Pictures, John C. Lakotas (Eastman Kodak Co.). Without their help and that of the Topic Chairmen and Arrangements Chairmen, the conference would not have been so successful.

Conference attendees again benefited from Conference Vice-President Harry Teitelbaum's wealth of experience in the overall supervision of the meeting's activities. And, as usual, the Conference ran smoothly. K. Blair Benson, the Society's Editorial Vice-President, was responsible for overseeing the organization and oper-

ation of the Technical Program. His appointment of Robert Buckley as Program Chairman was an excellent choice. Mr. Buckley's coordination of the many details involved in the technical sessions activities was indeed invaluable.

The Program Co-Chairmen, John Lakotas for Motion Pictures and Charles Anderson for Television, were chosen by Robert Buckley. Topic Chairmen for the motion-picture sessions were: Chester Luton, New Motion-Picture Equipment and Processes; Roderick T. Ryan, Laboratory Practices; Richard Stumpf, Sound for Film; David Degenkolb, Ecology for Laboratories; Richard Barlow, Motion-Picture Production Techniques; and Howard LaZare, Unconventional Imaging Systems. Topic chairmen for the television sessions were: Dale Manquen, Sound for Television; William G. Connolly, New Products for Television; Thomas Spence, Corporate Uses of Television and Film;

Leonard W. Eden, Television Production; William Orr and Joseph Roizen, Television Post Production; Charles Ginsburg, New Television Technology; and Julian D. Hopkinson, International Papers.

The Conference Arrangements Chairmen all contributed generously of their time and their energy to the planning and fruition of the day-to-day activities involved in running the Conference. Although we do not have the space to thank each of these chairmen individually for their efforts, our gratitude to them is enormous. Without their help, the Conference could not have been the tremendous success that it was.

The names and areas of responsibility of the Arrangements Chairmen are listed below.

Warren Strang, *Conference Chairman*; Don V. Kloepfel, *Audio-Visual Chairman*; Robert T. Kreiman, *Banquet Chairman*; Walter Eggers, *Luncheon Chairman*; John Norris, *Registration Chairman*; Frances Levinson and Fred Godfrey, *Registration Co-Chairmen*; Ed Burns, *Hotel and Motel Arrangements Chairman*; Russell F. Dubes, *Assistant Auditor*; Esther Kessler, *Hospitality Chairman*; Shirley Kreiman, *Ladies' Program Chairman*; E. M. "Ned" Whiting, *Membership Chairman*; Grover Boyd and Gary Borton, *Membership Co-Chairmen*; Philip B. Singer, *Opening Films Chairman*; and Scott Robertson, *Transportation Chairman*.

The Technical Program sessions presented a wealth of information on the latest technology and trends in the motion-picture and television engineering fields. A brief summary of each paper appears below.

Summary of the Technical Program

MONDAY MORNING

Opening Address

Immediately following the opening film/slide presentation, Executive Vice-President Robert M. Smith, delivered an Opening Address to begin the technical session. He recognized the contributions of many people who worked to make the Conference a success, and he indicated his expectations of how the Conference would run. Following are excerpts of his speech.

"Good morning, Ladies and Gentlemen: On behalf of the Officers, Governors and your Conference Program Chairman, I would like to welcome you to the opening program session of the 119th SMPTE Conference. We extend a special welcome to all of our foreign members and guests who have travelled from all parts of the world to be here today. Each year, we see a greater attendance at our Conferences from our



The Century Plaza Hotel.

overseas members, and the officers of your Society take this as an encouraging sign that the goals which the Society has set in making itself a truly *international* engineering organization are being achieved.

"Anyone present who has ever had the responsibilities of being a program chairman . . . must appreciate the many hours of planning and concern that goes into coordinating a conference of this size. The Officers of SMPTE would like to personally thank Robert Buckley, the Program Chairman for this Conference, for having fulfilled his responsibilities so well.

" . . . This morning's opening session is entitled *Interfaces*. If the Society is to meet the challenges of the '70s and is to go on to fulfill the important engineering and standardization requirements in the years to come, it is important that the word *interface* be applied to all the Society's engineering and administration activities . . . and I strongly feel that this is what you will witness taking place during this week's technical presentations and throughout the equipment exhibits and other Society engineering administration functions.

"If we are to fulfill the important engineering responsibilities that have been placed on our Society, we must maintain a successful *interface* or *interaction* between all disciplines of our industries.

"From all reports, this 119th Conference will be the largest in the Society's history, with 106 technical papers being presented at the program sessions and 134 exhibitors demonstrating their latest equipment, ideas, and techniques . . . This may well be the largest attendance ever at one of our Conferences.

"I would like to say a few words about one of the goals that your President, Bill Hedden, has set for his administration. It is his intention that the Society expand its interests in the area of motion-picture and television production.

"This year, a Governor-at-Large has been appointed by the Board of Governors to coordinate the Society's efforts in production, both on the National and Section levels. Throughout this year, there has been a large increase in the number of "production-type" presentations given at our local Section Meetings, and this week, at this Conference, you will see that the Society has made a serious commitment to this area with sessions being given on Television Production, Film Production, Television Post Production, and Corporate Uses of Motion-Picture and Television Production. This involvement offers the Society the opportunity to fulfill a technical commitment to this segment of our industry and also offers future growth to your Society.

" . . . In closing, I would like to thank the

Program Chairman and his Committee for setting a theme which the Society can be proud to present. I am sure, on Friday, we will all agree that it was a week which offered us a better understanding of the importance to the Society of interaction between the motion-picture and television industries.

"At this time, I would like to introduce the opening program speaker for this Conference."

Interfaces

1. Technology and the Consumer (*Sir Charles Curran, BBC, London*) The papers session opened with an address prepared by Sir Charles Curran, Director General of the British Broadcasting Corp. The paper, read by C. B. B. Wood in the absence of Sir Charles, surveyed the potential contributions to the world's television services of electronic picture making and motion-picture films. There is no denying, he said, that electronic picture making has advanced considerably in the past five years, but at the same time film has not been standing still. These advances have shifted the balance between the two mediums, so that it cannot be said that one has come down ahead of the other — the program producer's choices have not become easier. A working group of the European Broadcasting Union evaluating videotape recorders for electronic newsgathering and current affairs programming has stated that the electronic pictures should be comparable with good quality 16mm film, keeping in mind that the tapes used for broadcast are likely to be second- or third-generation copies. Lightweight, portable recorders giving quite good performance are available, but due to lack of standardization, interchange between tapes is not possible. It seems also that portability and ease of editing run in opposite directions. In filming it is now possible to get rid of all the cables between camera and sound recorder, but a similar development in electronic picture making is awaited. Film technology is well established, guided by the unseen hand of comparatively few professionals, with the everyday use of film being handled by operators. We are still at the stage in electronic picture making where qualified engineers are needed at many points in the system to cope with problems. The eventual success of electronic picture making for location work calls for further substantial advances in technology before it will be generally worthwhile. The requirement for improved performance and standardization in videotape operations has never been greater, and this is seen as more important to the success of electronic picture making than lightweight television cameras. If film is ever to be replaced with videotape, there will first have to be international standardization, and the cost of setting up videotape editing facilities will have to



The registration area was crowded every day.



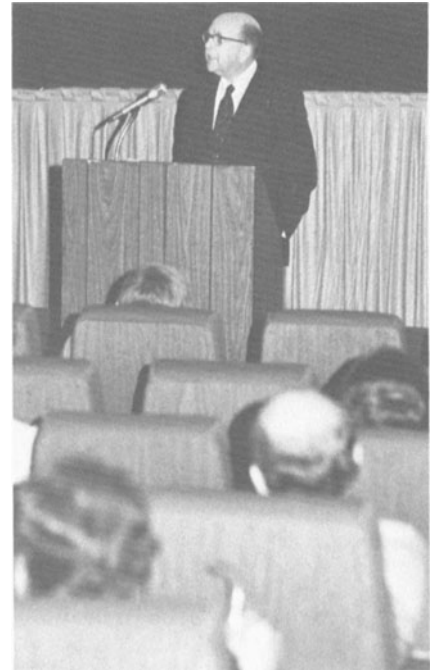
The papers session on Monday morning drew great interest from the audience.

come down dramatically. The challenge is to provide a solution that can be applied to 100 editing rooms in a broadcasting establishment at a cost that will let the program producer have exclusive use of the facilities for six to eight weeks if need be. Some would say that film is muddled and self-indulgent, but we don't want the program producer to be rationalized out of existence. The flexibility of film allows for a margin of program thinking. But what can we expect of film in the future? The cost of the film itself and the time taken for processing are matters which the advocates of film will have to study carefully, while steps are being taken to eliminate electronic picture making shortcomings. Another stumbling block is the transfer of tape to film. There is no reason why the production of programs should be different in one medium than the other. The main function of the program producer should be to exercise his artistic judgment, rather than worrying about technicalities. In conclusion the author made a plea for technology to take a back seat in program making. The film and television processes will merge eventually until they lose their separate identities and become a single versatile tool for the program maker, he predicted.

2. The Film-Television Interface: A Long Look (*Daan M. Zwick, Eastman Kodak Co., Rochester, N.Y.*) The author of this paper has been actively at work for the greater part of the past ten years on problems related to the use of color film in television broadcasting, within the Eastman Kodak Co., and in industry generally, especially through the engineering committees of the Society. Much of this work has been reported formally at conferences and in the *Journal*. This paper reviewed the work as a long-term effort, outlining the accomplishments and what remains to be done. A major part of this effort was aimed at identifying the causes of poor and excessively variable films received by broadcasters. Contributing factors were found to be: lack of uniform reviewing conditions for television films; a difference in color and density preference between East and West coast production centers; inadequate duplicating practices; a difference in color balance between newsfilm and other film programs; and a lack of appreciation of television requirements.

Recommendations included a standard room for reviewing television films; a kit to convert 16mm projectors to conform with this standard viewing condition; a modification of newsfilm color balance to give results more consistent with other film program material. It was also shown that the color balance of a film suitable for television gave acceptable results in direct projection on a screen as well. Investigations of film reproducing equipment identified the lack of studio picture monitor standards as one of the causes of variability and poor broadcast quality. As a result of a study of white color in television pictures it was recommended that a white equivalent to D6500 should be adopted for monitors as well as home receivers in place of the prevalent much bluer 9500 K. Another area investigated was the effects of automatic black-level control in telecine. A test slide was manufactured to display and measure the gray-scale transfer characteristics of telecines, and a standard was developed for this test slide. A survey of telecines in television stations indicated that chaotic conditions exist in gray-scale transfer characteristics. An engineering working group of SMPTE has been charged with the task of developing standards for telecine operation. It is hoped that action will be taken soon on standardization of the telecine transfer characteristic.

3. Image Transform — A System for the Reproduction of Video Images in Motion-Picture Film (*Pete Commandini and Toni Roth, Image Transform Inc., N. Hollywood, Calif.*) The methods used in the Image Transform recording process were described in detail in this paper. An electron beam recorder is utilized to expose the separation masters. The recorder was modified to run in "video real time," to give separate red, green and blue frames on a single strand of black-and-white 16mm positive film with a very fine grain structure and a long modulation transfer curve. The exposure rate is 72 frames/s, with each frame containing all 525 lines of the original videotape picture. To reduce the objectionable line structure in the television pictures, the scanning spot in the recorder was expanded in the vertical direction, eliminating the spaces between the lines. To expose the color negative from the separation masters a specially designed



C. B. B. Wood presented the first paper on the program for Sir Charles Curran, Director General of the BBC.

optical printer is used, incorporating a rotating filter wheel synchronized with the pull-down cycle. High-efficiency dichroic filters are used in the optical printer, combining the peak sensitivities of the color negative film with the spectral emissions of the xenon light source. Special processing conditions were set up in the plant for the color negative to maintain control and complement other steps in the process. Special processing is also employed for the black-and-white separation master film. Differential treatment is required in the exposure of the three primary images to obtain a neutral gray scale — this is accomplished electronically in the recorder. The process is capable of recording 10-MHz signals, a higher resolving power than the NTSC television system can produce, so Image Transform recordings are limited by the input videotape. A combination of gamma and exponential modification is applied to the electronic signals at the time of recording to produce an ac-



Financial Vice-President Joseph Dougherty and Mrs. Dougherty.



The Philip A. Hunt "Coffee Club" was a convenient meeting place throughout the Conference.

ceptable film result. The vast majority of customers prefer a "film look" rather than a film duplicate of the videotape. Viewer quality acceptance is much more critical for film than television in any format. Extended bandwidth systems have been proposed but the limiting factors are found in cameras and encoders. Most customers are limited to existing broadcast production facilities.

4. Masking in the Film/Telecine System (*Karel Staes, Agfa Gevaert, Mortsel, Belgium*) In this paper a brief outline of photochemical masking was given, showing how unwanted absorptions of dyes in negative color films can be eliminated in making the color prints. This concept was then extended to electronic masking in telecine, and it was shown that unwanted crosstalk occurs as in the negative-positive film system. An electronic masking matrix was described which produces modified signals proportional to the film dye concentrations. These equivalent neutral signals are not affected by the unwanted dye absorptions and have equal values for any neutral film area. At the picture monitor these signals are related to the dye concentrations and do not correspond to the appearance of the projected images. To provide an exact color reproduction of the projected images or the original scene, the signals should be proportional to the trichromatic coordinates of the film or of the original scene. The paper then reviewed two basic concepts of television film reproduction — one an information-storage system for accurately reproducing the original scene, and the other, reproducing the images as seen in optical projection. Two different masking methods were described for matching the pictures. A description was then given of tests of matrixing applications using a Rank Cintel telecine, with a full masking matrix and a neutral grading matrix. A videotape recording of several scenes on Gevachrome film was shown at the conclusion of the paper.

5. What's Happening in the Motion-Picture Business? (*Spero Kontos, The*

Filbert Co., Glendale, Calif.) Progress in motion-picture making and exhibition over the past 50 years was reviewed in this paper, which concluded with a plea for format standardization and greater care in film handling so as to give the public better presentations in theaters. During the 1950s there was a great proliferation of different formats — Cinerama, VistaVision, 3D, Cinemascope, and stereophonic sound, as well as a variety of wide-screen formats. A great deal of money was spent by theater owners modifying their facilities to accommodate these formats, but in the end only a few have survived, mainly because of cost. In addition, there was a lack of product, and gross receipts fell sharply. Recently there have been signs of improvement. Stereo optical sound has good prospects, but a majority of theaters are not well equipped for sound. It was claimed that the public is well aware of good sound, as a great deal of money has been invested in home sound systems. In the motion-picture industry everyone wants to go his own way, but the industry needs a single format with stereo optical sound. That would greatly simplify theater operation and presentation. It was proposed that a three-perforation format should be considered as this would reduce print costs by a quarter. Also a plea was made for prints on 6000-ft reels to simplify automated theater projection. Citing examples of careless handling, the author stated that too many in the industry do not have a proper sense of quality control. As the trend towards automated theater operation continues, operators should take a close look at their positions with a view to becoming managers. It was predicted that large complexes of up to eight small theaters will become the norm, many of them similar to sophisticated review rooms.

MONDAY AFTERNOON

New Equipment and Processes in Motion Pictures

6. Bolex Aspheron — A Super Wide Angle Adapter (*Fred Onderka and Joe*

Vasata, Bolex International, S.A., Yverdon, Switzerland) The Bolex Aspheron, developed in the R&D Dept. of Bolex International S.A. in Switzerland, was first shown at Photokina in 1976. The Aspheron is an optical element designed for modifying the focal length of a basic lens. News events where the camera-to-subject distance is a critical factor challenge every camera operator. The coverage of standard wide-angle lenses is often insufficient. This problem has been solved with the Aspheron, a super wide-angle attachment, specially computed to match the Switar 10-mm Rx lens with preset diaphragm. The Aspheron consists of a single multi-coated element, utilizing the retrofocus principle. In a retrofocus lens the front group is divergent (negative) and the rear group is a convergent magnifier. When the Aspheron is added to the basic Switar prime lens of 10mm, a new combined focal length is created — in this case 5.5mm. The very short focusing distance of the Switar 10mm lens is a prerequisite with the Aspheron; otherwise the combination would be beyond the range of focusing of the basic lens. In common wide-angle optical attachments corrections are distributed over several elements, but the Aspheron has only two diffractive surfaces. A new way has been found to solve this difficult problem: an aspherical convex surface is introduced while keeping the concave surface spherical. It is claimed that this revolutionary design enables all aberrations to be corrected, to the extent that optimal perspective is achieved, free of all distortions. The Switar 10mm lens with the Aspheron attachment can be used on all Bolex H-16 cameras. When it is used on other makes of 16mm reflex cameras the diaphragm should be closed to $f/2.8$ or more.

7. Programming for Cue Analog: A Computer-Controlled Paper Tape Editor (*Michael Chewey, Walter Eggers and Allen Hecht, MGM Laboratories, Culver City, Calif.*) Cue Analog is a system designed by MGM Laboratories in 1967 to enable numerically controlled cueing of



Jeffrey Friedman, SMPTE Exhibit Manager.

printing machines utilizing punched paper tape. Several versions of this method have been developed in the industry, and the concept is now well accepted and widely used. A punched paper tape contains all relevant scene information — footage and frames, green and blue additive values, and fader speeds. The latest programmer designed by MGM Labs is a minicomputer-based system with peripherals including a CRT/keyboard, high-speed printer and combination punch. The menu is displayed on a video screen, various options are presented on the screen, and the operator chooses the task to be performed. A hard copy printout is available. Tapes can be edited and updated, and converted from 35 mm to 16 mm. A subtractive timing tape can be changed to an additive tape automatically. This method has resulted in an 80% reduction in operating errors. The approach selected at MGM Labs was paper tape, but direct control of the printer from the computer is being investigated.

8. New Arc Discharge Lamps for Projection Systems (*Thomas Lemons TLA-Lighting Consultants, Salem, Mass. and Michael J. McGovern, Macbeth Sales Corp., Newburgh, N.Y.*) Arc lamps used in projection systems have been limited to xenon and Marc 300. The dc lamp operation eliminates flicker concerns since light output is constant. Increased screen luminance is obtained compared with incandescent sources. While these lamps are used in projectors they do not meet all projection requirements. New opportunities for the development of projection systems have opened up with the introduction of metal halide arc lamps. In Europe, such lamps were first utilized for overhead projection, their main advantage being a two to three times increase in efficacy and luminance over incandescent lamps. However, these lamps have an ac arc that produces flicker when used in motion-picture projection. HMI lamps are now available in a range from 200 to 4000-W which could meet the needs of all motion-picture projection systems, but flicker is the major problem to be dealt with. The use of HMI lamps for location lighting has made necessary the development of flicker-free ballasts, and these developments will also meet the needs of flicker-free projection systems. Both electronic and magnetic ballasts are now available for both HMI and HCI lamps, but total replacement of xenon lamps will be limited because of the much greater luminance of the xenon lamp



Russ Dubes and Esther Adler checking the Conference accounts.



Conference registration.

(up to three times greater than the HMI lamp). The increased efficacy of the metal halide lamp is accompanied by a decrease in infrared energy. This enables HMI and HCI lamps to be incorporated into metal reflectors. Tooling of metal reflectors is much less expensive than that of glass reflectors which use a dichroic coating to control heat.

9. A Totally New Concept in 35mm Theater Projection Lenses Based on Past, Present and Future Needs and Designs (*Glenn Berggren, Schneider Corp. of America, Mineola, N.Y.*) In this paper the vast changes and improvements in projection equipment over the past 100 years were reviewed. Lenses have been considered separately from arc lamps, projection heads and screens. Camera lenses for original film production have undergone continual change as the needs and demands were redefined, but developments in theater projection lenses have been limited by competition, new technology and the marketplace. In the period from 1917 to 1957 there was outstanding progress in film and lens improvements, but in the past 20 years while film has continued to improve, lens designs have remained almost unchanged. As a result of price competition less expensive four- and five-element lenses are being used with lowered picture quality on the screen. In the past 20 years a rapid shift to xenon arc projectors has taken place, replacing the carbon arc units; curved gates are being used in projectors; and there has been a trend from full-time manned equipment to unattended projection. These developments have shifted the emphasis from readily adjustable lenses to lenses that will hold focus over long periods. It was proposed that lens needs in theater projection should be reviewed, to redefine the role of the projection lens. Several technical advances have been made in the optical industry that have not been incorporated in projection lenses. These and other developments can be included readily in a totally new design that would improve

picture quality and efficiency. A prototype 3-in (76-mm) $f/2$ lens has been built, with curvature adjustment, and tested in several large cities. At Radio City Music Hall the new lens gave 30% more light, with improved contrast and less flare.

10. A Low-Cost Super-8 Duplicator with Simultaneous Magnetic Sound Transfer (*Roy B. Ference, C. Bradley Hunt and H. Robert McNair, Eastman Kodak Co., Rochester, N.Y.*) In a new approach to making copies of super-8 films, a super-8 duplicator has been developed that could be attractive for low-volume (1 to 10 copies) in-house production of training and educational films. A continuous one-to-one optical duplicator transfers both sound and picture in a single operation, with a common-shaft sprocket drive synchronously pacing the print film with the original. Two matched lenses are used in the duplicator, one lens projecting the original images on a high-gain front projection screen while the other lens forms images of the display on the print film. The sound is transferred simultaneously with magnetic heads contacting the original and the prestripped print stock. Color balance can be adjusted with filters placed over the tungsten-halogen light source. Original camera stocks can be



Joe Roizen, Telegen, and Christiane Coutel and Bernard Pauchon, both of SFP, France, in the Author's Lounge.

used for duplicating, contrast being reduced by flashing. This can be done in the duplicator. An experimental model has been constructed from readily available parts. At the conclusion of the paper demonstration footage made with the duplicator was shown.

11. A Low-Cost Color Television Film Recording System (*Kenneth G. Lisk, Eastman Kodak Co., Rochester, N.Y.*)

Many different types of low-cost non-broadcast television equipment are in use at the present time to make recordings on videotape, suitable for training and educational purposes. The storage of video information on tape has some advantages, but the distribution and showing of these materials, especially to large groups, can be quite difficult. There is an increasing need to convert videotape programs to film, making possible either direct optical projection or telecine reproduction. With programs on films, standards conversion is no longer a problem. Videotape-to-color-film transcriptions are being made on a commercial basis with a number of facilities in this country and abroad, usually with 2-in quadruplex videotape as the source. Most of this transfer work is being done from shadow-mask picture tubes, the quality being generally acceptable. This paper described a system of making shadow mask recordings in-house, utilizing low-cost video components. The system includes a Sony U-Matic recorder, Model V01600; a Panasonic 19-in receiver with video input option; a PIN-diode light meter, and a low-cost recording camera, utilizing either reversal or negative film. Eastman Color Negative II film 7247 is being used to make the recordings, but for single copies better results can be achieved with Eastman Ektachrome Video News film 7240. Instead of using filters to expose these films from the color picture monitor a better method is to simulate the effects of the filters by video gain adjustments. A video test signal is used to set up the system. Neutral balance is achieved with a color bar signal, the chroma being reduced to give a gray scale. A detailed description



The Society's Board of Governors met on Sunday of Conference week.

of the set-up procedure was given. The paper concluded with a demonstration.

