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## SUNDAY—APRIL 26

12:00—6:00 REGISTRATION

## MONDAY MORNING—APRIL 27

8:00 REGISTRATION

9:30 LABORATORY PRACTICES

### A New Color-Print Film for Universal Applications in Color Printing and Processing Systems

R. G. L. VERBRUGGHE and W. A. SEYS, Gevaert-Agfa N.V., Mortsel, Belgium, and R. A. EYNARD, Agfa-Gevaert Inc., Teterboro, NJ

Gevacolor print film, type 9.85, is a new high sensitive and extremely sharp color-positive film of conventional design. Each of the three light-sensitive layers contains an appropriate dye coupler. Exceptional sharpness and excellent color saturation, achieved by very stringent selection of the various dye couplers, combined with extremely thin emulsion layers make the film especially suitable for small formats. Processing is based on a commercially available color developer which uses 2-amino-5-diethyl aminotoluene monohydrochloride. This film can be processed together with other similar color-print films using exactly the same processing methods, solutions and processing times without causing any contamination whatsoever.

### Pollution Abatement From Photographic Processing Solutions

L. E. WEST, Photographic Technology Div., Eastman Kodak Co., Rochester, NY

Photographic processing solutions are evaluated in terms of subsequent water pollution on discharge. Methods for calculating the pollutant content, and means for minimizing the waste loads, including the recovery and reuse of chemicals, are described. The effects of oxygen-demanding chemicals, bacterial nutrients and chemicals toxic to plant and animal life are assessed. Thiosulfate, sulfate, acetate and benzyl alcohol (the major constituents of processing effluents) are shown to be readily biodegradable in treatment plants similar to those used for sanitation wastes. Some proposed methods for reusing bleaches and fixers are discussed. It is shown to be technically feasible to reduce the amounts of bleaches and fixers discharged to the sewer by a reverse-osmosis treatment. Silver recovery also reduces the quantity of pollutants that must be discharged to the drain. Test results from an experimental waste treatment plant are presented, and guidelines for process pollution reduction are reported.

### Multiformat Motion-Picture Sharpness Evaluation

JOHN C. NORRIS, Photographic Technology Div., Eastman Kodak Co., Rochester, NY

Color release motion-picture prints in 35mm, 16mm, and super 8 formats are being produced from 16mm originals. An evaluation is made of the image sharpness achieved in the prints, using both subjective testing and modulation transfer techniques. The sharpness of 35mm enlargements of 16mm Eastman Ektachrome Commercial Film 7252 originals made through 35mm internegatives is comparable to that obtained through conventional duplicate negative and reversal duplicate negative stages that start with 35mm color negatives. This enlargement from the 16mm reversal original is superior to enlargements of 16mm color negatives through the 35mm duplicating stages. Super 8 prints made with the newest reversal original, internegative, and print materials surpass the image quality attainable in 16mm prints made with the preceding generation of color films.

### System Sharpness Calibration of Commercial Super 8 Prints

JOHN C. NORRIS, Photographic Technology Div., Eastman Kodak Co., Rochester, NY

The production of commercial prints in the super 8 format can be accomplished via several printing systems. The available camera original may be a 35mm negative, 16mm negative or 16mm reversal original. The super 8 release prints may be direct reduction prints or prints made via 35mm, 16mm or super 8 internegatives or intermediates. Super 8 print sharpness of seventeen systems is evaluated by modulation transfer techniques. The sharpest prints can be produced by reduction printing from 35mm negatives, 35mm reversal intermediates and 35mm duplicate negatives. The best system for sharpness when a 16mm camera original is used appears to be the 16mm reversal original/16mm internegative/optical reduction system. Super 8 prints made from 16mm internegatives through duplicate negative stages are inferior for sharpness. Economic considerations suggest that it may not always be practical to seek maximum sharpness from a given original.