12. A Computerized Tape-Punching System Incorporating Frame-Count Cueing (*Martin S. Mueller, Carter Equipment Co., Lawndale, Calif.*)

Carter Equipment has developed and is marketing a fourth-generation computerized tape-punching system which takes advantage of state-of-the-art electronics and many devices available to electronic equipment designers. This unit, designated CTPS-4, incorporates all of the features of the previous Academy Award-winning unit (Class 3 Scientific or Technical — 1975) with the addition of a separate keyboard and the ability to generate either composite or separate frame-count cueing tapes in either frame-only mode or a footage-and-frame mode. Packaging the three separate pieces into one unit that includes punch, hardcopy printer, read head, dual keyboards for color- and frame-count cueing tapes, program selecting switches and displays produces a compact, easily operated unit. Microprocessors are utilized in the design of four separate cards for the displays, system logic, keyboard, and the punch printer and reader. With this design troubleshooting is greatly simplified, no longer

requiring an electronic technician. The various methods of operation were described. Notches and tabs are eliminated, greatly reducing operating errors. Color timers can concentrate on the subjective aspects of timing.

13. High-Speed Reader and Frame-Count Cuer (*Wallace I. Vance, Carter Equipment Co., Lawndale, Calif.*)

With the trend towards frame-count cueing in mind, Carter Equipment Co. developed their CE-HSR-1 high-speed reader for use with automatic additive printers. The reader is intended to operate with the Bell & Howell automatic light valve and makes extensive use of microprocessors. It has fast response, time and noise immunity and has the capability of being utilized as a straight color reader only or as a color and frame-count cue reader. Details of the construction and operation of the reader were given in this paper. In addition, a new frame-count cueing system designated CE-FCC-2 was described. This unit utilizes many of the same design features and gives the laboratory user many of the same advantages. Complete compatibility and interchangeability with Bell & Howell cue tapes has been achieved. The paper also described pickup or frame-counting devices for conventional printing machines and color analyzers. The paper was extensively illustrated with slides, but the author commented that it would not be possible in a verbal presentation to give all the details of the units.



Meeting of the UNIATEC Bureau: David Samuelson, Pierre Houguenade, Karel Ludvik, Claude Soulé, Alberto Sciarretta, Robert Gale, Dennis Kimbley and Kenneth Mason.

New Products in Television

14. A Digital Noise Reducer for Encoded NTSC Signals (*R. H. McMann and S. Kreinik, Thomson-CSF Labs, Stamford, Conn. and J. K. Moore, A. Kaiser and J. Rossi, CBS Technology Center, Stamford, Conn.*)

Digital television techniques make possible the processing of television signals on a element-by-element basis with mathematical precision, and the cost of digital line, field and frame storage has



grated package providing novel effects with minimal control complexity.

17. Automatic Microprocessor Color Camera Set-Up Unit (*Kiyoshi Inoue, Ikegami Tsushinko Co. Ltd., Long Island City, N.Y.*) The Ikegami automatic microprocessor color camera set-up unit, a state-of-the-art product that permits trained non-expert personnel to achieve proper camera set-up was described in this paper. Automatic features and stable circuits in most broadcast quality color cameras has not lessened the demand for simplification of set-up procedures. Automatic iris, automatic white and automatic black balance, and automatic centering circuitry reduce the time needed to properly adjust a camera, but other important parameters cannot be easily automated. Set-up time for a camera is reduced to about 45 s with this new unit, compared with 10 to 30 min needed by a skilled operator making use of conventional methods. Up to five cameras can be addressed and corrected within four minutes with a single microprocessor unit, and the set-up is completely reproducible. A special, easily reproducible test chart is utilized with the microprocessor. Status verification is provided during automatic set-up and error indicators assure proper final adjustment. The paper reviewed Ikegami's original design objectives, current accomplishments and future possibilities of automatic color camera set-up. It was noted that cameras must be within given operating tolerances for the automatic set-up system to work.

18. Design Concepts in the Development of a Lighter, More Efficient Portable VTR (*M. Morizono, T. Chimura and K. Koguma, Sony Corp., Tokyo, Japan*) The proliferation of U-Matic VTRs for electronic newsgathering has given rise to stricter standards. ENG systems must be comparable in performance to 16mm film. Tape systems offer a number of distinct advantages, but these systems are heavy, requiring several people to operate them, and do not provide a means to check the recording prior to playback. A new design is

come down so rapidly that it is now possible to exploit the redundant nature of the television signals in both frequency and time domains to improve picture quality. The noise reducer described in this paper makes use of a digital frame store operating as a recursive filter controlled by an element-by-element detector utilizing comb filtering and signal modification. By these means an improvement of 15 dB has been achieved in signal to noise. Further developments should provide additional improvements in the future. The algorithm employed is equally effective at low frequencies so that the streaky characteristic of chroma noise in $\frac{3}{4}$ -in VTRs is removed. No objectionable artifacts are introduced into high-quality input signals, allowing the noise reducer to be left in the program line at all times.

15. Saticon® — The New Color Television Camera Tube (*R. G. Neuhauser, RCA Corp., Lancaster, Pa.*) Selenium, the earliest known photoconductor, has been developed as the latest improvement in color camera tube technology. The photoconductor has good stability and long life. The high resolution of the tube and its low lag (obtained by the use of small amounts of bias light and a low-impedance beam gun design) make the 18mm version of the tube uniquely suited for use in cameras for electronic journalism. Low reflectivity of the photoconductor greatly reduces optical flare and color contamination of shadow areas. The 25mm version gives a measure of improvement in lag over sulfide vidicons in color telecine service where high-contrast films may be encountered. The resolution of the 18mm tube rivals that of the 30mm lead oxide tubes, enabling much smaller and more versatile cameras to be designed. The Saticon tube was developed in Japan by NHK, Hitachi and others. RCA has made improvements to the target and the gun. (Saticon is a trademark of the NHK, Japan Broadcasting Corp.)

16. The DVE System (*Michael D. Paten, The Grass Valley Group, Grass Val-*

ley, Calif.) Special effects previously obtainable only with film or specialized optics can now be produced electronically with a digital video processor and a production switcher. By incorporating the video processor into the switcher the operator interface is greatly simplified. A single integrated system has a further advantage in production automation. This paper described the DVE (Digital Video Effects) system and the methods that can be employed to simultaneously manipulate and synchronize the input video. Switcher inputs or outputs can be fed into the processor, the output of which becomes a switcher input. Normally the processor output is inserted into another signal by keying, but a simpler method is to make the processor output video follow a key or wipe generated by the switcher. An auto-take feature will perform new source selection part way through sequential effects such as flips. Invalid effects which could cause a discontinuity are inhibited and a control panel lamp lights allowing the error to be corrected before the effect is used. An auto-mask function is included in the DVE system which is a key mask that follows movements of the key signal to which it is locked. The DVE system combines switcher and video processor in an inte-



Session Chairman David Degenkolb (center, facing the camera) in a briefing with the authors from the Ecology for Labs Session.

needed giving greater ease of operation with improvement in reliability and dependability. Ideally, the design should allow for one-man operation. The VTR should weigh less than 12 lb (5.5 kg) with battery and cassette. For newsgathering, a record-only VTR should be acceptable; eliminating playback circuitry and mechanics enables weight and size to be reduced. A single cable from VTR to camera should allow for remote start/stop operation, and the camera viewfinder should display all VTR operating states. The VTR should operate continuously for four hours (one with camera) and draw 12.5 W from a Ni-Cd battery. While reliable and dependable VTRs are available, these are complex machines and will never be completely free from malfunctions. A practical design would monitor the recording process for malfunctions and indicate their presence. Six warning functions with indicators are considered to be necessary: servo lock, video, condensation, auto off, end of tape, and battery warning. The VTR must have an assembly (in-camera editing) capability similar to a 16mm camera. Video and audio performance must be equal to any similar unit. The Sony BVU-50 portable U-Matic VTR has been developed based on these design concepts.

TUESDAY MORNING

Laboratory Practices

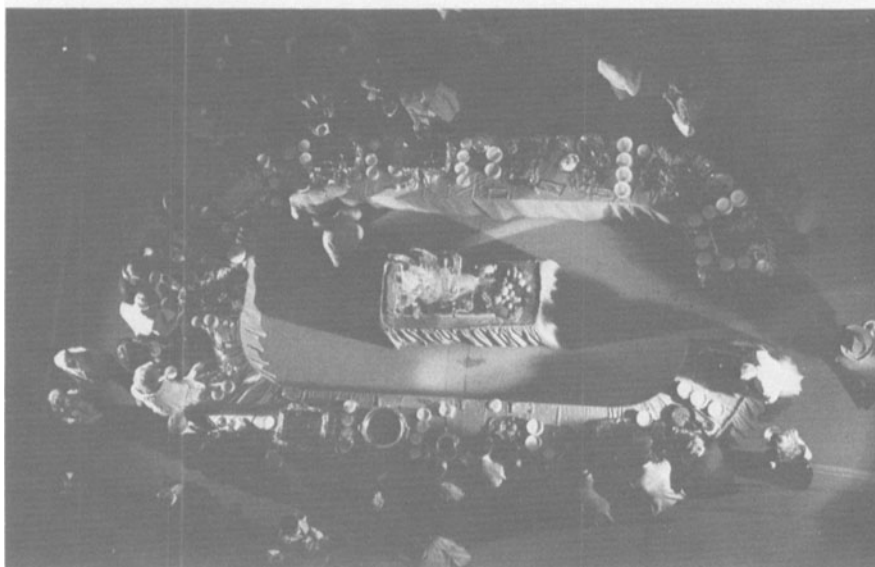
19. Simplified Electrolytic Method for Ferricyanide Bleach Regeneration (*J. Wesley Kleppe and Charles R. Nash, Eastman Kodak Co., Rochester, N.Y.*) Increasing cost and environmental considerations make the regeneration of ferricyanide bleach desirable. Different methods of regeneration were reviewed in this paper, the most favorable method being electrolysis. A low-cost electrolytic cell was described that reduces ferricyanide waste by 30%. The cell consists of a bundle of 120 carbon welding rods fastened to an anode plate and suspended in a PVC canister 8 in in diameter and 12 in long. The canister is perforated, allowing liquid contact with a diaphragm or membrane of woven Dynel on the outside, covered with expanded stainless steel serving as the cathode. Direct current is applied at 10 A/ft² of anode surface. In a typical production set up, four cells are placed above a tank and pumps maintain a flow of 10 l/min through the cells. A pH controller set at 8.2 monitors the recirculated bleach and adds a 48% solution of hydrobromic

acid, so that when the bleach has been regenerated to replenish strength in ferricyanide the required amount of bromide is already included. A four-cell installation will handle 1000 l of ferricyanide bleach per day.

20. A New High-Temperature Color Positive (*George F. Duffin, 3M Co., St. Paul, Minn.*) This paper described an improved product for the motion-picture and television markets, a new 3M Color Positive film, that gives improved sharpness, lower granularity, and accurate color rendering. The high sharpness of this product, particularly in the spectral regions important for rendering flesh tones, is achieved by the addition of acutance dyes. Thus, the sharpness of the magenta is a good improvement over previous products. The film can be processed in the high-temperature ECP-2 process. These improved properties have been achieved utilizing the most modern technology.

21. A Non-Silver Soundtrack for Conventional Infrared Sound Reproduction Systems (*F. P. Brackett and J. M. Andreas, Consultants, Hollywood, Calif.; J. D. Hopkinson, Agfa-Gevaert Inc., Hollywood, Calif.; and W. L. Graham, Technicolor, Hollywood, Calif.*) The production of completely silver-free release prints by Technicolor was described in this paper. In the Technicolor dye-transfer printing process no silver was needed for the picture portion of the composite prints, but like conventional color positives silver was required for the optical soundtrack. Various methods were investigated, ending inevitably with ferric ferrocyanide (Prussian blue) as the modulating material. In the mid-1960s two alternative methods were considered; one, developed by Tull at Technicolor London, consisted of a soundtrack in the magenta printing matrix subsequently treated with an iron toner. Technicolor Research in Hollywood developed a method of striping with a diazo sensitizer and iron toning to produce a Prussian blue image. To be commercially feasible the process would have to be compatible with the operating speed of the dye-transfer machines at 315 ft/min, and the sound quality would have to be equal to or better than existing optical tracks. Mercury arc lamps were used to expose the diazo stripe and the raw stock and negative were rolled emulsion-to-emulsion on a pin-belt printer. The iron-toned tracks showed little or no image spreading, making necessary printing of the negatives on a special thin emulsion stock. The process was developed to the point where limited production was possible on one of the eight Technicolor dye-transfer machines, but then the dye-transfer process became obsolete.

22. The Development of Wetprinting Systems (*W. D. Carter, Carter Equipment Co., Lawndale, Calif.*) This paper traced wetprinting systems from their origin in



The Conference began with a Mexican party on Sunday evening, courtesy of Eastman Kodak Co.



During the Board of Governors Meeting, Joe Dougherty (left) receives a special token of appreciation for his long years of service to the Society.

still photography. Three types of wetprinting are thin layer, aquarium gate and total immersion. This paper gave descriptions of hardware for each of these systems, with the advantages and limitations of each. Production printing systems were compared from quality and economic angles. Contributions of pioneers were recognized, as well as European manufacturers. Hardware items, both retrofitted and of new manufacture, and both step and continuous printing, were illustrated. Some consideration was given to the future of wetprinting in the professional motion-picture laboratory.

23. A Progress Report on a New Bleach for Eastman Color SP Print Film (*John H. Baptista, Julianne E. Crisante, Frederick C. Franswa, Michael D. Purol, Eric V. Knutsen and Keith H. Stephen, Eastman Kodak Co., Rochester, N.Y.*) This paper was a report on a new potassium persulfate and sodium chloride bleach which could be a potential alternative to the ferricyanide bleach now used in motion-picture process ECP-2. The study was undertaken to give another option to the laboratory where local ordinances restrict the use of a ferricyanide bleach. A chemical mechanism for the bleaching action was outlined. Described also were the chemical formulations, processing conditions, and the method by which these were determined. The results of a period of 17 months' experience with its use in process ECP-2 in the motion-picture pilot lab at Kodak Park were given.

24. Forced Processing of Modified Eastman Color Negative II Film 5247 (*Thomas P. Cribbs III, Eastman Kodak Co., Rochester, N.Y.*) A common practice in the motion-picture industry is to force process or push-process Eastman color negative II films when negatives have been underexposed in filming with available light, when sets have not been lighted adequately, or when efforts are being made to create what is termed a "special look." Forced processing is usually specified in terms of "push 1" or "push 2", which implies compensating for one or two stops of underexposure. This usually means that an attempt will be made in the laboratory



R. W. Bachmayer, Technicolor, Inc.; Mrs. Edna Mason; Richard Mason; Kenneth M. Mason, Eastman Kodak Co.; Mrs. Lee Bachmayer; and Dick Goode, Color Film Services Ltd.

to provide a negative that will print in a similar manner to a normally exposed and processed negative. The aim is to make the densities approximately correspond with those in a normally exposed negative. The effects of forced processing on the sensitometric and quality parameters of Eastman color negative II film 5247 were described and a demonstration film was shown.

25. Major Factors Affecting Apparent Screen Brightness of Large Theater Screens (*Warren Jenkins and Robert Endres, Radio City Music Hall, New York City and Glenn Berggren, Schneider Corp. of America, Mineola, N.Y.*) Standards for screen brightness in motion-picture theaters are given in PH22.124, recently revised as PH22.195-1977. In these standards several factors are assumed. The difference between apparent screen brightness and actual measured screen brightness can become quite large when additional variations are involved. For indoor theater projection 16 fL is expected. On the other hand, it is rare that outdoor drive-in theaters have more than 3 to 4 fL, and yet the pictures appear to be acceptable. In comparison 3 to 4 fL in indoor theaters does not seem to be acceptable unless there are some special factors. This paper gave the results of tests and studies into those factors which can give fully acceptable screen images at brightness much lower than the normal value of 16 fL. Included in the tests were major changes in color temperature, apparent screen size, screen image ratio, surround illumination, ambient lighting on the screen, and changes in contrast with lenses, windows and screen materials. In this paper it was proposed that future screen brightness standards include these factors, possibly in chart form, to enable acceptable screen images to be obtained in widely varying conditions, instead of specifying a single value of screen brightness in footlamberts. Tests run at Radio City showed that 16 fL could not be achieved but the picture was regarded as highly satisfactory. Many factors detract from apparent screen brightness. There were so many unexpected findings that further study is needed to determine the actual areas of agreement.



Mr. and Mrs. Charles Ahto, Charles Ahto, Jr.

Television Post Production

26. Post Production at the Société Française de Production (*C. Coustel and Michel Oudin, SFP, Paris, France*) The Société Française de Production (SFP) is a state-owned company formed after the splitting up of the ORTF, the French broadcasting organization. Its mission is to produce internationally oriented programs for the French television companies and for the cinema. New methods for producing feature programs by video are being studied at SFP, more flexible and more economical than film. In spite of many attempts to develop a new video style, film has so far remained better suited for dramatic productions. Recently methods have been developed to make video production more competitive with film production, using film methods with electronic cameras and taking advantage of video post-production techniques. A lightweight portable camera is used, mounted on a tripod. There is no control room — the director works on stage. A 1-in VTR of broadcast quality is fed directly from the camera. This method of shooting lends itself to more post-production editing. Up to 30 h of recording can be put on a 1-in playback machine. Various methods have been used in the post-production stage. By using 3/4-in machines for preproduction editing, and then transferring the 1-in recordings to 2-in quadruplex master tapes, production costs can be reduced to about 70% of the cost of comparable film production. For a typical VTR production four days are taken up in the original shooting, twelve days in pre-editing and six days in final editing. Methods are being developed to transfer the edited master 2-in tapes to film for screen presentation. A demonstration videotape at the end of the paper showed some of the production techniques that have been developed at SFP.

27. Television Post Production — The Small End of the Funnel (*Arthur Schneider, Consultant, Agoura, Calif.*) The development of videotape editing systems was reviewed in this paper, culminating in the highly sophisticated equipment and methods being utilized in today's production centers. The techniques devised for editing popular television shows as *Laugh In* were described, and the need for careful pre-planning of editing operations was emphasized, to avoid costly delays later on. An editing system was outlined which in-



Norma Keck, Leonard Keck, SMPTE President William Hedden and Lora Hedden, all of Calvin Communications.

cludes, first of all, an off-line edited work print and a punched paper tape and paper printout. These supply all the information needed for automatically conforming the original recordings. The paper print lists all the edits for easy reference and the punched tape is used to enter edit data into the computer memory. Sound mixing and soundtrack modification should be handled separately in a dubbing stage using a 1-in or cassette-format work print from the edited master, synchronized with a multiple track audio recorder. The paper also described briefly a training program in computerized tape editing instituted by the Film Editors Guild. Over 100 members have passed through the course and there is still a waiting list of 50. It was claimed that videotape will replace many shows now being shot on film and that the demand for trained tape editors will increase.

28. A Unified Videotape Editing System (*Sterling E. Davis, Metro Tape West, Los Angeles, Calif.*) Developments in editing systems incorporating microprocessor techniques were reviewed in this paper. These developments have enhanced the ability of videotape editors to emulate film editing techniques. From work prints to scoring, easy handling of a nonvisible medium is becoming a reality. Still-frame viewing devices, multitrack audio recorders and computerized controls make possible the manipulation of all the elements in an editing system. An example of an operational system for complete tape editing integrated with double-system sound control was described in the paper. The introduction of high-quality recorders with



Roderick T. Ryan, Mrs. Ralph Westfall, Allan Williams and Patrick Kurtz, all of Eastman Kodak Co.



Walter Seys (left) and Roland Verbrugghe (right) of Agfa-Gevaert with Pablo Weinschenk-Tabernerro, SMPTE.

still-frame capability and the ability to mix different quality machines during editing are blurring differences between off-line and on-line editing. Off-line editing utilizes low-cost devices to produce work prints and holds down costs where the decision-making is time consuming. By using microprocessors in an interface between a machine and a computer, individual machine characteristics can be programmed into its interface, while the computer stores only data applicable to any machine. Thus machines can be exchanged without changing expensive software. To make use of this new technology Metromedia is using 21 machine interfaces and four control terminals with computers, two off-line, one on-line and one for sound. Handling of decision lists in computer core memory contributes to speed and ease of editing. The editor has complete freedom to edit or re-edit in any sequence. The 3/4-in cassette format was selected for off-line editing since clients can view work prints outside of the editing rooms. The cassette format also permits quick reel changes. Joystick controls have been added for still-framing, jogging and searching. The sound portion of the system has been arranged to encourage the use of double-system editing as an aid in scoring or remixing productions. Up to 16 tracks can be mixed in audio postproduction, to replace the sound on the master tape. Sound sync is maintained with the SMPTE time code.

29. Development of a Quadruplex Videotape Duplications Facility (*J. Calaway, Vidtronic, Inc., Hollywood, Calif. and John Streets, Merlin Engineering, Palo Alto, Calif.*) Much of the work load of any



John Ehrenberg, Bell & Howell, and Ken Lisk and Robert Hufford of Kodak.

videotape production facility is making large quantities of dubs — duplicated tapes — for distribution to users. Dubs are usually made with a number of quad VTRs recording in parallel. With this method expensive capital equipment and skilled staff are tied up in relatively simple functions. This paper described a custom system that has been designed and is in regular use to meet the needs of high-volume dubbing. The system makes use of ten quadruplex VTRs designed specifically for recording. These machines are part of an integrated system that needs a minimum of operators. The VTRs are built around a constant-tension transport, especially useful for dubbing short commercials. The machines are controlled from a central control panel. One channel of playback electronics is provided for a quality-control check. The output from the head switcher in each VTR is fed to the central control which switches the signal through a single demodulator, equalizer and digital time-base corrector, giving a high-quality playback channel by which all the VTRs can be quickly and accurately checked for the quality of the recordings.