### Equipment and Film Parameters for Optimum Transfer of Magnetic Sound on Super 8 Print Film

R. W. BAUER, H. F. OTT and R. E. UHLIG, Photographic Technology Div., Eastman Kodak Co., Rochester, NY

In the motion-picture industry, sound is transferred to prestripped film using the A (straight-path) configuration, where the film is generally supported by tension alone, but may, in some modifications, have an air or felt backup, or using the C (on-the-drum) configuration, in which the support is a rotating drum. Significant problems have been encountered, and an analysis shows that, besides the primary consideration of film

path configuration, the critical variables are film condition, head design, head pressure and film guiding. Data are presented indicating the effect of these variables on equipment design. Choice of the *C* configuration tends to diminish the importance of the other parameters, but the *A* format can also be operated successfully, provided appropriate equipment changes are made.

### **A Method for Reporting Exposure on Color Negatives**

**FRANK P. BRACKETT and FRED H. DETMERS, Technicolor Inc., Hollywood, CA**

An important link in the chain of factors influencing the printing characteristics of a negative has been neglected: the person who exposes the negative. Since negative and positive emulsions, processing conditions and printer criteria can vary, direct printing information may be of no value in reporting to a cinematographer, who must then depend on subjective evaluation of daily rush prints and a kind word from the laboratory contact man. Exposure has been reported in terms of numbers on an arbitrary printer scale. Means for keeping the scale constant in the face of varying conditions is described, and the system is offered as a language of communication between laboratories, cinematographers and photographic-effects technicians.

### **Central Arrangement of Sound Carriers for Perforated Film**

**ADOLF HINZE, Siemens Corp., Karlsruhe, Germany**

To facilitate film handling, the central arrangement of units into one room has been done with the aid of a new technique of synchronization. This is done instead of having special areas for mixing, sound transfer, double band projection, etc. The new technique allows the film and television studios to put together in one unit the necessary combination for all the tasks involved in the handling of sound films in a well-arranged and economic manner.

## **MONDAY AFTERNOON**

### **12:00 GET-TOGETHER LUNCHEON**

**Guest Speaker: MIRON ALEXANDROFF**  
President, Columbia College, Chicago

## **CONCURRENT SESSIONS**

### **3:00 LABORATORY PRACTICE II**

#### **The Pathology of a Super 8mm Projector Design Program**

**LEE H. SCHANK, Fairchild Industrial Products Div., Plainview, NY**

The technical history of a family of super 8 cartridge sound equipments is reviewed, from concept to product. Emphasis is placed on the impact of contemporary materials engineering on design choices. Parameters, such as the physical properties of the materials and current manufacturing techniques, play a large role in the early decisions. These parameters, coupled with requirements for the ultimate in economy in fabrication and assembly within a specific manufacturing environment, form the basis for the many design tradeoffs faced by the project engineer.

#### **Film Dynamics of a Rolling-Loop Film Transport System**

**WILLIAM C. SHAW, Multiscreen Corp., Galt, Ont.**

Work on the commercial development of a 70mm, 15-perforation motion-picture projector has resulted in the production of four prototype mechanisms. One of

these, installed in the Fuji Pavilion at Expo '70, employs a 25,000-W xenon short-arc lamp to project a 15-min, multiple-image motion picture on a screen measuring 43 x 62 ft. One of the difficult technical problems that had to be solved was how to advance the film at 15 perforations/frame, 24 frames/s, with a pull-down time of less than 10 ms, while simultaneously achieving good registration, good film life and mechanical reliability. Possibilities of excessive accelerations and impact forces on the film were matters of concern. The solutions, obtained from mathematical analyses and observations of prototype operation, involved appropriate film-guide design, the use of air jets to assist in forming and picking up the loops, and the incorporation of a mechanical device for producing controlled and accurate registration without perforation damage. A description is given of the behavior of the film as the rolling loop forms, grows, moves toward the gate where registration takes place, shrinks and finally disappears.