30. SMPTE Time Code Sparks Small-Market Creativity (*Gary W. Jones, Faulkner & Assoc., Little Rock, Ark.*) The purpose of this paper was to show how the installation and production applications of the SMPTE time code could be useful in small-market television stations. The author claimed that local television stations are a natural spawning ground for creative talent, but local program directors have been limited in the quality of their production efforts. The SMPTE time code can expand considerably local creativity as compared with network productions. While lighting, photography, set design, scripts and talent all contribute to the quality of local production, time-code editing gives the bland local spots a classy finished touch. The SMPTE time code allows anyone with a relatively modest investment, by broadcast standards, to edit with off-line, helical-scan VTR decision-making and 2-in quadruplex on-line assembly. Creativity in the production of local spots can be expanded by dividing the production into separate shooting, off-line editing and on-line assembly sessions. Even low-budget productions can make use of this style of working. Shooting goes faster by setting up and lighting short segments recorded from a single camera. Any production can be improved by devoting more time to its completion. Once a station has the time-code facilities, single-camera "mini-cam" photography and frame-by-frame editing become practical. A demonstration tape at the end of the paper showed the high quality of the work that can be accomplished with these production methods.

30A. Panel Discussion.
Papers Session Chairman: Milton R. Shefter, CFI



Howard McClure and Mert Knold, Lenco, Inc.; Marge Grasso, IMI, Inc.; Dick Lawrence, Lenco, Inc.; and George Grasso, Micro Consultants, Inc.

Moderator: Bill Arenson, A & G.

Panel Members: Len Lauk, Canadian Broadcasting Corp.; Phil Squyres, Metro Tape West; J. Calloway, Vidtronics; John Streets, Merlin Engineering; Sterling Davis, Metro Tape West; Arthur Schneider, Consultant; Christiane Coutel, SFP; Bernard Pauchon, SFP.

The panel session opened with a few brief remarks by the panel members. Len Lauk commented that all these new developments cost a lot of money. He was reminded of a German rocket scientist who came to the US after the war and said he did not feel any responsibility for the damage caused because he only threw the rockets up — where they came down was a political decision. Engineers working on the development of new equipment should be more concerned with the ultimate effects on managers who are being overwhelmed with conflicting claims for new equipment.

Q: How was the animated sequence in the Gary Jones demonstration tape produced? *A:* The same basic method is used as with film animation. Frame-by-frame animation can be accomplished directly on 2-in tape or the HS-200 video disc can be used, with the SMPTE time code, to animate frame-by-frame.

Q: But what about the costs of doing that kind of work? *A:* That demonstration was made in a television station at Little Rock, Ark., where the facilities are used for other purposes as well, and in this case a promotion spot was produced for the station's own use.

Q: With the rapid development of videotape editing where do the trained video editors come from? *A:* The Film Editors Guild in Hollywood has done some training with acquired facilities, and they have found film editors take to VTR editing very quickly. Graduates from those courses now have skills in tape as well as film. VTR editing can be thought of as an electronic Moviola. The transition from film to videotape is relatively easy. But it is not practical to try to train everyone. Film studios are concerned about the transition to videotape. Not enough money is available to buy equipment to train new people. Several organizations in Los Angeles are already making the transitions, with savings of up to 40%. But simpler equipment is coming which is aimed at newcomers to

the field, and postproduction is being divided into editing and conforming.

Q: Is the durability of quad equipment adequate for editing? Are the maintenance budgets adequate? What about the 1-in helical format? *A:* Wear and tear on quad machines is not a significant factor. In regard to the 1-in format it is likely to be less tolerant of aberrations. Quad machines were built for continuous operation. There is as yet not enough experience with 1-in machines, but they may be more difficult to maintain.

One panel member commented that he has had some experience with 1-in machines. Head life is likely to be 1000 h and the costs will be lower, with greater flexibility.

Q: Are the 1-in machines being designed for post production? *A:* No. These machines are designed for record and playback, but are being transformed into devices that can be manipulated and interfaced with other equipment. There have been already extensive developments along that line with quad machines.

Q: What about teaching students in film and VTR (in a university)? Should we encourage new people to learn these techniques? *A:* Editing is editing — either tape or film. Anyone can learn these systems. Creativity is still the same.

Q: What is the decision split between off-line and on-line? Most producers refer to stay in the editing area to follow through post production. What amount of time on-line as opposed to off-line? *A:* Up to now about 75% of editing is on-line. Off-line is a luxury many cannot afford. But this is changing rapidly with more flexible off-line equipment and techniques, and then paper-tape computer-controlled conforming. Conversion programs have been developed for different computer-controlled systems.

J. Roizen (Telegen): I would like to ask Mr. Lauk what he wants to learn about essentials?

Lauk: The tremendous enthusiasm of the technical people is overwhelming, but he said he has to deal with producers. There is the language problem too — technicians and engineers use a language that others cannot understand. We should cut out the magic and get down to the cost of the equipment. There is a division between engineering and the creative people. He said he would like to know the long range consequences of equipment decisions. In the papers at technical conferences, managers get lost after the first two sentences. Conference topics should be adapted to the needs of managers.

Q: Someone said that technology in the U.S. is further advanced than other countries. What do the people from SFP say to that?

Pauchon: Different methods have been developed for different types of program production.

Calaway: Programs in Europe are better.



Dennis Kimbley, Kodak, London, and Walter Seys, Ms. Maxine Hopkinson, Julian Hopkinson and Karel Staes of Agfa-Gevaert.

Closing Statement by Session Chairman Milton Shefter

"It's been said that the only two things in life that are inevitable are death and taxes, and I guess Len would join some of us in saying there's a third in our business called an evolving technology. This morning we have tried to look at where we are and if nothing else we may have realized that in twenty some odd years of videotape we've come back to film technique in post production. With each step of technological progress comes a churning turmoil of alternative decisions. What's next or, as our engineer-arbitrator said this morning, what's right or who's right? Here are a couple of facts: space-age technology has certainly given us better performance and more economical prices particularly with the advent of the computer. Software has helped our program decisions and all of our decision making progress by taking away some of the redundancy of the post-production operations. The result has been what some of us call advancing the state of the art, but basically it's a benefit for the end user whether he be a broadcast producer or non-broadcast producer. But how does that affect all of us in the business and as engineers? And what is the role of an engineer who wants to combine technology to technique? I might say again, in answer to Len, that all engineering creativity really rests upon a designer's dream because imagination is the first law of creativity."

TUESDAY AFTERNOON

Laboratory Practices

31. Flashing of Eastman Ektachrome Video News Film for Intercutting with



Joe Roizen, Telegen; Irv Zavada of Dave Bell Assocs.; and Roland Zavada, Kodak.



Ray Piper, Unlimited Productions, Inc.

Eastman Ektachrome Commercial Film 7252 (*William G. Doody, James K. Lawton and Rodney S. Perry, Eastman Kodak Co., Rochester, N.Y.*) The upper scale contrast of Eastman Ektachrome video news film 7240 (tungsten) and Eastman Ektachrome video news film high-speed 7250 (tungsten) can be reduced to approximately the same level as Eastman Ektachrome commercial film 7252 by pre-process flashing of the films. This can be accomplished in a motion-picture printer or other suitable apparatus giving the film a uniform low-level exposure. This technique is useful in situations where the high speeds of 7240 and 7250 are desirable, and the films must be intercut with 7252. Procedures are outlined for obtaining best possible quality with this technique and the results are described.

32. A Bleach System for Color Positive and Negative Films that Reduces Waste Treatment Requirements (*C. Russell Dupree, Color Film Corp., Stamford, Conn.*) Federal, state and municipal regulations on the disposal of industrial waste water have been responsible for much photographic industry activity where chemical and mechanical methods must be devised to comply with the regulations. Several systems are in use for treating the major problems of photographic waste water. The bleach solution is one of the most troublesome materials to treat on account of the



Bernard Pauchon, SFP, France.

heavy metals or cyanides in the solutions. These must be reduced to levels of 0.1 ppm. This paper described work that has been done in development and testing of a bleach formula containing no chromium, iron or cyanides. The materials used are allowed with current regulations to be as much as 15 times greater than the levels permitted for chromium or cyanide, enabling much simpler waste treatment. About 20 years ago it was suggested that a copper halide could be used as a bleaching agent. In a study at Color Film Corp. an investigation was made of copper halide bleach since permissible levels for copper are 15 times greater than for cyanide and hexavalent chromium. Either cupric bromide or cupric chloride could be used, and the latter was selected for testing because it has a cost advantage. A concentration of 21 g/l was found to give bleaching times equivalent to SR27. The replenishing rate is 654 liters per million feet of 35mm color positive film type 5381.

33. New Type Fujicolor Negative Film (*Makoto Hara and Hisao Kishimoto, Fuji Photo Film Co. Ltd., Tokyo, Japan*) Fujicolor Negative Film, 35mm type 8517 and 16mm type 8527, is a fine-grain, high-definition color negative film for use in motion-picture production. It replaces Fujicolor Negative Film type 8516. This paper described the new improved negative film and gave detailed information on its use. The speed is the same as type 8516, with an exposure index of 100 (tungsten) but with a considerable improvement in grain and definition. The new film has better tone reproduction characteristics and wider exposure latitude, as well as more natural color reproduction and improved force-processing capabilities. This film has been designed for high-temperature rapid processing. It can be processed without modification in Eastman Kodak process ECN-2.

34. New Type Fujicolor Positive Film for High-Temperature Rapid Processing (*Makoto Hara and Sadayuki Yamaryo, Fuji Photo Film Co. Ltd., Tokyo, Japan*) This paper described the new Fujicolor Positive Film 35mm type 8813 and 16mm type 8823, that has been developed for high-temperature rapid processing. The film has been designed for the production of release prints from color negatives or color duplicating negatives. The new film incorporates all the features of the current 35mm type 8812 and 16mm type 8822, while at the same time reactions to variations in the color developer and the stop bath are suppressed. The film can be processed without modification in Eastman Kodak process ECP-2.

35. Laboratory Problems in Making High-Quality Soundtracks (*John Mosely, Colortrak Inc, Beverly Hills, Calif.*) In the course of development of the Colortrak Optical Sound System it became evident



Andrew Tenne Sens, Communications Research Center.

at an early stage that there were many problems in making consistently high-quality prints. This paper described the results of extensive investigations into these problems.

36. Photomec High-Speed Processing Machine Using an Angle Drive System (*John J. Galvin, Photomec (London) Ltd., St. Albans, Hertfordshire, England*) This paper described some of the latest developments in the design and construction of film processing machines. Photomec of St. Albans has been making processing machines for over 30 years. The latest machine for color film runs at the rate of 300 ft/min. In the early 1970s when a machine was being built for very thin film for the EVR process it was found that the helix angle used successfully in other machines was not acceptable. In the design of the 300-ft/min processor, it was necessary to eliminate this helix throughout the film transport section. The basic approach, in substituting twists in the film for the conventional helix, required angling the bottom spools and making sure that the transfer of the film in the different sections of the machine takes place in a true straight line with no side movement. The bottom spools are located on a single shaft with a groove location. Angling of the film is obtained by moldings in the groove of this shaft to correctly orient all the components. A special ramp circuit is built into the drive control to give a 20-s delay in build up to maximum speed. Any mechanical problems in the machine are sensed automatically, and a current-limiting device shuts down the motor. Top spools in the wet section are submerged to prevent oxidation of the solutions.

Television Post Production

39. The Hollywood Editors Guild Looks at Tomorrow (*Bernie Laramie, Reeves/*



The Get-Together Luncheon which was sponsored by Agfa-Gevaert.

Milestone Inc., Los Angeles, Calif.) This paper described the training program in videotape editorial techniques for television inaugurated by the Hollywood Editors Guild. The program was intended to provide orientation for film editors in videotape techniques and acquaint them with current state-of-the-art technology. Videotape production and post production in Hollywood has increased dramatically in the last five years. To give adequate training time on proper equipment the Editors Guild purchased a CMX-50 videocassette editing system. The Guild also contracted with Don Stern Productions for a separate training program using the Tem-V editing system. Trainers to conduct the classes were videotape editors who had experience with the CMX equipment and had agreed to be instructors as their schedules permitted. A six-week training program was organized consisting of six sessions of three hours duration each. Course attendance was limited to two students to give each student adequate time to practice. Response has been phenomenal: about 300 editors enrolled in the course up to August 1976. To date over 160 have been trained. A fee of \$200 is charged for the course. Several studios and networks are paying for all or part of the training program fee. Each student is given a certificate on completion.

40. Video Post-Production Systems (*George Gould, Teletronics International, New York, N.Y.*) This paper reviewed the development of television recording and program production systems. In the early 1970s the application of minicomputer

techniques marked the coming of age of video editing. The CMX System 600 stores frame coded video and audio on modified computer disc packs, and editing functions are performed with the aid of a light pen, calling up wanted scenes and accomplishing lap dissolves, fades, re-edits, and inserts in fast, normal, slow, frame-by-frame, forward and reverse modes. A minicomputer stores the editing decisions and produces a punched tape that is used to automatically conform the 2-in recordings. Similar systems are now available from other manufacturers. These are all "on-line" SMPTE time-coded devices, controlling quadruplex recorders, with the editing being completed on 2-in tape. Other systems are available for "off-line" editing — that is, nonbroadcast tape is used in the editing and later on a punched tape is used to conform the 2-in recordings. Recent developments in film-to-tape transfer processes together with the sophistication of video editing raise the question: "Why not complete all television film production in video?" Scene-by-scene video color correction of film, introduced at Teletronics in 1969, is now widely used in the assembly of television commercials and in longer programs with severe picture imbalances. Both primary and secondary color components as well as gamma, luminance, pedestal and gain are brought out to controls at the color mixing console. Adjustments of the controls for each scene are stored in a minicomputer and applied to control the film camera chain in playback. Video post-production technology is beginning to make 16mm an acceptable medium for high-quality television pro-

duction, utilizing both 16mm negative dailies and original reversal films.

41. Future of Audio in Post Production (*Tom Keller, WGBH, Boston, Mass.*) It seems that audio has been almost forgotten in video production, but television is capable of living with a very modest audio system. At WGBH a major problem is program distribution. The station produces many important programs including *The Boston Pops*. Distribution will be by satellite. Three basic modes are used — 5 kHz, low dynamic range; 15 kHz mono, local and microwave; and stereo full bandwidth for simulcast with associated public radio stations. The only practical method is double-system recording. This allows accenting of sound to match the picture. WGBH uses 16-track 2-in tape machines with 70-min reels at 15 in/s. Channel 1 is used for recording the SMPTE time code; channels 2 to 13, for master recording, Dolby A; channels 14, 15 and 16 are used for the audio mix down. The 12-track recording eliminates interlock during post production. Three basic systems are used: (1) SMPTE code is fed to 16-track audio and video recorders, off-line editing, audio mix, then layback to VTR and electronic editing; (2) video editing first, then audio mix, conformed to new VTR, and then final mix, and layback on master tape; and (3) 16-track audio with CMX-300. Audio tracks on videotape recordings have a high-frequency flutter — a form of distortion that is not measurable with conventional test methods. It was discovered that a 960-Hz flutter is being caused by rapid fluctuations in tape speed



The President's Reception held before the Get-Together Luncheon.

over the audio heads. This is caused by the video heads striking the tape. The effect is worst with new heads, but varies greatly from head to head and time to time. All but two of their machines have this problem; in these machines the tape passes over a guide at a high angle, isolating the video and audio heads. A plea was made in this paper for a standard for audio compression in stations.

42. Television Post-Production Demand (Robert B. Pfannkuch, Bell & Howell, Chicago, Ill.) The video division at Bell & Howell is growing rapidly. Studies have been made of trends and markets to try to find out how many minutes of new programming are being produced each year. Industry is a good growth area making increasing demands on post-production facilities and outside services. The education market is weak, and mostly utilizing film, although there are some moves to video distribution in education. Government is the biggest producer with 2500 h of finished video programming. One big item is shipboard entertainment, video-based. Theatrical markets are making use of 35mm transfers from videotape, and many Hollywood studios are moving into video for release instead of release on film. The consumer market is small now but there are many special audience markets demanding specialized programming. Some of these are Pay TV, hotels, aviation, marine, work camps and foreign distribution.

For the markets mentioned, 10,000 h of programs are being produced now each year, but it has been estimated that in 10 years there will be 132,000 h, giving some indication of anticipated growth.

42A. Panel Discussion

Panel Chairman: Joseph Roizen, Telegen

Panel Members: Al Malang, TAV; Arthur Schneider, Consultant; Bernie Laramie, Milestone Productions; K. Blair Benson, Teletronics International; Tom Keller, WGBH; and Robert Pfannkuch, Bell & Howell.

The chairman invited Al Malang to make a short statement as he did not have an opportunity to express an opinion in the previous papers programs on Television Post Production. Mr. Malang remarked that a very great deal of effort has been devoted to videotape technology, but there has been a lack of effort on the non-technical side. If video is to take over from film, surely enough attention has been given to converting film people. Production people need to be brought in to show what can be done with this medium.

Q: How did Mr. Pfannkuch manage to miss medical and law enforcement markets? A: These were included in general education as health education.

Q: Mr. Keller mentioned the need for compression standardization. Surely this could be avoided in another way. A: The producer determines sound levels and dy-

namic range must not be modified till it gets to the station and then this varies from one station to another. Background music sometimes comes out as loud as foreground sound. This sort of thing would be comparable to 20 or 30 degrees phase shift in video.

Q: Mr. Keller, a lot of money has been spent on audio, but it is known that the home receiver is the limiting factor: 15 kHz is a complete waste when 8 kHz is the maximum being reproduced. Please explain. A: Most programs are aimed at stereo simulcast. Once people realize that television programs can have good sound they will demand better receivers. Some receiver manufacturers are interested but the product people are not yet convinced. One problem is that sound in the U.S. has to go through a fairly narrow-band system, so the home receiver is not the only limiting factor.

Al Goldberg (CBS Technology Center, Stamford, Conn.): I was intrigued by George Gould's scenario in which the CMX-600 is said to be the ultimate system. How does the future scenario fit in with all digital television systems?

Benson: At Teletronics an artistic environment is provided for clients and agencies. Their philosophy is that the hardware should be out of sight and hearing of the creative people. The ultimate system will instantly retrieve material for editing. The CMX-600 system is amenable to digital television. Digital signals could be stored on the video discs.

Roizen: Video of the future will have as its counterpart the film negative. Work prints can be handled by anyone. Digital video will be pre-production, in successors to the CMX-600, giving a closed private system. Edited masters will be cross-fed to another medium for general distribution.

Roizen: I always thought creativity took place in an unheated garret rather than luxurious surroundings.

Benson: The point George Gould tried to make was separation of the hardware.

Chris Hill: Mr. Keller, do you find any crosstalk between tracks 1 and 2 when track 1 is used for the time code? Also, do you have problems with the computer to get a whole word or syllable?

Keller: Yes, that has been a problem — the crosstalk between tracks 1 and 2. Regarding problems in slipping, we go to an-



Frank Flemming, NBC; Carlton Winckler, Imero Fiorentino Assocs.; Blair Benson, Teletronics; Frank McGeary, Motion Picture Labs.



Phil Singer, Hollywood Film Co. and Koichi Sadashige, RCA.



Herbert Pilzer, Sections Vice President and Richard O'Brien, SMPTE Secretary.



Mrs. Edna Smith; William Friedkin, Producer/Director (who was the Awards Speaker); Bill Hedden; and Bob Smith.

other tape at these points, using slave machines.

Q: What about Gould's ultimate editing system?

Schneider: There is no such thing. Such a system cannot be developed because each user has different requirements. Systems are being developed that approach the ideal. A modular system may be the best choice.

Laramie: A post-production system has to involve the people as well as the equipment. Simpler equipment is needed, easier to work with technically. What makes great editing is not machinery but personnel.

Schneider: The simplest editing system is one you can talk to.

Roizen: I see a dilemma developing. Everyone seems to agree that off-line editing is economical and efficient. But machines for on-line editing are better. Why bother with off line now?

Flaherty: This comes to the fundamental point — What is off line? This is not a simple matter. Video editing is complicated and difficult, as Sir Charles Curran has mentioned in his paper. Film editing is simpler. With film an edit can be opened to add or take out a frame. On-line sequential edits are like cutting the master negative. At first, post production was mainly assembly, and this has been developed to a high state. Off line means making decisions with materials not used for the final transfer. The CMX-600 is the only device where you could go back and change by trimming in random order. All other systems deal with one edit at a time. Random-access replay will make off-line editing nearer the ideal, but these are still in the future. Until that happens VTR editing is still ponderous as compared with film. Single camera VTR systems require more sophisticated editing equipment.

Malang: In television we live with limiting technology. Once I heard it said that TV is a producer's medium while film is a director's medium. An enormous amount of effort has been put into electronic production. Technology has to cease to be a burden to the creative people.

Laramie: We are committed to off-line



Three Past Presidents of the Society: Loren Ryder, John Frayne and Norwood Simmons.

editing. We have come to the conclusion that we need to develop systems that will make creative work easier. On-line editing is a mechanical process. Off-line editing will survive.

Benson: We believe that off-line systems will give creative people what they want. But quality should be broadcast sound and picture.

James Redmond (BBC Engineering, London) There is another method. A vision switcher is used with a director making decision as the action proceeds. At the end you have a complete tape. What does the panel think of that method?

Malang: This is one of the techniques that some will continue to use. Whoever is in charge must have a clear idea of what is wanted. It is a very powerful and economical method. But the crew and talent must be capable of functioning that way.

Pfannkuch: There is a lack of experienced production people to go back into the studio where they are more comfortable working. But there is a significant trend to studio production.

Laramie: Still some of the best shows are done with the switcher.

Roizen: A recent survey has shown that there will still be a continuing demand for big switchers.

WEDNESDAY MORNING

Ecology for Labs

43. National Effluent Guidelines Development for the Photographic Processing Industry (Robert B. Schaffer, U.S. Environmental Protection Agency, Washington, D.C.) This paper outlined the program of the Environmental Protection Agency for developing technology-based national regulations for the discharge of industrial wastewater to municipal treatment systems or navigable waters. The methodology used in determining the types and quantities of wastewater pollutants generated by the photographic processing industry and the pollutants were discussed. In addition, EPA's expanding effort to identify and control the discharge of toxic pollutants in



Lester Shorr, recipient of an SMPTE Special Commendation Award, with Julian Hopkinson and Herb A. Lightman, Editor of *American Cinematographer*.

industrial wastewater and the preliminary results of this work in the photographic processing industry were presented. At present EPA intends to set standards only for silver, chromium, cadmium and cyanide.