### **New Large Screen and Multi-Image Motion-Picture System**

**WILLIAM C. SHAW, Multiscreen Corp., Galt, Ont.**

A new system, designed to produce high-quality motion pictures on screens up to 85 x 120 ft, operates with standard, polyester-based, 70mm motion-picture film, projected at the standard rate of 24 frames/s. To achieve the desired picture quality and brightness within the limitations imposed by grain size and heat energy absorption of existing film, a new large format is employed which utilizes a 15-perforation "pull-across" projector (incorporating a "rolling-loop" film transport) instead of the conventional 5-perforation pull-down. The frame size is 1.91 x 2.74 in. Expo '70 visitors will see the first presentation of the system.

### **The Crystamatic and its Application to Double-System Filming**

**NEVILLE C. H. DRUCE, Audio Engineering Ltd., London**

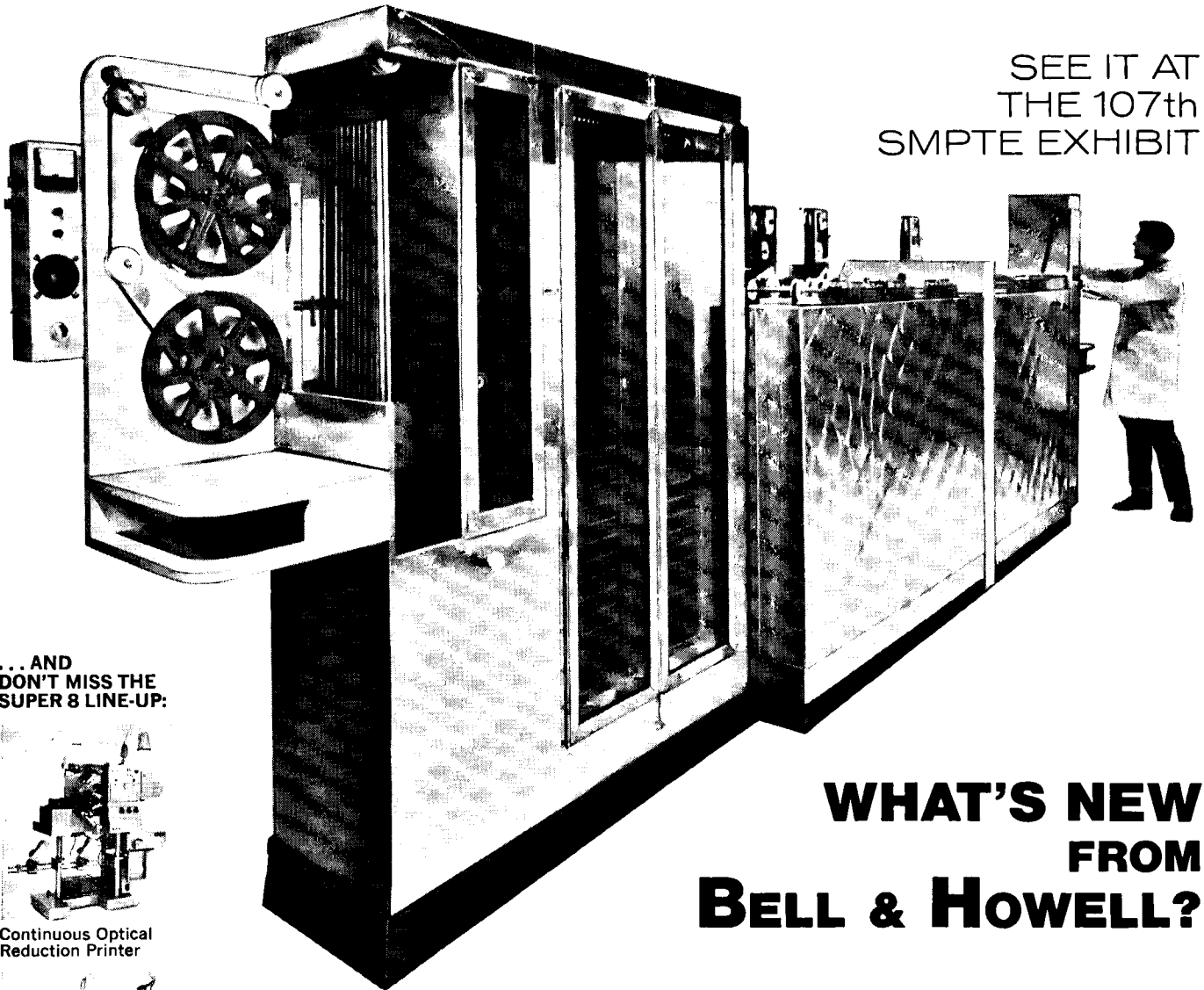
A new equipment provides a means of driving motion-picture cameras of various types phase-locked to a crystal oscillator. The equipment incorporates a digital sequential marking system which applies a simple coded signal to the picture and soundtrack at the start and end of each film sequence. The marked signal for the soundtrack is transmitted by radio and the cameraman may use the transmitter to record supplementary verbal identification on the soundtrack. The digital marker system is entirely automatic, and the tape recorder may also be stopped and started automatically, in synchronism with the camera.

### **Transmission Line Considerations in the Application of Timing Marks to High-Speed Film**

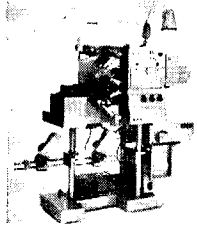
**H. T. KALB, F. L. CROSSWY and G. J. FORD, ARO, Inc., Arnold Air Force Station, TE**

Certain characteristics of a transmission line illustrate how this timing lamp system component in combination with the neon lamp dynamic ionization curve contribute to a major percentage of timing lamp malfunctions. Two methods of circumventing these problem areas are discussed whereby lamp pulse repetition rates in excess of 100 kHz have been achieved at terminal ends of lengthy transmission lines with good lamp current waveform definition. One method employing the neon lamp produces 0.25  $\mu$ s rise and fall time, 1 to 50 mA current pulses. The second method uses the solid-state light-emitting diode (LED) to 1 MHz. A novel current ramp-density wedge generator is discussed.

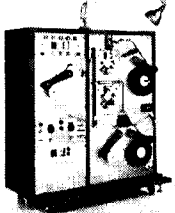
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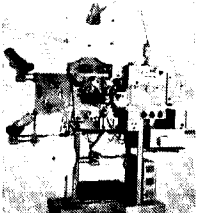
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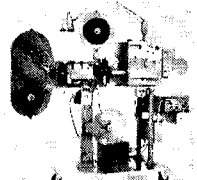
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## CONCURRENT SESSION

### 3:00 TELEVISION I

#### Tone Adjustments in Color Television

YUJIRO OTSUKA, NHK, Tokyo

Since the rapid increase of color programs and color television sets, viewers have been troubled by lack of color uniformity from channel to channel. This is partially because some of the color adjustments, especially color camera and monitor adjustments, still depend on the visual sense of the technician. A new adjustment method eliminates such misadjustments; it consists of adjusting the white balance, contrast, hue and saturation of color monitors to obtain a standard picture quality; picking up a color slide by color camera and displaying it on a monitor; and adjusting the camera system comparing the picture on the monitor with a slide placed beside the monitor. Since human eyes can discriminate color differences in detail by comparing simultaneously, more precise adjustment can be expected.

#### Compact Optical System for Field/Line Sequential Color Videotelephone Camera

R. L. EILENBERGER, F. W. KAMMERER and J. F. MULLER, Bell Telephone Laboratories, Inc., Holmdel, NJ

A very compact optical system has been designed to implement a field/line sequential color camera intended for videotelephone use. The basis of the system is a spectral separation prism, which employs internal dichroic reflectors. Conversion to an electrical signal is via a pickup tube provided with a new form of composite fiber-optic/clear-glass faceplate. This configuration allows a multiplicity of adjacent identical images to be brought into focus in the same plane, at the sensitized target surface.