44. Effluent Management in Today's Regulatory Environment (Claudia P. Weber and Raymond H. DeMoulin, Eastman Kodak Co., Rochester, N.Y.) This paper reviewed the work that has been done to characterize the effluent from all industries and set effluent limitations for each industry. The National Association of Photographic Manufacturers representing the photoprocessing laboratories as well as photoprocessing manufacturers have interacted with the Environmental Protection Agency and their contractees to assure the consideration of factual data in these proceedings. Interim final effluent guidelines for point source dischargers in the photoprocessing industry were promulgated last year and went into effect on 1 July 1977. Any effective effluent management program must balance the availability of technology against operating costs and must work within the framework of federal and local effluent regulations. EPA guidelines are given as chemical raw waste load while most local sewer codes specify chemical concentration. The total flow raw waste load of a laboratory is affected by process specifications, equipment design, process waste water sources and any reuse. The costs of resource conservation, processing equipment modifications, pretreatment, solution disposal and surcharge payment within the framework of federal and local environmental regulations are prerequisites for effluent management. Selection of operating conditions within this framework that are most cost-effective and maintain high product quality must be taken into account in efficient effluent management.

45. A Review of Water Conservation Techniques in Motion-Picture Processing



James Redmond and C. B. B. Wood, both of the BBC, and K. Blair Benson.



Mr. and Mrs. Gary Borton, Margaret Beach Goodhue and John Norris, all of Kodak.



Joe Flaherty, CBS; Renville McMann, Thomson-CSF Labs; and E. Carlton Winckler.

(John L. Baptista, Frederick C. Franzwa and Lewis E. Allen, *Photographic Technology Division, Eastman Kodak Co., Rochester, N.Y.*) Water conservation is a subject of increasing importance in the processing of motion-picture films. In this paper techniques for reducing water usage in motion-picture processing were reviewed. The advantages and disadvantages of the more commonly used techniques were described. The applications of these techniques to the ECP-1, ECP-2 and ECN-2 processes were considered. Some ideas on water conservation techniques needed for the future were offered, to stimulate thinking on the subject and help to find new ways to conserve one of our most important resources, water. The thesis was presented that water rates can be reduced considerably, and specific numbers were given indicating what is possible and practical.

46. The Use of Solar Energy as Applied to the Photographic Industry (Kenneth G. Sorenson, *FAFCO Inc., Menlo Park, Calif.*) This paper examined the performance of a low-temperature solar collector for use in the photographic industry in terms of efficiency (payback) and ecological considerations. The total energy concept, that is, the energy required to produce the collector compared to the energy made available by the collector over its lifetime was compared with several economic measures of performance. The main emphasis of the paper was on a combination of energetics, ecology and economic considerations and their relationship to decision making. Different criteria may apply in different situations. A comparison of manufacturing costs for synthetic and

metal collectors, glazed and unglazed, was given. In many low-temperature applications (25–40°C) an unglazed synthetic material or a single-glazed synthetic collector gives the best economic efficiency. Key factors affecting collector thermal efficiency were identified. In determining the economic merit of any system the simplest comparison is between fuel saved per year and the initial cost of a solar system. Despite rather widespread optimism, the payback period seems likely to be ten years or more.

47. A Novel System for Removal of Toxic Heavy Metals From Photographic Effluents (Harry Parsonage, *Photo-Chem Systems and Engineering, Walnut Creek, Calif.*) Experiments employing iron pyrites (fool's gold) and organic acids such as oxalic acid have proved that this approach can be quite effective in reducing concentrations of toxic heavy metals in photographic waste water. An excess of iron is used. This method has application to silver recovery.

48. The Reuse of Film Process Wash Water by Ion Exchange (David J. Degenkolb, Arthur L. Ford and Fred J. Scobey, *DeLuxe General Inc., Hollywood, Calif.*) In 1975 DeLuxe General presented a paper entitled "Silver Recovery from Photographic Wash Waters by Ion Exchange." Since that time research has continued on ion exchange, and it has been determined that the same technology used to remove the silver complexes from wash water is equally effective in removing wash water contaminants such as thiosulfates and sulfites. The removal of these complexes provides a water of sufficient purity for

reuse in the photographic processes. DeLuxe General has installed closed-loop water recycling on all positive machines resulting in an overall water reduction of greater than 60%. An added feature of this system, the use of solar energy for reheating the recycled water, was described in this paper.

49. Removal of Hexacyanoferrate from Selected Photographic Process Effluents (Donald J. Brugger, *Eastman Kodak Co., Rochester, N.Y.*) This paper described the treatment of bleach wash water in Eastman color processes using ferricyanide bleaches. Almost complete removal of hexacyanoferrate anion can be achieved by ion exchange. A weak gel-type resin is used, with a capacity of about 50 g Fe(CN)₆ per liter of wet resin. After treating the resin with sodium hydroxide eluting the hexacyanoferrate, the solution is oxidized and used as a bleach replenisher. The final wash of process K-14 for Kodachrome films can be treated successfully also, but re-use is complicated by the presence of thiosulfate anion removed from the effluent by the resin.

Television Sound

50. Modern Television Stages (John Studwell and Michael Rettinger, *ABC, Los Angeles, Calif.*) The design and construction of several new television stages — the American Broadcasting Company's new Hollywood Stages 57 and 59, and two television stages in the new multimedia complex of the Los Angeles Community College — were described in this paper. The ABC stages are 150 ft long, 100 ft



Charles Hacker, recipient of an SMPTE Special Commendation Award, and Ken Mason.



Irwin Young, Du Art Film Labs and William Smith, Allied Film Labs.



Mr. and Mrs. Harry Teitelbaum.

wide and 55 ft high, separated by a 40-ft space used for video and audio facilities and supporting services. The video rooms are "blind," having no direct view of the stages. The acoustic treatment consists of 2-in-thick fiberglass board fastened to the concrete walls with anchor pins. The air velocity in the air conditioning system is about 500 ft/min, with 12 changes of air per hour in the 825,000-ft³ stages. Lighting facilities include 180 12-kW SCR dimmers and 12 12-kW non-dim units, controlled from a patch panel with 750 cords. A full ribbon gridiron allows space for electric hoisting of scenery and electric pipes. The LACC building is a complex of enclosures including two television stages, a cinema stage, two radio studios and associated support facilities. A noise level survey was conducted preliminary to initiating the design of the television stages. The proximity of a football stadium and a main thoroughfare dictated the amount of sound insulation needed, and in addition internal sound insulation had to be provided to isolate the various studios. The floors of modern television stages are usually concrete. To avoid problems with paint and water, the concrete surface was finished with a layer of epoxy, flowed onto the concrete. To reduce hum in the high-current lighting cables in steel raceways, the ducts were placed in resilient sound-absorbing tunnels. The paper also described a method for calculating air conditioning noise levels in a big studio and establishing minimum noise levels.

51. Audio Recorders in Television Post Production (*Samuel L. Keiser, Ampex Corp., Redwood City, Calif.*) Problems with videotape recorder audio arise because the magnetic particle orientation is transverse. Also the number of tracks available is limited. Signal-to-noise ratio has been typically about 10 dB less than equivalent audio recorders, and there are flutter components added to the audio at high frequencies not normally measured by flutter meters. In terms of creativity in the audio material, however, such machines can be used as complete multichannel mixers to build up a program one part at a time. One new option is to use layback head assemblies that can be put on an audio machine to give the same audio format as on a quadruplex VTR.

52. Applying the SMPTE Time and Control Code to Television Audio Post Production (*George R. Swetland, Electronic Engineering Co. of California, Santa Ana, Calif.*) This paper reviewed the many benefits made possible with the SMPTE time and control code. Today virtually all television programs and commercials are being made with this precise indexing method, in which taped scenes can be located quickly, accurately and automatically. The code serves as "electronic sprockets" enabling several tape transports

to be precisely synchronized. The time code can be recorded in any available audio or cue channel. It uses 80 binary bits to identify frames by hour, minute, second and frame count. The time recorded can be elapsed time from the start of the recording or the time of day. Eight four-bit words are left blank and can be utilized for additional identification or control in editing. A 16-bit sync word indicates end of frame and direction. Editing techniques utilizing the code have now been well established, but the application of these techniques in audio post production calls for special attention.

53. Post-Production Videotape Audio (*Emory M. Cohen, Glen Glenn Sound Co., Hollywood*) This paper gave a profusely illustrated account of what happens in post-production audio. The normal approach is to dub from the master VTR onto a cassette machine and simultaneously onto a multitrack audiotape; then using joystick control for the cassette VTR makes decision making very easy and accurate. Sound effects are added easily and dialogue can be corrected.

53A. Techniques for Maintaining Audio/Visual Synchronism (*Norman Schwartz, Wally Heider Recording, Hollywood, Calif.*) Session chairman Dale Manquen gave an abbreviated presentation of this paper at the end of the session, referring to the author's notes. The paper outlined considerations for providing production through redundancy during live recording and methods for replacing sync in post production.

53B. Scoring and Music Mixing to Video Using Time-Code Synchronization (*Phillip Feretti, Sunwest Recording Studios Inc., Hollywood, Calif.*) The use of time codes and pulse techniques in practical operations was considered in this paper. Described was a music recording studio equipped for pre-recording, post-picture scoring, mixing, and audio sweetening



SMPTE President Bill Hedden congratulates the Conference Program Chairman on the success of the meeting.



On behalf of the SMPTE, Bill Hedden receives a present from Chang-Ling Wei of Central Motion Picture, Taiwan.

using several synchronization methods. In many cases audio material is being recorded but there is no inclination or capability to record time code. In such cases it is recommended that vertical rate pulses at least be recorded to allow accurate timing in playback even without code. If the audio does not match the video and the audio is music, it is possible to "pull a loop" on the audio machine to regain synchronization, a technique that can also be used to compensate for a video edit.

WEDNESDAY AFTERNOON

Motion-Picture Sound

54. A Post-Production Audio-Processing System for Motion-Picture Films (*Joseph D. Kelly and Emory M. Cohen, Glen Glenn*



George Stevens, Jr., Director, American Film Institute, was the principal speaker at the Get-Together Luncheon.



The Fellows Luncheon.

Sound Co., Hollywood, Calif.) A system was described in this paper which applies tape and electronic technology to the tasks of completing the soundtrack for a motion-picture film. After picture editing has been completed, the picture work print and the dialogue track are transferred to a helical-scan videotape and a multitrack audiotape. The SMPTE time code is recorded on both the videotape and the audiotape, and is also superimposed in the picture area on the videotape recording. Spotting of sound effects and music then takes place utilizing low-cost videotape players. With the aid of a computer-controlled electronic sound editing and assembly system the sound effects and music are recorded on the multitrack audiotape in the proper locations as determined in the spotting session. The final dubbing or mixing is then accomplished by interlocking the multitrack tape reproducer with the film-interlock system in the dubbing studio. This was the first of nine papers on photographic sound systems.

55. Two-Language Photographic Soundtracks (*Ronald E. Uhlig, Photographic Technology Division, Eastman Kodak Co., Rochester, N.Y.*) In two previous papers published in the *Journal*, in April 1973 and September 1974, a system for recording and reproducing 16mm

two-channel stereophonic photographic soundtracks was described. Stereo soundtracks were obtained by recording two variable-area tracks side-by-side in the area normally occupied by a conventional monophonic track. This paper described methods for recording and reproducing dual-language soundtracks with a similar system. The dual-language soundtracks do not call for any printing or processing procedures nor any extra production steps. The special negative can be made either on a stereo recorder, as described in an earlier paper, or on a modified monophonic dual-bilateral recorder. With a stereo recorder both tracks can be recorded in one pass. The negative has to be recorded in two passes in a modified monophonic recorder. First, one half of the dual-bilateral track must be masked off, and the remaining track is then reduced slightly in width and modulation level and moved slightly further away from the center of the soundtrack area. The two-language tracks can be reproduced easily in a projector that has been modified for stereo sound playback. The modification consists of installing a dual-channel photocell and a switch for selecting either half of the track. In some projectors a simple mask can be inserted between the exciter lamp and the sound scanning optics so that only one of the tracks is reproduced. In some applications

it may be advantageous to reproduce both tracks at once, feeding one output to a loudspeaker and the other to headphones for persons in an audience with a second language requirement. A substantial amount of application data was also given in this paper.

56. Dolby-Encoded Soundtracks: A Progress Report (*Ioan Allen, Dolby Laboratories, San Francisco, Calif.*) The 20th Century-Fox production *Star Wars* which opened in May 1977 was the twenty-first film to be released with Dolby-encoded soundtrack in 70mm magnetic and 35mm stereo optical versions. Over 100 theaters in the U.S. are now equipped to play back stereo variable area soundtracks, most of these utilizing the Dolby model CP50 optical soundtrack processor, described in this paper. Experience with large-scale release of stereo optical prints has shown that this technique is trouble-free, both in the laboratory and in the theater. A new technique for recording surround effects has been used in the Warner Bros. production *A Star is Born* and on *Star Wars*, giving sound quality comparable with a four-track discrete system. Further development in 35mm SVA optical recorders has reduced distortion and extended release print bandwidth beyond 12 kHz. Costs and maintenance difficulties militate against continued use of 35mm magnetic four-stripe release prints now that 35mm stereo optical has proved to be a viable release format. However, six-track magnetic sound will continue to be used for the time being on 70mm prints. The technical parameters of recent Dolby-encoded prints were described, followed by a demonstration.

57. The Light Valve and Multitrack Photographic Sound Recording — Past, Present and Future (*Frank E. Pontius, Westrex, Beverley Hills, Calif.*) This paper reviewed the various configurations of Western Electric and Westrex light valves used in recording multiple tracks and stereophonic sound on film and described the latest four-channel, variable area configurations. Latest developments were discussed, including the latest four-channel, variable-area configurations.

58. Compatible Four-Channel Optical Sound for Motion Pictures (*Terry Beard, Nuoptics Associates Inc., Westlake Village, Calif.*) The Nuoptix four-channel optical-sound system was described in this paper. The system records four discrete variable area tracks within the standard



Dennis Kimbley, President of the BKSTS, addressed the SMPTE Fellows Luncheon.



Mr. Kimbley presenting a BKSTS Honorary Fellowship Award to Walter Bach.



Blair Benson, Fred Remley and Carleton Hunt.



Jack Hall, Filmline Corp., and Charles Anderson, Ampex Corp.

76-mil optical soundtrack area. Each track gives a frequency response beyond 12 kHz and a signal-to-noise ratio better than 60 dB with channel separation greater than 55 dB can be obtained through the use of a new noise-reduction process. Laboratory processing is the same as for conventional variable-area tracks. The tracks are separated by 8-mil guardbands which allow for weave and misalignment as allowed in conventional 35mm optical-sound standards. The tracks are directly monaural compatible and can be played back on a conventional optical head giving playback comparable with normal optical tracks. In the track there is a control signal for companding. The process was described in detail and demonstrated.

59. The Colortek Optical Stereophonic Sound Film System: General Theory (*John Mosley, Colortrak Inc., Reno, Nevada*) Colortek is a high-quality optical-sound system consisting of four separate and discrete audio tracks and a control track within the area assigned to the present monophonic variable-area and variable-density soundtracks, in accordance with ANSI PH22.40-1967. The film can be reproduced on any standard projector fitted with an optical sound head. But because of the use of electronic companding and the lack of ground-noise reduction the reproducing electronics should be modified to accept this format correctly. The same print can be reproduced either monophonically or stereophonically. Both the frequency and dynamic range have been extended so that anything that can be recorded on a magnetic master can be transferred to and reproduced from the optical print in a faithful manner. The system can be extended to accommodate six separate channels of sound by the addition of matrix encoding, thereby satisfying all the present requirements for 35mm and 70mm theatrical presentation. The addition of a narrow control track enables the stereophonic reproducer to be aligned automatically and permits control of theater and special effects from the film, thereby enhancing the entertainment value. The author noted that the Colortek system offers a novel approach for a completely integrated sound system. He confidently predicted that the increase in the quality of performance and the economies that would be realized by maintaining a single-print-type inventory will justify the



Reid Ray, Steven Knudsen, Harry Teitelbaum and Harold Eady.

expense of modifying the projector sound head. Because a state-of-the-art approach was used, it is claimed that the system should satisfy all theatrical requirements for years to come. The technique can be extended to the smaller 16mm and super-8 formats. For convenience the presentation was divided into four separate papers, of which this was the first.

60. The Colortek Optical Stereophonic Sound Film System: The Recorder Electronics (*David E. Blackmer, Colortrak Inc., Reno, Nevada*) Described in this first part of a two-part paper were the electronic circuits required to achieve full audible frequency-range response from an existing ribbon light valve. Negative resistance is used to achieve critical damping of the ribbons. A soft slipping circuit limits peak modulation of each track and additional equalizers extend frequency response to 20 kHz. Variations in the response of the compensated light valve do not exceed ± 2 dB below 20 kHz.

61. The Colortek Optical Stereophonic

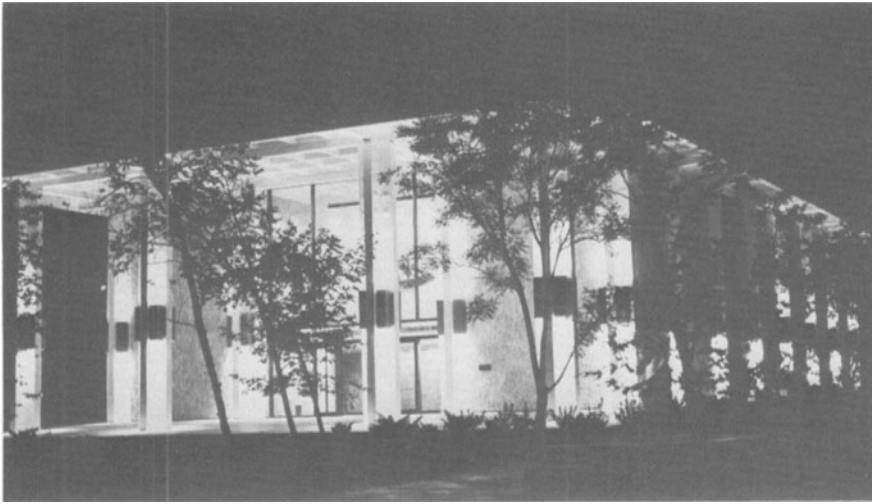


A most interesting display of historical photographs was shown at the Fellows Luncheon.

Sound Film System: The Comander and Control Systems (*D. E. Blackmer, Colortrak Inc.*) In this second part of the paper, a linear decibel compander system with 2.3 : 1 compression ratio was described, by which a 90-dB signal-to-noise ratio was achieved for each of the four signal tracks. High frequency pre-emphasis reduces noise modulation effects. A control track makes possible thousands of commands and control signals to achieve special effects in theaters using telephone Touch Tone® frequencies to code the data. Additional information capacity is provided for picture and print identification. An important consideration for the system is that it be compatible for monophonic playback. The coupling of control signals into the monophonic playback is at 90 dB below peak program level — sufficiently low to be



At the Fellows Luncheon, Bill Hedden commented on the Badge of Office which had been presented to the SMPTE by the BKSTS in January 1976.



USC's new Eileen Norris Theatre was described in a paper on Thursday evening. This was followed by a tour of the facility.

imperceptible under monophonic theater listening conditions.

62. The Colortek Reproducer: Boundary Reproduction of Variable-Area Recordings (*Keith O. Johnson, Colortrak Inc., Reno, Nevada*) This paper described a system using a charge-coupled photosensitive array scanning a narrow focused slit which reads just the moving edge (boundary parts) of variable-area optical recordings. The system is not affected by those parts on either side of this moving boundary and is therefore immune to dirt, scratches and other noise sources. The system converts four recorded tracks within the present standard monaural dimensions to width-modulated pulse trains. Faults such as film weave, dirt, aging of exciter lamp and cross modulation causing image spread or image contraction can be recognized electronically in the scanned pulse trains and compensated for automatically. With this method mechanical servos and other adjustments can be eliminated. When the

system is used with record-compress, reproduce-expand recordings, it gives drift- and alignment-free operation. Full-system dynamic ranges of 80 dB with 40-dB channel separation for 12-kHz reproduction have been attained. The Colortek sound system was demonstrated at the conclusion of this set of papers in a showing of an excerpt from the current motion picture *A Bridge Too Far*.

Television Production

63. Videotape at Studio Center: A Progress Report (*Joseph A. Flaherty, CBS Television Network, New York, N.Y.*) A technical description entitled "New Horizons in Television Program Production, Post Production and Continuity" in the Sept. 1977 issue of the *Journal* outlined work being done on the introduction at CBS Studio Center of a special multi-camera videotape system for the production of two situation comedy series. This system retains the creative flexibility of

film style production techniques, but the recordings are made on 1-in videotape with electronic cameras. No control room, production switcher, television lighting or other facilities of the live television studio are needed. No changes of any kind have been made in the Studio Center film stages for these productions. The creative people can continue in precisely the same way as in film production. Editing is accomplished entirely in the post-production stage, which takes place in two steps. First, the original recordings are played back through a switcher, the output of which is recorded on another machine. In this operation 70 to 80% of all the edits are made. In the second step of post production, music and special effects are added and any additional picture trimming is accomplished. This method is being employed in the *Betty White Show*. Editing takes 3½ to 4 h, and final post production 6 to 8 h. Demonstrations were shown including the separate recordings made with four cameras and the final edited version.