#### A System of Distribution of TV Sync Generator Pulses Through a Single Cable

JOVAN VIDOVIC, NIKOLA TKACENKO and NIKOLA VIDOVIC, Sarkes Tarzian Inc., Bloomington, IN

The pulses from the sync generator are encoded in one composite pulse that contains all the essential information of the sync, blanking, horizontal drive, vertical drive pulses and subcarrier. This composite pulse is distributed through a single coax line in the studio and at the points of use it is decoded. Decoding allows the regeneration of all the above-mentioned pulses, plus the generation of burst flag pulse. The circuitry for encoder and decoder are relatively simple and inexpensive, and the system allows considerable reduction in cable and installation costs by reducing the required number of lines from one cable per pulse to one cable for all pulses. The line is driven by an 8-V peak-to-peak composite pulse which insures good noise immunity of the system.

#### Automatic Color Phase Control System

Y. ITOH and Y. INOUE, Tokyo Broadcasting System, Inc., K. SAITOH and N. IDESHITO, Nippon Electric Co., Ltd., Tokyo

The intention of this system is to maintain automatically the phase of the color burst to a fixed phase angle with respect to a chrominance reference subcarrier supplied from a chrominance subcarrier generator. This is done by detecting and comparing the phase difference between a color burst of the video signal and the chrominance reference subcarrier by a phase detector located at inputs of the switcher. Correction voltage (dc) derived from the phase detector is supplied to a variable phase shifter installed in a transmission route connected across a video source such as a color coder or video-tape recorder.

## MONDAY EVENING

### 5:00 EXHIBIT OPEN HOUSE

## TUESDAY MORNING—APRIL 28

## CONCURRENT SESSIONS

### 9:30 THEATER PRESENTATION AND PROJECTION

#### Photographing Motion-Picture Screen Images for Analysis

GLENN M. BERGGREN, Wil-Kin, Inc., Atlanta

The lack of progress in the improvement of motion pictures has been related to the difficulty in analyzing the results. To analyze total image performance including side-weave, color rendition, sharpness and image-information dimensions, high-quality slides of motion-picture screen images are taken to record, permanently, the total screen results. Films used, cameras used, limitations and freedoms found are discussed. Numerous comparison slides in the same and different theaters illuminate the differences in color rendition, title shifts and side-weave in the equipment, side-weave on the film; in some cases the screen image is compared to a slide of the original motion picture to indicate equipment vs. film problems.

#### New 35mm Lens System for Improved 1.85:1 Ratio Projection

KENNETH R. LEONARD, Kollmorgen Corp., Northampton, MA, and GLENN M. BERGGREN, Wil-Kin, Inc., Atlanta

After the introduction of CinemaScope in 1953, the motion-picture theater industry rapidly accepted the practice of the widescreen presentation and slowly discarded the previously standard 1.33:1 ratio width-to-height ratio. In new theater installations, essentially all US projects aim for the two basic screen ratios, 2.35:1 for anamorphic (CinemaScope) and 1.85:1 for normal wide-screen without anamorphosis. The major emphasis now is on being able to maintain the same picture height for the two ratios with a minimum of complexity in the projection booth. Professional picture presentation has been severely hampered by the need to change optics completely when changing film formats. The challenge of improving both anamorphic and normal 35mm wide-screen projection was undertaken during the Ultra-Vision (trademark of Wil-Kin, Inc.) program. Although that program was primarily to make substantial improvement in the anamorphic presentation, it was quickly found that progress could be made in the 1.85:1 ratio as well; but with the existing lenses, the 1.85:1 ratio was difficult to achieve accurately, and the necessity of changing lenses always left the opportunity for a temporary out-of-focus condition. These tests indicated the need for a new and direct optical solution for the problem; therefore two new lenses were developed by Kollmorgen Corp. One is a prime lens compatible with existing anamorphic attachments; the other is a variable power 0.65 Magna-Com attachment to the new prime lens that permits precise adjustment of picture height when projecting at the 1.85:1 ratio. Thus, the new prime lens can be used with an anamorphic attachment for the 2.35:1 ratio, or with a Magna-Com Attachment for the 1.85:1 ratio, for high quality presentations at a constant picture height.