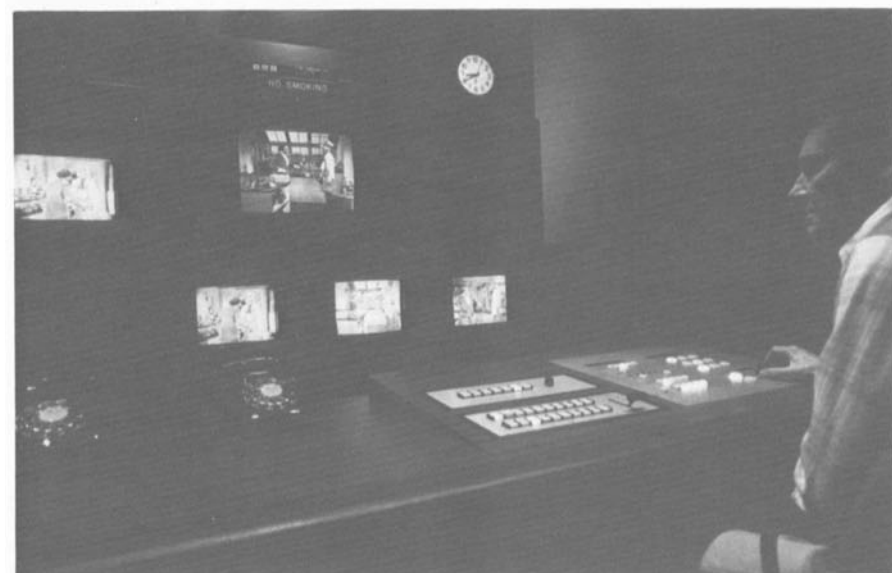
64. New Techniques in Television Drama Production (*James Redmond, BBC, London*) Television production in the U.K. is somewhat different than in the U.S. Here there is a large industry based on film, and this has influenced the choice of methods. In the BBC the output is dominated by electronic production from the studios. For the two networks, electronic production is 67% while film accounts for 31%. Although about 5 million feet of film is used in news, this amounts to only about 5% of total output. The BBC is interested in electronic newsgathering, and they have acquired one experimental ENG unit. Greater progress has been made in electronic program production. In 41 years of television operations conventional methods have been followed, although the equipment has been changed several times. The philosophy in the BBC is to produce the best possible picture quality. There has been heavy reliance on filmed inserts in studio-produced programs, and considerable effort has been directed towards matching color film with electronic camera output, including color correction techniques and the use of color negative. For outdoor program production the big mobile units have been used. These are bigger, heavier and more expensive than needed for this purpose. In 1973 a start was made on planning for modification of large multi-purpose mobile units. The program people wanted a production unit with two cameras, and a unit of this type began to be used for drama production outdoors. Later this unit was replaced with a custom-built unit that has been utilized extensively to make programs in natural settings, giving an output of 10 min or more per day. The BBC may go to two recorders and lighter cameras and small, highly maneuverable vehicles. There are opportunities for producing lightweight cameras for location production, especially drama. Three 2-



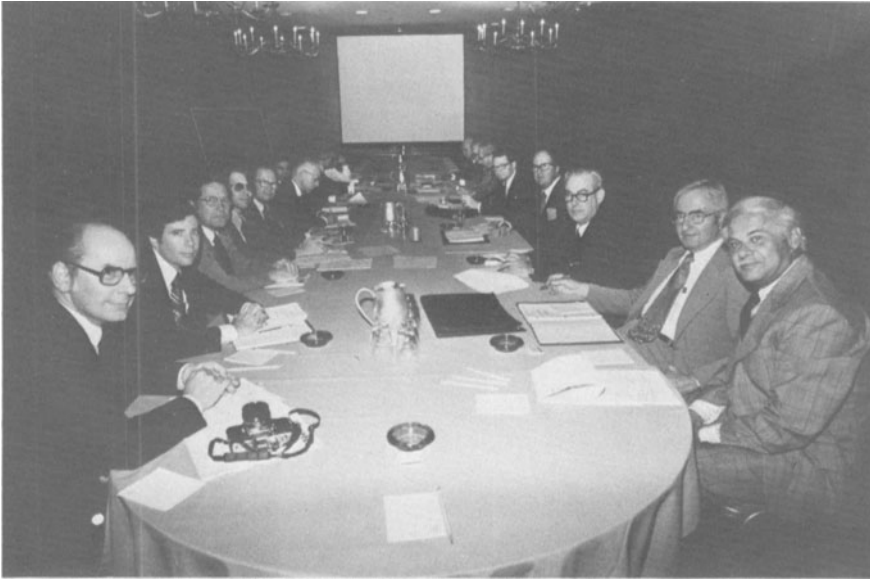
At the Fellows Luncheon, Charles Ginsburg, Neal Keehn, Bengt Orhall, Frank McGeary and Henry Ushijima.

camera units are in use, with four more to come. It is difficult to make cost comparisons, but a reasonable estimate would be that a two-camera unit is about 25% cheaper than single camera 16mm film production and 15% more expensive than working in the studio. Some work is being done with film cameras fitted with electronic viewfinders, with an electronic clapper board, crystal control and four cameras working as a unit. The outputs of the electronic viewfinders appear at a control desk and are recorded on a simple VTR. This tape is used later on in editing. The aim is to expand production outside of the studio. Electronic production will grow but film is by no means obsolete. The differences are becoming blurred.

65. Electronic Program Production in the SFP (*Michel Oudin, Société Française de Production, Paris, France*) Société Française de Production is a state-owned company formed after ORTF (Office de Radiodiffusion Française) was dissolved. Its mission is to produce an international product for television companies and the cinema. With a staff of 3000 people and an annual budget of 600 million francs (\$124 million), SFP specializes in three principal areas — television, with 11 color studios; mobile units with 12 color OB vans; and film, with five stages, 25 film teams and two film laboratories. SFP has produced more than 2000 hours of programs for the three French television channels, and co-produced 25 feature films in France and foreign countries. The programs to be produced and their anticipated evolution determine the policy on equipment, to meet not only creative needs but also to rationalize production methods. Technical progress over the past two years in television cameras, videotape recorders and editing systems has allowed studios to produce dramas in a new way. Drama production has had to yield to film mainly because of film's flexibility. Television production costs are substantially higher because productivity is lower. The television equipment is still heavy and technical crews are larger than film crews. But it is possible to make television production competitive with film by using film methods with electronic cameras and by taking advantage of post-production techniques. Working with a lightweight, portable video camera, adding a zoom lens and finder, and mounting the camera on a tripod, we can obtain both the flexibility of film and the advantages of television without the bulky equipment problems of television. The production of a six-hour series, *The Life of Offenbach*, directed by Michel Boisrond, a cinema director who had never worked with video, was started in March with the new video technique. Experience has shown that directors no longer need to have special training in either film or cinematography nor is it necessary to use a special style in video. Production costs are reduced and less than the costs of film. Possibilities



On Tuesday evening a tour was held at CBS Studio Center during which techniques and equipment discussed in paper 63 were explained and demonstrated. The production equipment center and the post-production switching center (shown in the center and lower photos) are housed in a trailer which is moved from stage to stage, as required.



Committee on Theater Projection Technology.



Committee on New Technology.



Working Group on One-Inch Continuous Field Helical Video Systems.

for artistic expression are no less than film. But in spite of progress in television, 16 and 35mm films still remain the universal base considered most efficient for the broadcast of audiovisual messages.

66. BCN Format Update: New Products, New Applications in Production and Post Production (*Hans Groll and Henry Zahn, Robert Bosch GmbH, Fernseh Group, Darmstadt, West Germany*) BCN is a 1-in tape, segmented helical high-band video recording format with three wide-band longitudinal tracks for audio and automation control data, such as the SMPTE time code. The segmented helical video recording format was carefully and purposefully selected as the only arrangement which could eventually provide all of the VTR capabilities broadcasters will demand as the 2-in quadruplex format begins to be replaced. This paper described the design approach which permits the use of a small diameter head drum. Gyroscopic problems created in large drum nonsegmented helical VTRs are eliminated; sticking effects between tape and drum are reduced; and transport operating-power requirements are minimized. Only a 190° tape wrap is needed, thus simplifying the design of compact cassette transports for ENG and in automated system applications. Bosch-Fernseh is rapidly expanding the BCN line to take advantage of these design features. The BCN-20 battery-operated portable VTR is now in use around the world in EFP and ENG applications. The first 1-in helical cassette VTR weighs 20 lb and has 20 min of playing time. A low-cost multiple-application digital store with several interfaces has been developed also as an accessory for the BCN line. The digital store used with BCN open reel or cassette VTRs can give forward or reverse slow motion/stop motion display. This facility also enables precise edit point selection in post production. Possibilities for digital recording with two-head machines were outlined. This technique completely eliminates the banding problem.

67. Cost-Effective Planning, Operation and Evaluation in Electronic Outdoor-Program-Production Facilities (*Junnosuke Wakabayashi, Naokata Madarame and Shuichi Morikawa, NHK, Tokyo, Japan*) Television viewers are demanding more programs on topics close to them, directly useful in their daily lives. This paper outlined the work that has been done by NHK (Japan Broadcasting Corp.) during the past five years in developing and deploying outside broadcast units for its local stations so as to meet this growing demand. By the end of March 1977, 51 outside broadcast units were in operation at 47 local stations throughout Japan. To provide this kind of service, NHK, like most of the world's major broadcasters, must invest huge amounts of money. Maximum utilization and economy in the operation of the equipment are primary considerations.

NHK has devised special methods for directing and reporting on the operation of the vehicles. After making surveys of regional variables, central broadcasting headquarters in Tokyo selects the most suitable equipment to meet local needs and production requirements. Reports from these locations on a monthly basis are analyzed and reviewed. During the past four years the number of outside broadcasts has increased 2½ times, and in 1976 some 3400 programs were produced. This was accomplished with no increase in personnel. This paper was presented as a videotape recording, introduced by Naokata Madarame.

68. Program and Commercial Production Using ENG Equipment (*Scott Gibbs and Steven Smith, KPIX-TV, San Francisco, Calif.*) This paper was presented by filmmakers working with electronic equipment. They have been producing public affairs and magazine type programs at KFIX-TV in San Francisco for the past six months, in cooperation with four other Westinghouse stations similarly equipped, and trading items. They are using ¾-in U-Matic cassette recorders with Ikegami HL35 cameras. A van is used to carry equipment and personnel, and the camera and recorder can be taken out of the van for portable operation. In producing the shows, there is no mixing of video, only cuts between scenes. Some color correction between scenes is done. Time code is put on the tapes when they come back from the field. A Datatron editing unit is used. A crew of two or three people go out on location. To be able to go back to the van and look at the recordings is invaluable. But the equipment is very heavy — the camera weighs 20 lb and the recorder 30 lb. It is very frustrating to do all this work to make up a 7-min show and then see it played only once. To put together a show takes 9 to 16 h. The edited cassette tape is transferred to 2-in quadruplex tape for broadcast. All of the work is done by production people. One problem with the camera is that the lens can't be changed — interchangeable lenses are needed as with film cameras. But the electronic cameras should not be made too light because that would make it more difficult to hold them steady. The recording material should be in the camera. In August, a one-hour show was produced on tape to show television viewers how the programs are produced, the second half being the program itself. Part of this recording was shown on monitors in the auditorium to demonstrate the results that can be achieved with this kind of operation.

69. Latest Portable EFP Equipment Makes Possible Television Series (*Ray Piper, Unlimited Productions Inc., Hollywood, Calif.*) At the opening of this papers session a videotape was shown with the title *California*. The production of this



Panel Discussions were held at the end of both sessions on TV Post Production. Tom Keller, WGBH; Arthur Schneider, Consultant; Bernie Laramée, Milestone Productions; Blair Benson, Teletronics International; Robert Pfannkuch, Bell & Howell; and Al Malang, TAV.

show was described in this paper. Shooting for the half-hour program took up nine days with a five-man crew: cameraman, director, assistant director, grip and video operator. Transportation was by plane and rented cars. The camera was an RCA TK76, and the recorder a BCN-20 — portable, battery-operated and weighing 40 lb. No lighting was employed. Some night scenes in San Francisco were shot with 15 fc. This is a tourist style program, which will become a 50-part PBS series in the same format. The equipment was loaded and unloaded from the plane four times a day and in and out of rental cars. Working days averaged 11½ h. The camera was down only 2½ h during the entire production, and the BCN recorder gave stable pictures and no problems at all, despite rough handling and bouncing around in cars while shooting. A Steadicam unit was used with the camera. Electronic field production calls for a new type of field engineer who can handle camera and recorder. The 1-in recordings were transferred to 2-in quad tape for editing off-line with CMX-40 unit, giving a third generation master. Post production amounted to 4 days off-line and 12 h on-line, for a total of 470 edits. Producers are changing their attitudes to single-camera film style. A 35mm test of the worst part of the program, an overcast day, was made by Image Transform and shown on the big screen in the auditorium.

THURSDAY MORNING

Unconventional Imaging Systems

70. A Proposed Economical System for Archival Preservation of the Color Motion-Picture Film Image (*Linwood G.*

Dunn, Film Effects of Hollywood, Hollywood, Calif.) The proposed system applies to the preservation of 35mm color negatives, but other types of color films and formats can be treated in basically the same way with appropriate modification of equipment and procedures. The 35mm negatives would be transferred as 16mm successive-frame red, green and blue images on 35/32mm black-and-white film, printed side-by-side and running in opposite directions. The soundtracks would be transferred to the standard center-track area at the increased speed of 108 ft/min. Retrieval would be accomplished by combining the separation master prints to an internegative. With this method the bulk of the stored film information would be greatly reduced. Normal film stocks, processing and printing procedures would be followed. The soundtrack at 108 ft/min would retain practically all of the original 35mm quality. Costs, compared with the conventional three-strip preservation method, would be greatly reduced. The material could be examined easily by screening a contact print by additive pro-



Topic Chairman for the Television Post Production session was Bill Orr of CMX.



Scott Gibbs, KPIX-TV.



Milton Shefter, CFI.

jection. Demonstration materials were shown including an original color 35mm print, three separation black-and-white masters and reconstructed color prints in 35mm and 16mm.

71. Holographic Images (*Strawberry Gatts, Holographic Image Systems, Los Angeles, Calif.*) During this paper a demonstration was given of holographic images recorded on videotape. The originals were 4 × 5-in glass plates. The most important consideration is that a point source of light has to be used and the viewing angle is quite narrow. Most interesting are the differences in picture appearance between actual videotape pickups of live subjects and the holograms. A significant improvement in shadow detail was claimed, and it was predicted that all photography would be holographic in the future. Color intensity is said to be stronger in holograms. To make the masters dichromatic emulsions were used. The purpose of the demonstrations was to show the difference in three-dimensional effects as compared with normal videotape pickups.

72. Three-Dimensional Holographic Microscopy (*R. A. Briones, L. O. Heflinger and R. F. Wuerker, TRW Defense and Space Systems Group, Redondo Beach, Calif., and G. L. Stewart and C. R. Booth, Institute of Marine Resources, La Jolla, Calif.*) Described in this paper was a two-beam holographic scheme consisting of a 1:1 relay lens and a rigidly attached hologram used to record microscopic phenomena three-dimensionally. When the new scheme was tested it was found to form diffraction-limited images good to less than 2- μ m resolution at working distances of less than 10 cm. For higher resolutions the hologram had to be reconstructed at the

same wavelength, especially in the case of diffusely illuminated holograms. Collimated illumination is less sensitive to wavelength changes; for example a 10% change in wavelength could be tolerated without degrading resolution providing the reference-beam angle was changed proportionally. This technique is being applied to behavioral studies of microscopic marine zooplankton. It has also been applied to the combustion of small solid rocket fuel samples in a high-pressure chamber. For the plankton studies the rapidly moving organisms are recorded with pulsed xenon-ion laser illumination in a 35mm motion-picture camera transport mechanism at frame rates up to 150 frames/s. The structures of small single celled plants that are potential food for the zooplankters can be adequately resolved. A far more violent phenomena is found in solid rocket propellants. Particles near the burning surface were found to move at velocities of 20 m/s. Pulsed argon lasers were inadequate; instead a ruby laser was employed, modified to generate 10-ns emissions. The holograms were reconstructed with a continuous-wave helium-neon laser. A method for making double-exposure recordings was also developed enabling measurements to be made of particle displacements. With this method frame rates as high as 200 million frames/s could be achieved, it was claimed.

73. Binocular Symmetries and Asymmetries in Stereoscopic Motion-Picture Systems (*Lenny Lipton, Consultant, Point Richmond, Calif.*) This paper described efforts that have been made to perfect the existing system of stereoscopic motion pictures using sheet polarizers for image selection. This would eliminate eye strain and discomfort for the audience and would give images free from annoying distortions. In this investigation a new class of symmetrical properties related to the taking and displaying of stereoscopic motion pictures has been uncovered. Many papers have been published on photographic stereoscopy, including a number in the Society's *Journal* in the early 1950s. In the experimental work described in this paper it was noticed that the apparatus needed to conduct a study existed already in easily adaptable equipment designed for synchronization of super-8 double-system sound. Super-8 cameras because of their small size can be placed close together to obtain low values of interaxial separation without mirror optics. Sixty subjects, many in several sessions, were shown hundreds of scenes photographed and projected with this system using sheet polarizers. It was found that there are many possible sources of eye strain or discomfort, and to a large extent strain is related to binocular symmetries. For example, the upper right portion of the screen for the left field must have the same intensity of illumination, within narrow limits, as the upper right

portion of the right field. Additional controllable binocular symmetrical properties are color, linearity, steadiness, aberrations, focus and sharpness. Tables and graphs have been developed as guidelines for the filmmaker for producing strain-free, stereoscopic motion pictures.

74. Embossed Relief Images for Color Motion-Picture Applications (*Michael T. Gale and Karl Knop, Laboratories RCA Ltd., Zurich, Switzerland*) Information recording and replication using surface-relief structures is an old art. Recently this concept has been successfully applied to the reproduction of color images by surface-relief phase-diffraction gratings. These images, designated by the term ZOD (a trademark of RCA Corp.), can be reconstructed in conventional projectors using the zero diffraction order of light, that is, the undeviated component of the light transmitted through the gratings, and they can be displayed interchangeably with normal color film in the form of slides, motion pictures and microfilm. The images can be replicated rapidly and inexpensively by hot embossing a metal master onto clear thermoplastic film. Since the ZOD images have no dyes they do not change with time or prolonged projection, and as no light is absorbed during projection, temperature rise is minimal, allowing much higher projection light intensities to be employed. In this paper the principles of operation of ZOD images were reviewed, and the application to motion pictures was described. Picture information is contained in ZOD images in a relief pattern, consisting of gratings. With white light illumination the colors observed with three different grating depths are yellow, magenta and cyan. By superimposing these three gratings a subtractive color reproduction is obtained similar to color film or color printing. A continuous tone picture is converted into a half-tone pattern composed of small dots with sizes varying according to the local color saturation desired, in a manner similar to screening techniques in the printing industry. Three screened color separations, one for each of the three superimposed gratings, are needed to form a full color picture. In areas where all three gratings overlap, black is obtained. The main cost in making pictures with this method is the production of the metal master tape needed for hot-embossing the reliefs. The paper described a technique for making the masters utilizing master blanks consisting of uniform relief gratings coated with photoresist. The master blanks are exposed with the picture information, and after resist development the grating is destroyed in revealed areas by electroplating. With the remaining resist removed the mask is ready for embossing. The grating constants are $d = 1.4 \mu\text{m}$ and the grating depths are of the order of $2 \mu\text{m}$. Over 1000 copies have been made from a single metal master without any significant change.

75. Recent Experiences with Tape-to-Film Transfer by the Laserscan Method (*F. P. Gloyns, A. D. L. Jackson and F. J. Nunney, Rank Film Laboratories, Denham, England*) This paper was a progress report on the use of the LaserScan process (for videotape to film transfer). This is the CBS system, consisting of three mechanically modulated laser beams combined into a single composite beam, deflected by a multi-faceted spinner and recorded with a rapid-pulldown 16mm camera. Two argon lasers and one helium-neon laser produce red, green and blue beams exposing one layer only of the color negative with each beam. The camera pulls down the film during the television blanking period (in the 25-frames/s television system). The spinner rotates at 39,000 rpm and has been most reliable, except that the reflectivity of the mirror surfaces is not uniform and this causes what is called a "waterfall" effect. Compensating electronic circuits are employed to correct this condition. The mechanical galvanometer which has to move quickly during the television blanking period develops a mechanical resonance causing uneven bunching of lines. The galvanometer suspension has been redesigned to overcome this problem. The multiple optical surfaces in the system cause flare, and frequent cleaning is essential. Test patterns have been developed to assess flare. The recordings are made on Eastman 7247 film, exposed and processed to give results similar to a normal cinema negative. Prints are made on Eastman 7381 film or on low contrast 7638 film for telecine. The process depends heavily on the personal skills of operating personnel. Demonstration films were shown to illustrate the quality of the transfers that has been achieved.

76. Laserium Imagery in Entertainment and Advertising (*Ivan Dryer, Laser Images Inc., Van Nuys, Calif.*) Laserium is an entirely new entertainment medium that makes use of a single krypton gas laser as a light source. The abstract images of laser light created by the Laserium projector consist of interference patterns produced by diffraction through optical elements, and Lissajous figures, obtained by rapidly scanning individual colored beams. The colored beams are broken down by a prism from the single beam of white light from the laser. This paper described the effects that can be produced and the uses to which the technique can be put. Many of the effects have the appearance of being live forms. Others resemble oscilloscope traces. When the pure colors of laser light are projected in Laserium's domed environment, a strong illusion of three-dimensional forms suspended in the air is formed. These effects are not only unusual; it would be almost impossible to duplicate them by animation.

77. Methods of Color Conversion of Monochrome Films (*DeLoy D. White,*



Ladies Program Luncheon on Tuesday was held at the Palm Springs Tennis Club Hotel. In the foreground are Mrs. Shirley Kreiman (left), Mrs. Shirley Myler (center), and Mrs. Doreen Pointer (right). Photo courtesy of Mrs. Diane Young.



Mrs. Charlotte Winckler; Mrs. Barbara James, Hostess; Mrs. M. Williams, Hostess; Mrs. Shirley Kreiman, Chairperson, Ladies Committee; Mrs. Jeannie Degenkolb, Asst. Chairperson, Ladies Committee.

Telechrome International, S.A. de C.V., Mexico) Many motion pictures made with black-and-white film before the introduction of color would still have wide box-office appeal if they could be re-released in color. The Telechrome process was developed to add color artificially to these films. Methods were devised to add a color dimension according to the requirements of each scene. This is done manually, frame by frame and scene by scene in a production line manner, utilizing what are known as Overall, Lift-out, Animat feedback and Multicolor insertion. The client has to provide two fine grain prints and a dupe negative. A color director selects scene colors and a control card is prepared. In the assembly line operation there are six conversion stations, and about 2.4 min are required to deal with each film frame. Four feature films are being handled per year at the present time, and the plant is now being enlarged. Demonstration slides were shown.

Corporate Uses of Motion-Picture and TV Production

78. Corporate Communications Utilizing ENG/EFP Technology (*Kenneth A. Herr, Air Products and Chemicals Inc., Allentown, Pa.*) Until recently there has been very little use of television at the corporate level because of the lack of high-quality, moderately priced, portable equipment. Now that ENG/EFP type equipment is available, industrial users involved in television communications can make considerable advances in quality and versatility. This paper described how one company, Air Products and Chemicals, has broadened the scope of corporate communications. A communications consultant engaged by the company recommended that emerging technology would make available greatly improved facilities in the future. The decision was made to build a television communications system based on



In addition to the music of Manny Harmon and his Orchestra, entertainment was provided by the University of Southern California's Glee Club and part of the UCLA Marching Band.

ENG/EFP quality equipment utilizing $\frac{3}{4}$ -in recorders to be replaced with better quality equipment as it becomes available. The paper then went on to itemize the facilities that have been acquired by the company. These facilities are used for two main purposes — communications programming and analytical needs. The greatest amount of utilization has been in training, sales, product orientation and management communications. Programs are produced by film-style field production; television-style field production; and studio production. The simplest production technique is film-style, with one camera/tape system being used to record every shot in a scene, repeated until the director has covered all applicable angles and cut-aways. Field production, television-style, calls for two or more camera/tape combinations to record several angles at the same time. This technique reduces the time needed to shoot a scene, but color matching between shots is very difficult to achieve. For ease of transport to shooting locations, a complete camera/tape system is shipped in six carrying cases weighing about 70 lb each. The field production crew consists usually of a director, an engineer and a production assistant.

79. Corporate Visual Communication — From a Whisper to a Roar (*E. Carlton Winckler, Imero Fiorentino Associates, New York, N.Y.*) This paper described the development of corporate visual communication. At first corporate video was introduced to progressive executives as a kind of visual memo. The tapes produced at that time had gray backgrounds behind monotonous speakers, illuminated by flat light. These presentations had little visual attraction and there was a good deal of frustration with the medium. But proponents realized that they needed practical instructors and talented production people from the broadcasting industry. As more professionals moved into the field, corporate visual communication made more progress and still continues to expand. Talent now has a fertile field with technical facilities keeping pace and sometimes leading the way. Many nonbroadcast production centers are turning out visual material comparable with the best products of commercial television using tape or film. But there is still a need for more creativity and imagination, especially in staging, lighting, and in post production.

80. Production Techniques for Under-



John D. Fackler, RF Technology; Michel Favereau, Thomson-CSF, France; and Bob Estony, Thomson-CSF.



Mr. and Mrs. John Lakotas and Mr. and Mrs. Gary Borton, all of Kodak.



Charles Ginsburg, Ampex Corp.; Benson Ackerman, CBS Technology Center with Mrs. Sirinsky and Dick Sirinsky, Ampex Corp.

ground Mining Films (Karl D. Wright and Samuel R. Sappo, U.S. Dept. of Interior, Pittsburgh, Pa.) Underground cinematography in a coal mine involves many problems not usually encountered in ordinary motion-picture assignments, a challenge to the imagination as well as the physical endurance of those who are involved. This paper described the work of the film production unit of the Mining Enforcement and Safety Administration in various types of coal mines. Often the film equipment had to be set up in low coal mines 500 ft below the surface, in tunnels where the coal seam is no more than 36 in thick. One of the first problems was getting the equipment into the mine. In mines with track haulage the equipment could be transported underground in coal cars to a transfer point as close as possible to the filming site. From there it had to be carried or dragged by hand sometimes as far as 300 ft. Lack of space, cramped quarters, dusty atmosphere, low temperature and high humidity hampered the work, and often huge mining machines took up most of the passageways. The thunderous noise of mechanical mining monsters made verbal communication impossible, and hand signals between film technicians and the miners had to be used. Underground, lighting was a serious problem. Light re-



From the right, Lev Artyushin, Lab Director, NIKFI; Harry Teitelbaum, Hollywood Film Co.; and Boris Popov, Chief Engineer, Byelorussian Studios.



Mr. and Mrs. Walter Eggers.

flected from the coal surfaces is almost nil making it very difficult to balance flesh tones with the dark surroundings. At some locations where mining operations were draining the power supply, filming had to be done late at night or over weekends. Personnel safety was another major consideration, even though the possibility of explosion or fire was remote.

81. The Corporate Television System and Its Hardware (Paul William Lowry, *American Telephone and Telegraph Co., New York, N.Y.*) The use of television in business and industry has progressed far beyond the CCTV or closed-circuit television designation of a decade ago, this paper pointed out. CCTV might better be termed corporate communications television today, as it is being used in so many different ways of business. Within a corporation there are many different communication patterns. One department usually becomes the custodian of the television medium, and this organization introduces the medium throughout the corporation. The corporate television system designer has to keep in mind the value of the medium within the corporation to bring an adequate return on the investment. Planning, designing, building and programming a corporate television system calls for many levels of knowledge not needed in the design of commercial installations. The first and most complex problem is an understanding of the flows and sources of information that make up communications in a business which the video medium might supplement or even replace. Corporate television in American Telephone and Telegraph Co. has as its common denominator the television signal. The system includes three production studios, two-way video conference facilities,



Mr. and Mrs. Robert Kreiman.



Ed Warnecke, Eastman Kodak, with Mr. and Mrs. Herbert Farmer, USC.

tape duplicating, RF and line building distribution center, and RSVP (regularly scheduled video programming). The demands on the corporate television designer requires a futuristic approach to systems design taking into account the practicality of corporate purpose.

82. An Interactive Audiovisual System to Display Clinical Simulations (W. L. Millard, B. J. Andrew, C. Pooley, K. O. Pritzlaff and I. A. Sofin, *University of Southern California School of Medicine, Los Angeles, Calif.*) The National Board of Medical Examiners launched a project in 1973 to develop interactive audiovisual simulations for the teaching and testing of communications skills of health professionals. This research project was designed to explore the dynamic and highly interactive process involved in patient interviewing and counseling sessions. The project was programmed to look at both verbal and nonverbal cues occurring in representative clinical situations where the health professional is required to demonstrate communications skills. The paper identified the operational requirements for the simulations, described the design of the audiovisual display system and the development and programming of the simulations, and summarized user experience. The system was required to store at least 60 min of clinical simulation program material and on demand retrieve at random about 300 individual response segments. The system consists of a display console with a color television receiver, audio speaker/headphone unit, a central processing unit with sequence recorder and random access slide projector with a television camera, and two specially modified 1-in videotape reel-to-reel playback units. The videotape simulations employ profes-



Conference Chairman Warren Strang, Hollywood Film Co., and Mrs. Strang.



Mr. and Mrs. James Redmond, BBC, England.

sional actors as patients, each program response segment being recorded from a programmed script, with coded identification. Data-track information is transferred to the control track of the videotape. The system has been tested in the field with 58 physician assistants at three national testing sites and has proven to be acceptable to users.

THURSDAY AFTERNOON

Motion-Picture Production Techniques

83. A Survey of Current Film Production Techniques, 1977 (D. W. Samuelson, *Samuelson Film Service Ltd., London, England*) This paper was a review of the tools available and currently used for making motion pictures to be used in cinemas, on television or for private showing, to entertain, inform or enquire. The single most significant factor governing the choice of motion-picture equipment is the size of the screen on which it will be shown. An anamorphosed image 21.29 mm in width is likely to be blown up to fill screens 15 m (47 ft) wide, a linear enlargement of over 700 times, and some in the audience will be sitting within one screen width from the projected picture. During the past few years, we have heard a great deal about the metal halide lighting revolution. There are just one or two little snags such as flicker. We have been promised ballasts to elimi-



The tour of the Eileen Norris Theatre held on Thursday evening was described in paper.

nate flicker, but if they are bulky and costly, they will not be acceptable. The definition and contrast of lenses, especially zoom lenses, has been greatly improved, but we now have cameramen using more and more diffusion and fog filters and other devices that give soft images. Much has been said about quiet, handheld cameras. We need a camera with a noise level of 25 or 26 dB or better with film in the camera and any lens on. Some new cameras have built-in television viewfinders — after almost 17 years of hesitant acceptance they are at last coming into their own. The EBU time-code system of picture and sound sync identification is an important development, if the economics of its use can make sense. Of all the recent developments, the so-called floating camera mounts have attracted the most attention. In 1911, E. F. Moy Ltd. manufactured the first handheld camera for aerial filming using a gyroscope as the stabilizing device. Floating helicopter mounts have been around for a long time. In France they have a camera mounting called a Louma in which a remotely controlled camera is mounted on the end of what can only be termed a long pole. The shots they make with it are truly remarkable. There are those who claim that ENG will replace film. For two or three competing networks it may be necessary, but for the viewer it is less important. The unreliability of ENG compared with film, especially when a microwave link is involved, has to be seen to be believed.

84. What is a Normal Exposure for Color Film? (*Daan Zwick, Eastman Kodak Co., Rochester, N.Y.*) Film speed indices and exposure meter standards were developed to aid photographers in correctly exposing pictures. But in these times recommended film speeds are out of fashion: magazines are full of articles about cinematographers who are exposing films at full stops above or below recommended values, and film manufacturers are putting out films that can be used at different index values selected by the photographer. Film laboratories offer options of push 1, push 2 and so on. Presumably these variations are related to some condition that might be

called normal. In this paper the concept of a normal exposure for color films was examined, particularly for color negative. The paper was partly tutorial, presented as a contribution in the proposed efforts within the Society to develop a recommendation for a national standard for film speed of color motion-picture negative films. The steps in determining the relationship between negative exposure and print quality were outlined. The translation of this relationship into a practical sensitometric method of speed determination was examined, and the particular effects of color and image structure were discussed. Some recent experiments were used to illustrate these points.

85. Strobing and Hum Bars Tackled at the Power-Supply Generator (*Keith W. Hammond, Lee Electric (Lighting) Ltd., London, England*) Hum bars in television, strobing in film, and television glitches were dealt with in this paper, and a method was suggested for overcoming these problems, particularly with mobile generator sets. Most companies have approached these problems at the light source, but Lee Electric goes a stage further back to the problem at the power source. Hum bars appear in television as dark and light shading rolling up or down in the picture. This is caused by power supply voltages getting into the video circuits. The rolling is caused by a difference between the power supply frequency and the television frame repetition rate. Strobing shows up as a pulsation in brightness or color and occurs in film or television with any form of lighting that has a cyclic variation. Strobing is most annoying when the resulting flicker is in the frequency range between one cycle in $2\frac{1}{2}$ s and 12 cycles/s. About ten years ago the British Broadcasting Corp. had a silent generator set built, with an electric governor to maintain frequency constant regardless of load changes. It was realized that an improvement could be made on simple frequency control by locking the generator output in phase with the television pictures and, in this way, eliminating strobing and rolling. This proved so successful that the unit known as

Synclock is now a standard fitting on all mobile television generators in the U.K. Another television horror is known as the glitch. It is usually caused by a sharp spike on the power supply waveform often due to a defect in the automatic voltage regulator. Because the Synclock takes as its reference a frame sync pulse from the television equipment, it is only necessary to delay the timing of the pulse to wind the glitch down to the bottom of the picture.

86. Color Rendering and its Evaluation (*Karel Staes, Agfa-Gevaert N.V., Mortsel, Belgium*) It has been proposed recently that the color rendering properties of color photographic systems could be evaluated with a test method based on the CIE color rendering index for light sources. Any consideration of the color rendering properties of a color photographic system requires agreement by all participants on the desired color reproduction. Color perception and color appreciation can be affected also by many psychophysical phenomena that still cannot be formulated. These cannot be incorporated in the CIE test color methods since it is based on perception of small differences in color as seen in specified conditions, not relevant to the normal viewing of color images. In this paper it was suggested that the color rendering index could give misleading results since this method does not take into consideration the specific characteristics of color photographic systems. It would be premature to adopt the CIE test color method and the CIR color rendering index for evaluation of these systems.

87. Post Flashing, A Simple Method of Contrast Control (*Howard Schwartz, ASC, Hollywood, Calif.*) Post flashing is accomplished by running the exposed negative film through a printer prior to development. The film can be flashed in varying degrees, from 5 to 50%. Some laboratories do not go beyond 20%, and recommend 15%, while others will go to 50%. Flashing is not done in exactly the same manner by all labs; the results can vary tremendously. It is imperative for the cinematographer to make flashing tests before giving the film



Roland Zavada, SMPTE Engineering Vice-President consulting with Michel Oudin.



Joseph A. Flaherty, CBS Television Network.

to a lab. Another type of post-flashing is done chemically in development, which eliminates extra handling of the film in the printer. Another technique is pre-flashing where the unexposed negative film is run through the printer prior to exposure in the camera. One cinematographer reports that pre-flashing assures him of constancy. He obtains gamma strips from the lab on each pre-flashed roll. A disadvantage of pre-flashing is that there is no flexibility for changing light conditions. With post-flashing, the amount can be adjusted when the film goes to the laboratory. This can be indicated in large numbers on the magazine. The decision about whether to flash or not is entirely up to the cameraman's judgment and the effect wanted. Flashing has a tendency to hold back contrasty highlights and build up shadows. It can be helpful in night exteriors when working with fast lenses, holding down large light areas on streets. Flashing can save a great deal of work for the cinematographer when trying to get an acceptable range of skin tones. This paper gave examples of successful use of flashing.

88. Front- and Rear-Projection Advances and Evaluations As Of Today (*William Hansard, Consultant, Hollywood, Calif.*) Seven to ten years ago the majority of motion pictures being made for theatrical release were either on domestic or foreign locations, and this brought empty stages to many studios. Various studio departments were considered to be obsolete and closed. One of these was the Process Dept. The remaining 48 Hollywood process projectors were pushed back into storage. However there was still a small trickle of process photography and some important advances were being made. New high-speed camera lenses, prime and zoom, were being used both on and off stage. New front projection material was developed. 3M came out with



Al Conte, Fred Remley, and Roland Zavada at the meeting of the Committee on New Technology.

retro-reflective screen material rated at a thousand; later on a new material was developed rated at two thousand. Their latest screen material, still in the development stage, will allow more spill light onto the surface without desaturating colors. Probably the most important advance is Eastman Kodak's virtually grainless new film which makes second-generation duping almost undetectable. Front-projection technique allows working in larger screen dimensions, and wide-angle camera and projector lenses can be used without hot spots. This paper described the planning and organizing of composite photography operations and noted that it is likely that front-projection, rear-projection and matte systems will continue to be used successfully for some time.

89. Cinema Products' New GSMO Camera (*Edmund M. DiGiulio, Cinema Products Corp., Los Angeles, Calif.*) A new 16mm mini-camera, the GSMO, described in this paper, was designed as a replacement for the Bell & Howell Filmo camera. The GSMO is compact and lightweight, and accommodates 100-, 200-, and 400-ft coaxial quick-change cassette-type magazines. The optical system has been patterned after the CP-16R reflex camera, except that the rotating mirror shutter is the single-blade type giving 180° shutter opening, and the mirror clearance is sufficient for the camera to accept any reflex-type lens fitting Arri or Eclair cameras. The standard CP lens amount is used on the camera, patterned after the BNC mount with its positive locking ring. The removable eyepiece is common with



Arthur Schneider, Consultant.



Charles Ginsburg, Ampex Corp.

the CP-16R camera, so that the GSMO will also accept the CP or Angenieux orientable viewfinders. The electronics are located on a compact circuit board, making liberal use of hybrid integrated circuits. The GSMO features crystal-controlled speeds of 24/25 frames/s as well as step-variable speeds from 12 to 64 frames/s. Slating and pilotone outputs are provided, and a semiautomatic exposure control system is available as an option. A major design goal was a sound level of 30 dB maximum (measured 1 m from the film plane), which makes this one of the quietest 16mm professional cameras available. The GSMO represents a formidable challenge to the designers of electronic cameras in terms of cost-effective quality performance, portability and reliability.

Corporate Uses of Motion-Picture and TV Production

90. The Patricia Hearst Bank Robbery Films: An Account of the Technical and Legal Problems Involved (*Vernon L. Kipping, Consultant, San Francisco, Calif.*) Over 800 still photographs were made by two cameras of the bank robbery in April 1975 in which kidnap victim Patricia Hearst had appeared as an active participant. Careful study of these photographs failed to show if she had willingly joined her captors in the bank robbery. A motion picture was needed to study the movements of the participants, but rapid sequence still



Sterling Davis, Metrotape West.

photographs from bank cameras had never been converted into motion pictures. This paper described the methods used to convert the still photographs at the rate of 4 frames/s into a 24-frames/s motion picture. The bank cameras used 150-ft loads of 35mm Kodak Surveillance film recorded as 24 × 36mm images in the horizontal direction. Film indexing was accomplished by a cam-actuated single claw with an 8-perforation advance, but the cameras failed to produce uniformly positioned film frames, and this precluded the use of optical printers to make the conversion. At some points the film had jumped out of its channel, recording parts of the images over the perforation area and giving images that were out of focus, with an angular displacement. A modified optical printer was utilized to produce a slow-motion film printing each frame twice. Additional films were made with experimental handmade equipment producing enlarged slow-motion pictures, some with split frames, for studying the actions of the participants. These films established legal precedents as they were the first such films to be produced from bank still pictures and admitted as evidence in a court of law. The films played a major role in the trial, from indictment to passing of sentence by the judge.

91. Film's Role in Corporate Video Applications (Roger R. Robinson, *Commonwealth Films Inc., Richmond, Va.*) Corporate applications include institutions, associations, companies and government agencies that produce materials for in-house purposes. Many of these organizations have invested heavily in video equipment for the purpose of communication, mostly 3/4-in videotape systems. The basic concept is right. Videotape can be used by the chairman of the board, and for sales and training, as the ultimate in communication tools, even in small organizations. With the popularity of videotape, film was considered to be old-fashioned. But many assignments should be on film. Videotape in comparison is a limited communications medium. Some say time can be saved with videotape. Properly used, film can actually save time. Such a film example was shown that had been produced in one day, and distributed to 130 outlets. To do this proper planning is essential. Many times the small video image is good enough, but should not be used for audiences larger than a dozen people. Television pictures give an impression of immediacy, while film is more dramatic in a darkened theater. An example was shown in both mediums, on the big screen and on the small television monitors, with same subject repeated. Every audiovisual specialist should be able to make a choice.

92. Panel Discussion: "Is Technology Killing You?"

Chairman: Frank Flemming, NBC

Members: Mark Sanders, Ampex; R. V.

Pointer, ABC; Anthony Lind, RCA; Marcel Auclair, CBC; Frank Davidoff, CBS; Joseph Polonsky, Thomson-CSF, Paris; Renville McMann, Thomson-CSF, USA; Henry Zahn, Bosch-Fernseh, Darmstadt.

The chairman asked each member of the panel to make a short statement.

Sanders: Superficially, advancing technology is a boon to manufacturers; they don't have to worry about saturation of the market, but this is not true. The day of the one-man inventor is over. Big development projects take six years or more and may result in products that are viable for only two or three years. Previously this period was seven to ten years. The solution for manufacturers is to have three or four teams at work concurrently. Shorter runs increase development costs. This year Ampex is spending \$20 million on development, making for higher costs for the customer. How can we or the customer afford this? But we can't stop technology. The solution is to direct advances to lower cost, greater versatility and simplicity in the equipment.

Pointer: Recently there was an article in *The Wall Street Journal* saying that the "R" is slipping out of R&D, because not only are the costs of research going up, but on account of inflation, less money is going into R&D. Expenditures are going into improvements on existing products rather than into new products. Three tests can be applied to a new product. Can we expect a new and different look on air? Is it cost effective — will the product reduce maintenance or overall cost? And, considering that most equipment is written off in seven years, can we get a return on the investment? If the answer is yes to this question, this raises another question: Can you afford not to go ahead?

Lind: The answer to the question "Is Technology Killing You?" is "No," but all this is making life more difficult. Can we recover the cost of the investment? The equipment must have a reasonable life span. Product life is going down, and success is more precarious when big capital investments are involved. In the past engineers were rushed in; now more careful study is needed by maker and user on new developments. More care is needed now with digital developments. There is a mushrooming demand for software, large-scale-integrated packages, with simple appearance, and a new look compared with the past. There needs to be more interaction between makers and users. The Society should be utilized more effectively to unsnarl problems at the interface. Helical-scan and digital-video technologies are examples.

Auclair: We should not be afraid of new developments but learn to cope with them. Technology is going too fast: that is the biggest problem. Costs must be related to results. Video switchers are so much bigger. Are they necessary? Are the programs better? Why is equipment so ex-

pensive? Often it is obsolete before it is installed.

Davidoff: The answer to the question before the panel is "No." New techniques may be misdirected. New technology is effecting changes that are greater in magnitude and faster. Neither manufacturers nor users can keep up. Yesterday we saw the remarkable videotape by Ray Piper (Opening tape, *California*, at session on Television Production Tuesday afternoon). He hoped manufacturers would not forget that human beings do not want the smallest cameras. New technology is eliminating all controls except those used by the creative people. Human engineering design is the aim.

Polonsky: When we put this question we are concerned that new technology is being introduced too fast. Without new technology there is no progress, but the developments should be slower.

McMann: As an engineer in an R&D lab we hope broadcasters can afford new technology. According to financial statements published, the money is there. Digital technology will sweep over the industry, but eventually semi-analog will come back.

Zahn: Who is the "You" in the question? Is it the manufacturer. Is it the user, the viewer or the banker? In Europe R&D is supported by the state and by private investors. The problem is how to get a return on R&D investments. Any success in a large company will affect all other parts. Competition dictates what happens.

Flemming: I say "no" to the question posed to the panel. New technology is expensive and must be applied carefully, but it cannot be stopped. It is useful to separate inflation from actual costs. I suggest we should be careful about depreciation. Seven years is a normal period.

Q: I have a question on videotape. Can we afford a Type A and a Type B in 1-in recorders? I had hoped to take home an answer from this Conference, but now I find there are two standards.

Pointer: Yes, there are A, B and C formats. The 1-in nonsegmented format has one head and one pass avoids carrying over quad problems and allows slow motion. The B format is segmented. Each purchaser must decide which format is best for the customer. You have to meet their needs. You can evaluate what is on the market. There is pressure for the C format. The 1-in tape will be very significant. In our organization, one operator was employed for each quadruplex machine. With the new contract three machines, in either record or playback, will be handled by one operator.

Flemming: The Type A format is industrial. Types B and C are professional formats.

Q: The new technology is killing maintenance people. Some equipment lasts a long time and then breaks down suddenly. What is the answer?

Sanders: Manufacturers are waking up

to diagnostics. Some equipment has hundreds of ICs. In the development of satellite equipment there were only three possible failure modes. Nowadays equipment is becoming self-diagnosing, even self-healing. We look forward to that. Maintenance is a high priority item with manufacturers.

Auclair: One problem is causing a lot of suffering — no manuals. Schematics are lacking. Every large manufacturer has this handicap. Before delivery of equipment, a manual should be available with the alignment procedure so that the operators know how to handle the equipment.

Lind: A good point. Every new product has new problems. Manufacturers are trying to do something about this. We try to have instructions ready ahead of delivery of equipment. It has been the practice when large equipment is involved to have technical assistance available for installation and training. But with ENG equipment for example, the volume of delivery is so large it would be impractical to send a field engineer to every customer. Field engineers are being brought into the factory to operate the equipment.

Davidoff: We share this concern over digital equipment. There are three tendencies in regard to maintenance. There is the time-honored method of having a large supply of spare boards. Then, with some equipment, only the designer understands how it works and diagnostic testing can be done at a central point by telephone. Finally, incorporation of diagnostic circuits, with self correction, will be part of the design in the future.

Q: What about quality control? Almost every piece of equipment has arrived inoperative at Anchorage and has to be sent back. A time-base corrector is one example; it was incorrectly wired. In a transmitter, there were wrong components and wrong wiring.

Sanders: Manufacturers are learning that the costs of correcting errors in the field go up ten times. When equipment doesn't work in the field an engineer must be sent. Everything is shipped in operating condition.

Davidoff: Equipment is checked after passing out of the factory by field engineers.

Lind: All manufacturers have a problem — people. Every piece of equipment should be right, but this is difficult to guarantee. In one instance, prototype equipment was put out in the field for product testing: no problems; then we went into production and problems began to develop. When we went back to the station, yes, they said, they had some problems but didn't bother to tell us because they were simple and were fixed. Often people are the problem.

Zahn: Customers are invited to the factory to check the equipment. Reliability calculations are made on mean time between failures. But so far we no have formula for human error.

Pointer: This is not all the manufacturers' fault. Many times parts are replaced but problems are not reported. Often maintenance is not concerned with costs to the company of thousands of dollars. Manufacturers are very responsive as a rule.

Q: This question is about the manuals. One piece of equipment has four cards but these are not shown in the manual. Competition is complicating the problems. Equipment is being put out too fast. Folks who used to tweak knobs are no longer able to do so. What are we going to tell these people?

Davidoff: With much of the digital equipment coming out, the manufacturer is trying to get back the cost of development. Competitors can undersell by copying the schematics. The user cannot know what goes on inside the equipment (calculators, for example); manufacturers guard carefully what goes on inside.

Q: On maintenance, it is not new technology that is causing the problem. The mechanical aspects are the most difficult. Sockets break, and so on. There is a big difference between manufacturers.

Lind: Mechanical aspects are difficult. Components must be small, and availability is limited. Military components are preferred, but parts such as connectors are not available.

Flemming: When all that brand new equipment arrives, take care of it because insurance is out of sight. Buy with caution and use with care.

THURSDAY EVENING

95. The Eileen Norris Cinema Theatre (Daniel H. Wiegand and Herbert E. Farmer, University of Southern California, Los Angeles) On Thursday evening a program and tour was arranged at the Eileen Norris Cinema Theatre, University of Southern California. This new auditorium-classroom for the Division of Cinema was opened in the spring of 1977. The intent of the donor was to provide as nearly as possible ideal conditions where films in all sizes and formats could be viewed and heard without the shortcomings so often associated with classroom and local theater conditions. The basic design provides for seating for 341 people comfortably and with good sight lines. The projection facilities provide now for 35-70mm and 16mm and will provide for slides, multi-images and television in the future. The acoustics were designed to be ideal for motion pictures, with provision for six-track reproduction and surround speakers. Color, lighting and viewer comfort assure that the audience is not distracted from the film presentations. Included in the basic structural budget is a full basement under the auditorium devoted almost entirely to the archival storage of a rather extensive



Harry Teitelbaum, Masaru Jibiki, Fuji Photo Film, Hollywood; and Elias Drexler, Fuji Photo Film, New York, at the International Delegates Reception which Fuji sponsored.



Paul Yang; SMPTE President Bill Hedden; Chang Ling Wei, Central Motion Picture, Taiwan; and Frank McGeary, Motion Picture Labs.



Yozo Yasuda, Executive Vice-President of SMPTE of Japan, and Roland Zavada.

collection of scripts, production records, equipment and film. There is already enough material there to keep scholars busy for years. Recognizing that equipment would be changing over the years the available funding was put into the building and the basic installations of seating, the 46-ft flat screen, curtains and lighting. The specific design consideration of the facility was discussed and demonstrated. Three films were shown to illustrate the presentation capabilities of the theater: a 16mm student film, *Eldorado*; a 35mm blowup from 16mm, entitled *A Child's Introduction to the Cosmos*; and a reel in 70mm from *Logan's Run*. This presentation was followed by a tour of the building.



Karel Staes, Roland Verbrugge, Mrs. Julian Hopkinson, Walter Seys and Julian Hopkinson, all of Agfa-Gevaert.



K. H. Liu, Director, Universal Film Lab Ltd., Hong Kong with Harry Teitelbaum and Paul Yang.



Harold Eady, Bonded Services, Toronto, receiving an award for his contribution to the success of the Toronto-Rochester-Montreal Conference.

FRIDAY MORNING

New Television Technology

96. Optical-Fiber Video Transmission Using Analog Baseband Modulation (*Andrew U. Tenne-Sens and Derwyn C. Johnson, Communications Research Center, Ottawa, Canada*) Optical fibers are being actively considered as a new transmission medium for video signals in CATV networks, surveillance systems, and various television distribution applications. This paper dealt with the design of an optical-fiber video link and the factors that must be controlled to obtain satisfactory video transmission. The paper included measurements of video transmission quality using analog baseband modulation. An optical fiber link consists of a transmitter using a light emitting diode and a receiver using a PIN photodiode. Measurements indicated that the most important factors are the signal-to-noise ratio, frequency response, chrominance/luminance gain ratio, differential gain and differential phase. To obtain a studio-quality SNR of 56 dB, an average optical power of -28 dBm was required at the receiver. Since -10 dBm of optical power can be coupled into the fiber, links as long as 2 km are possible with a fiber having a loss of 9 dB/km. The video bandwidth of 30 Hz to 4.2 MHz can be accommodated easily within the bandwidth of the optical-fiber link, but measurements of chrominance/luminance gain ratio showed that there is insufficient gain at the color subcarrier frequency. This work has shown, the authors claim, that excellent television transmission can be obtained with proper control of relevant parameters. Optical-fiber links have the added advantage that they are immune to electrical interference.

97. The Current State of International Teletext Technology (*Joseph Roizen, Telegen, Palo Alto, Calif.*) This paper reviewed teletext developments in the United Kingdom, Germany, Sweden, France and Japan. The Ceefax system of the British Broadcasting Corp. was first announced in 1972. Subsequently the Independent Broadcasting Authority (IBA) developed a system known as Oracle. A unified sys-

tem by BBC and IBA was put into operation in 1974, supplying English viewers with information digitally coded in the television vertical blanking interval assigned to lines 17, 18, 330 and 331. The British government has authorized regular service, and manufacturers of receivers are investigating economical decoder designs. Germany and Sweden have followed suit, and in France CCETT (the French television research center) has developed a system called Antiope, that is currently being used experimentally by one of the networks there. Antiope is not intended for insertion in the vertical interval only but in any part of the picture. The 4-Mbit/s channel can be divided among a variety of users for special audiences. The research division of NHK in Japan has developed a teletext system adapted to the Japanese cipher and character of their writing form. More than 2000 characters are needed for text transmission in Japan as compared with 26 alphabetical characters. The NHK system sends character patterns rather than a code, in an overlay at the bottom of the TV display, or as a full screen display. In the U.S. there has been wide use of teletext transmissions in closed-circuit and cable television such as for stock-market results and hotel/motel room tourist information. The use of line 21 in the vertical interval has been approved by FCC for deaf viewers, to provide for the transmission of captions. This was mainly an extensive color-slide presentation.

98. Hilbert Transform Chroma Processing in the Electronic Still Store (*Robert MacKenzie, Ampex Corp., Redwood City, Calif.*) The spectral structure of a frame of NTSC television is sketched. Certain properties of comb filters are outlined, and the impossibility of complete chrominance and luminance separation within a single frame is concluded. The generation of the second frame of the NTSC sequence from a single frame as required by the Electronic Still Store requires phase modulation of the chrominance portion of the NTSC waveform. Hence, some form of luminance and chrominance separation is required. A new method of phase modulation involving a filtering operation related to the Hilbert

Transform is described. The performance of this phase modulation method in the light of the incomplete chrominance filtering is discussed and the results are compared with the chrominance inversion method.

99. Adaptive Digital Filters for Separating NTSC Signals into Components (*N. F. Maxemchuk and D. K. Sharma, Bell Laboratories, Holmdel, N.J.*) In processing and coding an NTSC signal digitally, the need frequently arises to separate the signal into its three components, namely, one luminance and two chrominance signals. This paper presented comb and bandpass filters designed by minimizing the mean square error between the original values of the three components and those obtained after separation. It was shown that the three components thus obtained can be recombined to yield the original NTSC signal without any errors. Typically these filters require many multipliers and distort the picture if the characteristics of the local areas of the pictures differ from the norm. To alleviate these problems a class of adaptive filters was presented. The performances of all the presented filters were compared on a number of color still pictures by using the subjective evaluation of the resulting pictures and a number of objective criteria.

100. Considerations Regarding the Use of Digital Data to Generate Video Backgrounds (*E. Leonard, DaVinci Systems Group, Port Washington, N.Y.*) This paper reviewed recent advances in character generators, time-base correctors, VTR editing and noise reduction. Individual picture elements can be manipulated with frame synchronizers, thanks to high-speed microprocessors and arithmetic circuitry. An entire frame can be captured, allowing the location and value of picture elements to be computed selectively. This enables trimming of the picture in either the horizontal or vertical direction (or shifting in either direction); picture size can be expanded or reduced and the image can be zoomed from a minute size to three or four times normal. Portions of the stored in-

formation can be relocated automatically to "track" with a camera picture. The ability to create, store and retrieve digital information to replace real scenery opens up interesting possibilities. An example is a picture with no real background: the background video can be produced with a character generator, the camera video being keyed over it. This relatively simple technique may be expanded into plane backgrounds behind live action that can be zoomed, panned or shown from different angles, and three-dimensional views of "props" which may appear in front of live actors. Holograms may be used to produce these images, and individual "props" could be selected from a holographic "library" by the scenic designer.

101. Digitalized Process Amplifier and Color Encoder (*Yoshizumi Eto, Kazuyuki Matsui, Shizuka Ishibashi and Hiroyuki Terui, Central Research Laboratory, Hitachi Ltd., Tokyo, Japan*) Digitalization of television equipment is proceeding rapidly. Practical time-base correctors, frame synchronizers and standards converters have been successfully realized. Color fidelity depends on process amplifiers and color encoders. These have been constructed with analog circuits, but better accuracy, stability and freedom from adjustment are desirable. Improvements can be gained by digitizing these amplifiers and encoders; however, this requires highly complicated circuits and it has been difficult to realize more practical components than those in analog circuits. This paper described a method by which only the low frequency components of the analog television signals are digitally processed, a method which satisfies the objectives of digitization without an increase in circuit complexity. Stability and accuracy are needed mainly in the low-frequency components of the television signal. With this new method only low-frequency components of the preamplifier output signals are digitized, processed, encoded and D/A converted to an NTSC signal. This signal contains the low-frequency components of the luminance signal and the encoded chrominance signal. High-frequency components of the preamplifier output signals are mixed by an analog method with the high-frequency components of the luminance signal, and this signal is added to the digitally encoded signal to give a full NTSC signal. A higher clock rate is not necessary with this method because only the low-frequency components of the television signal are treated, a factor that is very useful in reducing size and cost of digital equipment. It was found experimentally that if a cutoff frequency of 1 MHz was chosen, picture quality was not degraded. All necessary circuits including A/D and D/A converters were achieved experimentally with six boards 14 × 17 cm in size, and almost the same picture quality was obtained as with a PCM-coded NTSC signal of 7 bits.

The American Film Institute

The AFI Program showed three films made by Fellows of the American Film Institute Center for Advanced Film Studies. As an appropriate introduction to these films, Robert F. Blumofe, Director of American Film Institute-West, noted that the future of the American film industry can be bleak or bright according to whether young people are encouraged to commit themselves to the art/science of filmmaking.

The Lost Phoebe: Directed and scripted by Mel Damski, and adapted from the short story by Theodore Dreiser, *The Lost Phoebe* is the story of an old man in search of his dead wife. Unable to accept Phoebe's death, Henry Reifsnider seeks her out in the dim light of his illusions. With his concerned friends and neighbors on his trail, Henry relentlessly pursues the elusive Phoebe, and finally manages an unexpected reunion.

Wednesday: Directed by Marv Kupfer, written by Marv Kupfer and Barbara Witus. Jerry Murphy (Jack Lemmon) is a hotshot Los Angeles disc jockey whose specialty is coaxing intimate secrets out of his female listeners. On *Wednesday*, as Jerry listens to Peggy from Pasadena explain that she is having an affair with her husband's business partner (who is also his best friend), her husband is among the thousands of anonymous listeners tuned in to the show. The conversation sets off a catastrophic chain of events.

In the Region of Ice: Directed and scripted by Peter Werner, produced by Andre Gutfreund. Based on a short story by Joyce Carol Oates, *In The Region of Ice*, explores the relationship between a teaching nun and a brilliant, eccentric graduate student. This film was awarded this year's Academy Award for Best Dramatic Short Subject.

FRIDAY AFTERNOON

Television Technology

102. Microprocessor Stabilization of Picture Monitors (*Benson Ackerman, Corporate Technology Center, CBS Inc., Stamford, Conn.*) Television picture monitors are often used for judging color pictures. When used for this purpose the picture monitors must operate within narrow tolerances. A significant amount of effort is needed to maintain the appropriate adjustments in spite of improved stability of currently available monitors. The low cost, small size and computational power of microprocessors enables these devices to be used for controlling individual picture monitors. This paper described a microcomputer system that can be used to stabilize many of a typical monitor's operating parameters. Since accurate adjustments

can be made automatically with this system, it may be possible to reduce the costs for monitors since there would be less need for components with tight tolerances. Analog signals at several points in the monitor are sampled, converted to digital form, and stored in a random access memory (RAM). This unit also contains the corresponding values of the initial calibration. A read-only memory (ROM) compares the current and reference values, and any difference represents a drift to be corrected. Over the available correction range for each parameter to be controlled, the absolute error can be reduced to the error inherent in any digital system. This error can be reduced to any desired value by quantizing more finely. With a digital interface in the monitor many additional functions become possible. The entire initial alignment can be semi-automated, and the alignment status can be continually displayed, eliminating arbitrary decisions by operating personnel. A Conrac Model CYF color picture monitor has been converted to microcomputer control at CBS Technology Center. Chroma gain and phase errors are detected and automatically corrected whenever color bars are available. Power supply voltages can be stabilized also by the microcomputer.

103. A New Digital Video Special-Effects Equipment (*Reginald F. H. McCoy, Vital Industries Inc., Gainesville, Fla.*) Recent developments in digital video make possible many new special effects in television production. The size or aspect ratio of a picture can be modified, and the modified pictures can be combined in different positions, effects that until now have been possible only with film. The first digital frame stores, intended for synchronizing remotely originated signals, maintained a fixed relation between picture elements and corresponding memory addresses. By changing the addressing of the memory, the picture can be compressed or enlarged. This paper reviewed digital special-effects developments and described a new frame store known as the Squeezoom. When addressing is made variable the condition can arise where simultaneous read and write operations are called for. This problem is compounded when several inputs are being written into the memory. There is also the problem that digitized video picture information is spatially quantized into lines as well as elements and, when addressing is continuously variable, data values are needed corresponding to points between lines and elements. In the Squeezoom design the memory ICs are organized in groups, each group being provided with buffer registers for input data and address for each of four inputs. The inputs can be nonsynchronous with each other and the output. This arrangement allows for four write operation and one read operation to be performed simultaneously. To provide data values corresponding to points between lines and

elements, interpolation between known element values is employed. The luminance and chrominance signal components are separated with digital comb filters, and separate memories are then provided for the *Y*, *I* and *Q* data. The four inputs can overlap and boundaries are computed for each input. This enables "cover" effects to be produced where one picture appears to slide in front of another. Position numbers (controlling the starting addresses) and compression numbers (controlling the rate at which the addresses are incremented) are generated by a microprocessor. A single handlebar lever can simultaneously control these numbers in a variety of different combinations.

104. WBBM-TV, A New-Technology Station (*David Horowitz, CBS Television Network, New York, N.Y.*) In the rebuilding of the CBS station in Chicago, WBBM-TV, new technologies and modern systems techniques were utilized, including a complete conversion to ENG, installation of a media room, an automated program continuity system, and a remotely controlled transmitter system. This paper described the work beginning in 1973 when a study was initiated to take advantage of new technology, improve the quality and flexibility of station operation, and at the same time reduce costs. WBBM-TV is the second CBS station that has been changed over entirely to ENG. Four microwave vans and two tape-only cars are now used to cover the Chicago area instead of the previous nine film crews. The signals are sent back to the station via two microwave relays on Chicago's highest buildings. It was decided that the new installation should include a media room. Here most of the station's playback and record equipment is located — film, videotape, core memory for graphics generators and disc packs for electronic still store. On-air program continuity is programmed from a floppy disc generated daily by the CBS broadcast management information system. Two-inch cassette machines are computer interfaced allowing random bin loading and automatic control. The station has a unique three-transmitter system installed in 1969 and now remotely controlled and continually monitored. In the news control room the producer can monitor incoming program material and communicate with ENG crews and program participants. All new audio, video, communications, pulse and clock systems have been installed in the station along with a comprehensive synchronizer assignment facility. Film is being gradually phased out at this station, leaving only feature films and some syndicated programs to be played back in telecine chains.

105. Operational Experience with an Electronic Still Store (*Raymond D. Schneider, CBS Television Network, New York, N.Y.*) Until recently methods used by broadcasters for presenting still pictures

were little changed since the inception of television. Stills in the form of 35mm slides or 3 X 4-in transparencies were projected in a telecine chain or mounted on a card and reproduced with a studio camera. In mid-1974 CBS Engineering and Development began a study in which operations were surveyed, to determine the number and types of slides and graphics used during a broadcast day, and also ways in which on-air presentation was limited by existing methods, especially in news programming. As a result of these studies the Electronic Still Store (ESS) was developed, a joint effort by CBS and the Ampex Corp. The ESS system utilizes digital recording, computer disc storage and computer-assisted operation. This paper described operational experience with the ESS at CBS and the techniques that have been developed for on-air use of the system in news production. Since early 1977 the first ESS unit has been used daily at the CBS Broadcast Center in New York, supplementing usual sources of graphics. Samples were shown of special techniques that have been devised in the on-going use of the ESS. These include what are known as frame-grabbing, split action, zoom and follow, reality graphics, and cumulative build-on graphics. It has been shown that the ESS enhances speed, flexibility and variety in graphics presentation.

106. UltiMatte: A Video Blue-Screen Matting Device (*Petro Vlahos, Vlahos-Gottschalk Research Corp., Reseda, Calif.*) The UltiMatte is a video blue-screen matting device used to combine a foreground scene with a background. Previous systems such as ChromaKey are based on a switching principle, from the blue backing to the foreground scene. UltiMatte functions on the principle that everything in the foreground except the blue screen belongs in the foreground, and the foreground red, blue and green video is routed through the UltiMatte without alteration. The background video is proportional to a control signal which varies with the visibility of the blue backing. If a foreground subject is partially transparent, the intensity of the background scene is reduced to a level one would expect to see. For the matting system to be successful it must accept a wide range of blue backings. An anti-veiling circuit is employed to remove the effect of contamination as a function of backing intensity. One of the most difficult problems with blue-screen systems is the influence of blue light cast on foreground objects by the blue scene. This problem is solved by using color-recognition circuits that eliminate the effects of blue light on flesh tones and most wardrobe and hair colors. It is also possible to use either green or red as the backing color — this method can be used when a blue foreground object is included. UltiMatte has shadow control circuits that permit selective retention or rejection of shadows on the background. This matting

system was developed for video applications but it will be available also for motion-picture production in the future. (A videotape illustrating the use of the UltiMatte system was not available at the time the paper was being presented.)

Equipment Exhibit

Without a doubt, this was the SMPTE's largest and most comprehensive exhibition of motion-picture and television equipment. There were 135 companies exhibiting, taking a total of 220 booths and showing many new developments. The exhibit area was crowded throughout the week as over 6000 people poured in to see the great range of new equipment and techniques and gain the latest information from the experts and specialists on hand.

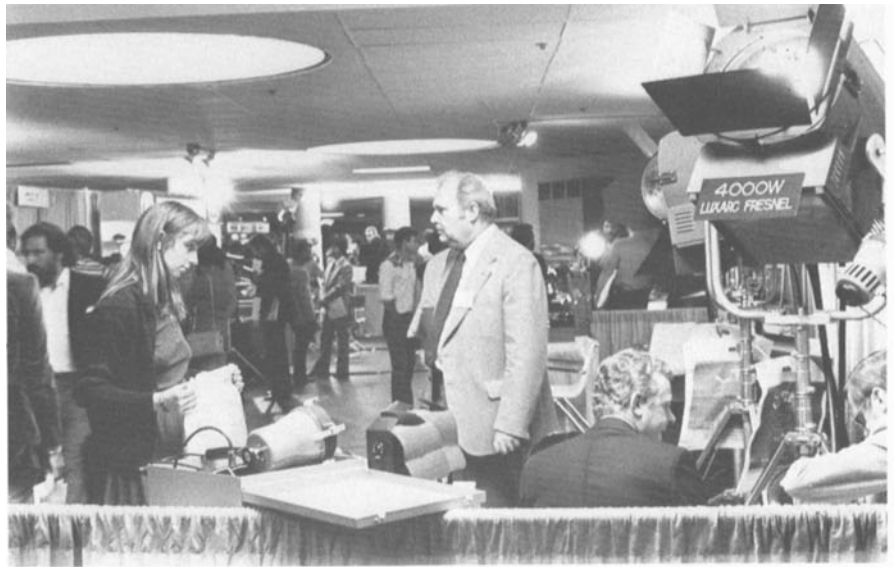
The very fine mix of motion-picture and television equipment (more television equipment than ever before) gave visitors a unique opportunity to look at both sides of these rapidly changing technologies and to acquire a new perspective on the advances and innovations that are being made in motion-picture and television fields.

Companies who exhibited are given below. The Exhibit Directory published in the September *Journal* lists most of what they showed. There were so many fascinating things to see in the Equipment Exhibit that it would be literally impossible to mention all of them. There was something for everyone — an outstanding show by all accounts for visitors as well as exhibitors.

List of Exhibiting Companies

Adda Corp.
 The Allen Products Co.
 Ampex Corp., Audio-Video Systems Div.
 Amtron
 Arriflex Co. of America
 Arvin/Echo Science Corp.
 Audio Services Co.
 Bardwell & McAlister, Inc.
 Belden Communications, Inc.
 Bell & Howell Co., Professional Equipment Div.
 Berkey Colortran Inc.
 Birns & Sawyer, Inc.
 Bosch-Fernseh
 Brumac Industries
 Canon U.S.A., Inc.
 Carter Equipment Co., Inc.
 Century Precision Cine/Optics
 Christy's Editorial Film Supply, Inc.
 Cinema Products Corp.
 Cinematics, Inc.
 Cine/Precision Engr. Co.
 Cine Production Equipment, Inc.
 Cine 60, Inc.
 CMX Systems, Orrox Corp.
 Coherent Communications Co.
 Cohu, Inc., Electronics Division
 Commercial Electronics, Inc.
 Comprehensive Service Audio Visual, Inc.
 Consolidated Video Systems, Inc.
 Continental Camera Systems
 Convergence Corp.
 Datatron
 Andre Debric

Digital Video Systems
 Dolby Laboratories
 The Durafilm Co.
 Dynair Electronics, Inc.
 Eastman Kodak Co.
 Ehrenreich Photo-Optical Industries Inc.
 Eigen Video
 Eiki International, Inc.
 Electro-Voice, Inc.
 Elmo Mfg. Corp.
 Farinon Electric Co.
 F & B/Ceco of California
 Film Equipment Rental Co.
 Frezzolini Electronics, Inc.
 Adolph Gasser, Inc.
 General Electric Co.
 Goldberg Brothers, Inc.
 Alan Gordon Enterprises Inc.
 Gould, Inc.
 Gray Engineering Laboratories
 GTE Sylvania
 Guillotine Splicer
 Hammond Industries, Inc.
 Hazeltine Corp.
 Karl Heitz, Inc.
 Hitachi Denshi America, Ltd.
 Hollogon Optical Systems Corp.
 Hollywood Associates
 Hollywood Film Co.
 Houston Fearless 76, Inc.
 Houston Photo Products, Inc.
 Ikegami Electronics (U.S.A.), Inc.
 Image Devices, Inc.
 Infotechnics, Inc.
 International Video Corp.
 Jamieson Film Co.
 J-K Camera Engineering, Inc.
 JVC Industries Co.
 KEM Editing Systems, Inc.
 Kliegl Bros.
 KLM Associates, Inc.
 Lab Methods Corp.
 LaVezzi Machine Works, Inc.
 Lee Filters Ltd.
 Lenco, Inc., Electronics Div.
 Lipsner-Smith Corp., Div of RTI
 Listec Television Equipment Corp.
 Lowel-Light Mfg., Inc.
 L.T.M. Corp. of America
 L-W International
 Magnasync/Moviola Corp.
 Magna-Tech/Quad Eight
 Matthews Studio Equipment, Inc.
 M.B.I., Inc.
 Merlin Engineering Works
 Micro Consultants, Inc.
 Microtime, Inc.
 Microwave Associates, Inc.
 Miller Professional Equipment, Inc.
 Mitchell Camera Corp.
 Mole-Richardson Co.
 Motorola C & E, Inc.
 Multi-Track Magnetics, Inc.
 Nagra Magnetic Recorders, Inc.
 NEC America Inc., Broadcast Equipment
 Div.
 Neumade Products Corp.
 Norton Associates, Inc.
 Nurad, Inc.
 O'Connor Engineering Laboratories, Inc.
 Oxberry Div. of Richmark Camera Service,
 Inc.
 The Perf-Fix Co.
 Peterson Enterprises, Inc.
 Pioneer Marketing Corp.
 Plastic Reel Corp. of America
 David Pringle Cameras Ltd.
 Quick-Set, Inc.
 RCA Corp., Photophone Systems
 Recortec, Inc.



Rosco Laboratories, Inc.
 Sachtler GmbH
 Skirpan Lighting Control Corp.
 Smith-Victor Corp.
 Sony Corp. of America
 Soremec-Eclair U.S.A., Inc.
 Strand Century, Inc.
 Studio Tape Exchange
 Super8 Sound, Inc.
 Tele-Cine, Inc.
 TeleMation, Inc.
 Telescript, Inc.
 Television Equipment Associates
 Television Research International
 Tentel Corp.
 Thomson-CSF Laboratories
 Time and Frequency Technology
 Unimedia Corp.
 Vega Div. of Cetic Corp.
 Video Systems Network, Inc.
 Videomagnetics, Inc.
 Videomedia
 Vital Industries, Inc.
 Vlahos-Gottschalk Research Corp.
 Westrex
 Wide Range Electronics Corp.
 The Winsted Corp.

Social Activities

The social activities of the 119th Conference began on Sunday night with Eastman Kodak's Mexican party in the Century Plaza's patio area. The Mexican theme extended to the food on the buffet table — tamales, guacamole, and the like — and the cocktails. Margaritas as well as more conventional cocktails were served. Some of the hosts were dressed in Mexican costumes, and there was music — in fact there were all the ingredients for an unusually delightful party.

Get-Together Luncheon

The big event on Monday was the traditional Get-Together Luncheon followed by the presentation of Awards. (A complete story on the Awards Presentation begins on p. 922.) Preceding the luncheon a reception for the Award recipients was given in the President's suite.

Following the reception all the luncheon guests (850 of them) assembled in the Los Angeles Room and were welcomed by President William D. Hedden. Excerpts from his opening remarks appear below.

"One year ago in New York when accepting the Presidency, you might remember my prediction of great things happening for our Society's programs. These have happened — and exactly for the reasons that I predicted. We continue to have many talented people, dedicated and greatly motivated, working diligently in the many areas of Society service. It has been the high point of my professional career to work with our Executive Committee, the Society Officers and Governors, our Executive Director, and those involved in many other Society activities. I have enjoyed their dedication and enthusiasm and am proud of the results that they have accomplished.

"Let's see some of our Society accomplishments this last year.

"First of all, it is obvious that we are having a tremendous Technical Conference. This didn't



Conference Vice-President Harry Teitelbaum, President Bill Hedden and Jeff Friedman, Exhibit Manager, at the opening of the Equipment Exhibit.

just happen. Many people gave that little extra ounce of effort that this particular Conference might be outstanding. We have an exceptionally large registration. Our Papers Program is full with high-quality technical presentations. We have a record number of exhibits and exhibitors. And, an attractive social program has been planned for your enjoyment. Everything possible seems to have been arranged to make you feel, next Friday, glad that you attended this conference.

"Our Sections Program is another asset of the Society. These Sections Programs bring interesting technical speakers and information to 20 different locations in the United States and Canada monthly. All Sections are healthy and meeting attendance has been good. Two Sections organized one-day special meetings this year.

"In the engineering area, a recent standardization accomplishment may bring credit to our Society and its Standards Program for years to come. I refer to the accomplishments of the two committees working toward the standardization of the two types of 1-inch helical recording. These committees have been in existence for only slightly longer than six months, however, they have achieved standardization agreement that should greatly facilitate orderly growth of the 1-inch format in the television broadcast industry. Also, these committees have demonstrated that where there is a pressing industry need, the Society's Standards Program can assist and do it without delay.

Another Society accomplishment this year is the employment of a television staff engineer who will facilitate Society involvement in the growing television sector.

"Many people have advised me that the greatest problem facing our Society is the growing polarization between film and television interests. Some predict that the diversity of these disciplines could split our Society. Of course, we are all aware of this. However, this awareness has been turned into a strength. Your officers and Board of Governors have approached this situation with good judgment and statesmanship. I am optimistic that progress has been made toward a type of unification so that both film and television interests will benefit. One immediate result of this will be an improved Television Conference in Atlanta next February. The theme of this conference will be Application of new Technology to Broadcast Television, with exhibits directly pertaining to that theme.

"Last, I wish to mention briefly our Capital Funds Program announced at this meeting two years ago. Through the success of this program to date, the indebtedness on the Society Headquarters property has been reduced by approximately one-third. As there is still another year remaining on this Capital Funds Program, your continued support (which is greatly appreciated) will further reduce our only outstanding item of indebtedness.

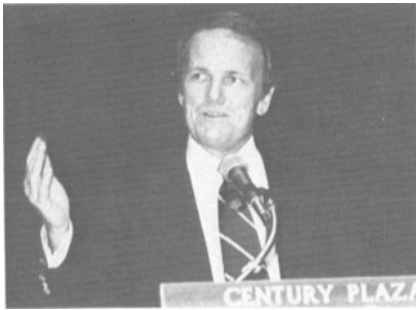
"This has been a fine year for the SMPTE, and, better still, the momentum increases. I am proud to be your president. Also, I wish to thank Calvin Communications for making this possible for me, but most of all to thank each one of you for your enthusiasm and help in the programs of our Society."

Keynote Speaker

Following his opening remarks, President Hedden introduced the keynote speaker, George Stevens, Jr., Director of the American Film Institute, who called for "concentrated attention and greatly enlarged effort to save and preserve color films."

Citing the tragic loss of countless black-and-white film classics from the first half century of production as a comparison, Stevens reported that greater effort and investment must be made soon or the motion pictures produced in the past twenty five years will have lost their color by the year 2000. He spoke of The American Film Institute's accomplishments as it nears its 10th anniversary celebration next month, noting especially archival preservation in collaboration with the Library of Congress, George Eastman House, the Museum of Modern Art, and the National Endowment for the Arts, as a major act of cultural conservation assuring the rescue and safeguarding of over 14,000 feature films in the AFI collection alone. A few excerpts from Stevens's remarks are given below:

"This coordinated archival effort began in 1967, fifty years too late, and, only by extraordinary effort in searching out lost films and substantial investment in transferring decaying nitrate to safety stock,



George Stevens, Jr.

were the remnants of several decades of remarkable creativity able to be preserved. These films, many of them now having taken their place as treasured classics of American culture, will live forever for the enjoyment of generations to come.

"We cannot allow history to repeat itself. Two weeks ago a conference of archivists from all parts of North America at George Eastman House in Rochester, New York, concluded on the solemn note that all color films produced since 1952 on single strip film, the successor to the three strip Technicolor, will not survive intact without special care.

"Single strip color negative continuously fades and many will deteriorate beyond recovery within twenty five years. The only recommended way for a color film to be preserved is by the costly production of three black-and-white separation negatives, one for each of the basic dye colors. Already there are harrowing stories of instances where fine films are selected for reissue or festival showings and the negatives will not produce a satisfactory print.

"It is unthinkable that we, now having the advantage of knowing the long term cultural value of cinema, should repeat the mistake of the first half century and permit the creativity of our industry to disappear.

"To stave off this problem there must be (1) increased consciousness on the part of corporate leaders and filmmakers, respectively, that their investment and the fruits of their labor are at this moment literally fading away; (2) closer collaboration between expert professional archivists and film owners in matters of preservation, so that all producers can follow the example of the very few companies which are now making separation negatives; (3) enlarged financial commitment of the industry and the federal government to the preservation of *both* black-and-white nitrate and color film; (4) and increased effort on the part of the scientific sector of the industry to create a less costly and totally effective method of color preservation.

"The American Film Institute is committed to working on this vast problem with our collaborating archives. I know we will be joined by the many in our industry who care about the survival and the creativity of American filmmaking."

Following the luncheon, the high point

of the event was the Awards Presentation. The Awards were presented by William Friedkin, Producer/Director for Universal Pictures. (A detailed account is given in the Awards Presentation story beginning on p. 922.)

Fellows Luncheon

Tuesday's event was the Fellows Luncheon held at the famous restaurant, Don the Beachcomber at Marina Del Rey — a beautiful view adding to the enjoyment of the Polynesian-type buffet. (See Awards Presentation story, page 927.)

Cocktail Party and Banquet

The social event of the week was the Wednesday evening banquet and dance preceded by a lively cocktail party. Music was supplied at the banquet by the UCLA Marching Band and by the USC Choral Group who began the program with a composition by Vaughn Williams, an impressive and unusual presentation, before going on to popular numbers.

Among the distinguished guests present was a most unusual, and rather scary, individual — none other than Darth Vader, the villain of *Star Wars*.

Highlight of the evening was a "technical" presentation by Max M. Feibelman entitled "A Systems Analysis Relative to the Eccentric Eating Habits of the Sprats." His talk, given below, elicited thunderous applause and roars of laughter.

At the awakening age of five, I was introduced by my nursemaid to the thought provoking lines:

"Jack Sprat could eat no fat, his wife could eat no lean.

But when they ate together, they licked the platter clean."

Through the ensuing years, with some educational exposure and an increasing awareness of forceful sexual motivations in our complex society, I have periodically attempted to derive a deeper understanding of this classic verse. Who first observed these strange characteristics, and why were they set down upon paper for posterity?

The Cinemascope turkey-leg-eating scene in "Tom Jones" provided some enlightenment relative to bisexual epicurism, but only recently has the systems analysis approach rewarded me with the true answer.

Let us first define system "S" in terms of the Sprats, a dining family or unit composed of the

collective sum of the sub-systems. The conditions necessary for an operational system are specified and/or implied in the last line; i.e., we need, as a minimum, a man, a woman, food, plates or platters and the essential utensils.

Now, let us assign Sub-system X to Mr. Sprat and analyze this Sub-system: X could eat. Query: Could eat what? Answer: No fat. This can be interpreted as follows: If there were such a thing as "not fat," X *would be capable* of eating it.

The uninformed reader may not attach much importance to this, but it must be emphasized that by means of his interpretation we have *already* formed one characteristic of Sub-system X.

Further analysis leads one to believe Sub-system X would not consume any substance with a high cholesterol index.

A more sophisticated interpretation is statistically optimized only by comparing Sub-system X with Mrs. Sprat — Sub-system Y.

Without repeating the conditional examination of Y's characteristics, it must be assumed we are in agreement that Y possessed identical picayunish attitudes in all interpreted cases except that Y's selection of substance is oppositely stated. Three simple formulae express the above discussion:

(1) $X + (-fat) \sim Y + (-lean)$.

(2) $X \times \phi = Y \times \phi$. (Note: ϕ is a factor of positive attitude.)

(3) $X + Y = Z$. (Note: Z is an unknown sub-system larger than X or Y, but not necessarily, and probably not a total system "S.")

It is remotely possible you are wondering whether or not successful transformations were accomplished by computer. Unfortunately the computer, after digesting these three formulae, simply recommended that further data be collected under synergistic conditions.

Let us now examine the remaining input: "But when they ate together, they licked the platter clean." This implies that the Sprats on some occasions ate separately. Unavoidably we must assume that these singular activities resulted in undernourished Sub-systems.

However, equation (3) denotes a resulting unknown system "Z" which could possibly, but not in all cases, satisfy the stable condition of a system "S." This is exactly what we find in the last statement regarding Sprat responses in joint meals. Each appears to want what the other has under the implied conditions that they never get what they want alone. I rather like this thought and feel that it contains a natural truism.

One of the most difficult segments to interpret (in order to establish the necessary operational system environment) is: "They licked the platter clean." Most discriminating gourmets suggest the use of a utensil sub-system of some sort. We cannot, however, discount the possibility that the



The head table at Monday's Get-Together Luncheon.



Herb Farmer, USC (right) and John Lowry, Digital Video Systems (center) with one of our European visitors.



Rod Ryan (left) and Bill Hedden (right) in conversation with George Stevens before the Monday Luncheon.



At Monday's Luncheon, John Gray, Pete Clark and Alan Gundelfinger at the "Hollywood Associates" table.



Michel Boxberger and Denise Boxberger with Joseph Polonsky (right), all of Thomson-CSF, France.



At the Fellows Luncheon, Rod Ryan (right), Steve Knudsen (center) and Jack Behrend examine photographs on display.

Sprats do, in fact, perform the licking of platters and/or plates after having properly used spoons up to the point of diminishing returns.

Now, what does all of this mean in terms which are significant for our current way of life? We may simply conclude that:

(A). The Sprats, although poorly adjusted individuals, do function effectively as a system, i.e., a family.

(B) Teaching verses such as this one to children who are not prepared for the systems analysis attack and its associated methodology may very likely create life-long quandaries which could develop into tendencies to rebel, march on campuses, wear unorthodox clothing, avoid cleanliness, and become disorderly.

My associates have asked me to continue this analytical work, expanding into the more risqué works such as Peter Piper. However, I feel at this time that I have contributed quite enough.

Perhaps far too much.

International Delegates Reception and Other Events

The reception for International Delegates was held Thursday evening in the Presidential Suite. Present were a number of distinguished guests, among them Dennis Kimbley, President of the British Kinematograph Sound and Television

Society. Taking place also on Thursday evening was the Vidtronics Open House.

Of special interest (also on Thursday evening) was a reception held at the USC Eileen Norris Theater. A more complete description of this is given on p. 913. A tour of this impressive theater was provided for the guests.

This full slate of social activities provided for delegates and registrants at the 119th Conference was one of the most interesting and well planned of any the SMPTE Conferences.

Ladies Program

An unusually interesting series of special activities for the ladies had been arranged by Shirley Kreiman and Jeannie Degenkolb, Chairman and Assistant Chairman of the Ladies Committee, with able assistance given by the 24 members of the committee.

The program began Sunday afternoon when refreshments and tea were served in the Bel Air Room after which participants signed for the week's exciting activities. In the evening registrants mingled at a cocktail party.

Monday's activities began with a continental breakfast with door prizes presented to some lucky people. At 9:30 a.m. a fascinating lecture on astrology was given by Alice Reichard. At noon the ladies attended the traditional SMPTE Get-Together Luncheon as guests of Agfa-Gevaert and at 2:30 p.m. they boarded a bus for a tour of historic Old Los Angeles.

Tuesday's activities began with the continental breakfast and door prizes, and at 9:00 a.m. the bus arrived to take the ladies for an all-day trip to Palm Springs with a stop at the Oak Glen Apple Festival

which was characterized by many small shops selling apple pies and cookies as well as candies, cheese and other goodies. Lunch was at the Tennis Club in Palm Springs. The afternoon was given over to shopping in Palm Springs with some members of the group visiting the Desert Museum. There was also a short visit to Hadley's where the main event was shopping for dried fruit, nuts, honey, jellies and other good-tasting items. Back at the hotel the evening was given over to an open house.

On Wednesday the day began at 8:00 a.m. with the continental breakfast and door prizes and at 10:00 a.m. there was a fashion show sponsored by Helft's Dress Shop and Snyder & Sons Men's Shop of the Century Plaza Hotel. In the afternoon bingo and bridge were available in the Bel Air Room but the big event of the day was the traditional Wednesday Evening Banquet.

Thursday began with the continental breakfast followed by an all-day trip to Pasadena with stops at various interesting places, the first one being a tour of Gamble House, built in 1908 and preserved by the State of California as an historical landmark. The next stop was at C. E. Bent & Sons, makers of floats for the New Year's Rose Parade, where the ladies could watch the construction of floats for the 1978 parade. Lunch was at Brookside Clubhouse followed by one of the most interesting events of the week — a stop at Norton Simon Museum to view exhibits of famous paintings by Italian, Dutch, Flemish, French, Spanish and German masters. The Museum also contains stone and bronze sculptures and tapestries. The open house at the USC Cinema Center on Thursday evening was a memorable occasion.

Friday the ladies lunched at Lawry's California Center and at 1:30 p.m. they returned to the hotel agreeing that the week had been filled with interesting activities and that the Ladies Committee had done a superb job of arranging this memorable program.

Short Films

The short films opening the technical sessions, providing information as well as entertainment, were selected and obtained by Opening Films Chairman Philip B. Singer. The films and a videotape were provided through the courtesy of Modern Talking Picture Service, Inc., Eastman Kodak Co., DeLuxe General, and Vidtronics. They are listed below, with their sponsors.

Up The Power Curve, Federal Energy Administration

Europe For All Seasons, Lufthansa German Airlines

Men and the Sea, Exxon Corp.

Elegance Defined, McDonnell-Douglas Corp.

Test Pilot, Rockwell International
Scrap, Institute of Scrap Iron and Steel



Christiane Coutel, SFP, France, and Henry Zahn, Bosch-Fernsch, Germany.

Does it Have to be This Way?, Environmental Protection Agency
The Big Hitch, Anheuser Busch
Testing 1-2-3-4, Movietone News; courtesy of DeLuxe General
California, Unlimited Productions; tape courtesy of Vidtronics
Play It Safe, National Safety Council
Always Tip The Fat Lady, Investment Co. Council
The Invitation, State Farm Insurance Companies
Rather Be a Chicken, Eli Lilly Co.
All that Glitters, Chicago Mercantile Exchange
The One Man Band that Went to Wall Street, New York Stock Exchange

Salute to the Broadcast Industry:
 The opening of the first technical session on Monday morning in Century Plaza Theatre 2 featured a dramatic 16-projector slide presentation entitled "A Salute to the Broadcast Industry." Sponsored by and courtesy of Eastman Kodak Co., the presentation began with the sounds of telemetry signals mixed with clips from vintage



Walter Seys, Julian Hopkinson, Marcel Vrancken, all of Agfa-Gevaert with Peggy Caggiano, SMPTE, and Bob Lovick, Eastman Kodak.

radio programs. There followed more than 600 film images that faded, overlapped each other and travelled in accompaniment with sound effects and music. Most of the visuals were gathered from the files of a hundred individual stations and major networks in the United States and Canada. It was a very effective way to recognize the talents, dedication and contributions of those who work in radio and television, including the engineers who work behind the scenes to keep the programs on the air. A number of future showings are scheduled including one at the SMPTE Television Conference in Atlanta, Ga., (3-4 February 1978).

Acknowledgments

The Society thanks the companies listed below for providing services and equipment for the Conference:

Coffee Club, Philip A. Hunt Chemical Corp.
Sunday Evening Social for Registrants, Eastman Kodak Co.
Monday Get-Together Luncheon, Agfa-Gevaert N.V.



Mr. and Mrs. Joseph Roizen, Telegen (right) with Joseph Flaherty, CBS (left) and R. Jaussi, Montreux Television Symposium.



Charles Ginsburg, Ampex; Roland Zavada, Eastman Kodak; Dick Sirinsky and Charles Anderson, both of Ampex, and Peggy Caggiano, SMPTE.

Cocktails for Fellows Luncheon, Ampex Corp. and Posso S.A.
Pre-Banquet Cocktail Party, Treise Engineering, Inc.
Banquet Music and Entertainment, Technicolor, Inc.
Foreign Delegates Reception, Fuji Photo Film, U.S.A., Inc.
Audiovisual Presentations, Hazeltine Corp.
Flowers for the Banquet, Bell & Howell Professional Equipment Div.
Photography, Most of the photographs in this report were made by Donna Foster Roizen.