#### Light Collection of Xenon Short-Arc Bulbs Used for Projection

KENNETH S. SQUIER, Macbeth Corp., Newburgh, NY, and GLENN M. BERGGREN, Wil-Kin, Inc., Atlanta

In modern motion-picture projection, the liberation of light energy from the short-arc xenon bulb is only useful when collected in an optical system which can

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efficiently "reorient or redirect" the light to the purpose, namely the transillumination of the film, and then through an imaging or objective lens and reflected from a screen. The polar patterns of available light of the various short-arc xenon bulbs are reviewed including the typical optical systems for collection, the typical losses at the shutter, aperture plates and lenses, and some of the reflection patterns of screens used in theaters. The collection of the light is explored in definition and concept through the mathematica of a modified sphere representing 100% of the polar pattern, in order to arrive at a useful numerical efficiency factor for typical lamphouses.

### **Motion-Picture Theater Viewing at the Village Cinema**

**C. W. FORTSON and G. M. BERGGREN, Wil-Kin, Inc., Atlanta**

The technical factors of motion-picture viewing are not currently subject to industry standards. Choices of aisle locations, seat spacings, row-to-row spacings and picture-height locations are all interrelated. With reference to earlier technical efforts, the width-to-length relation of the auditorium is discussed, plus the advantages of "continental" seating layouts (side aisles only), in order to obtain the maximum number of seats within the narrowest practical angle of viewing, yet keeping within a reasonable screen-width-to-back-row ratio. The mere obtaining of the most number of seats in an enclosure is far from the optimum viewing. Certain factors of viewing in the front half of the theater, compared to the rear half of the theater, are reviewed. The height of the picture above the viewer is explored in relation to obtaining a realistic scene with natural location in relation to the viewing of the cameramen. Apparent correct location of the viewer in relation to the size of common objects in the image is reviewed.

### **The Ziegfeld Theater—New Concept in Film Presentation**

**ALBERT Z. JEKSTE, Atlantic Films & Electronics, Ltd., Montreal**

## **CONCURRENT SESSION**

### **9:30 TELEVISION II**

#### **A Mix-and-Gate Amplifier**

**H. NAITOH and Y. ITOH, Tokyo Broadcasting System, Inc., T. IMAI, K. SAITOH, J. HIRATE and T. UTSUKI, Nippon Electric Co., Ltd., Tokyo**

A new video gain-control circuit having fade-control and keying functions has been developed. An amplifier using this single gain-control circuit can mix, wipe and fade-in-gate, so that there is no need of color subcarrier phase alignment upon functional selection. The amplifier using the gain-control circuit exhibits an outstanding performance when used in a color composite signal switching system, since the sync and color burst can always be passed through the amplifier at a constant level without bypassing.

#### **A Solid-State Machine Control Assignment System**

**R. J. SMITH, Commercial Electronic Systems Div., RCA Corp., Camden, NJ**

Complex techniques used in the production of program material in the modern TV station simultaneously with on-air transmissions have placed heavy requirements on television tape recorders and film islands. The station management is faced with the challenging task of balancing equipment investment and production costs

to achieve optimum overall performance. The return on the investment may be increased by maximizing the utilization of the equipment. The use of tape recorders and film cameras may be enhanced by a remote machine control system. A modular system employing solid-state circuitry allows control of any machine to be accomplished from a number of operating positions. The advantages and limitations of the various methods of assignment are evaluated from the economic and human-engineering standpoint to assist the engineer in satisfying his station requirements.

### **Transitional Logic as an Aid to Complex Switcher Operation**

**J. M. WALTER and C. R. MONRO, Commercial Electronic Systems Div., RCA Corp., Camden, NJ**

TV program production requirements are continuing to increase in complexity, demanding that program assembly switchers provide a substantial number of buses and several control levers for mix/effects. Such multiple reentry facilities increase the possibility of operational confusion and subsequent embarrassing and costly "on-air" switching mistakes. Incorporation of "operator-assisting" control logic circuits, particularly for mix/effects, results in a control system that accomplishes the flexibility of the multiple bus, multiple level switcher and still maintains the operation of the control panel as a simple routine function. For example, a four-bus switcher can be made to provide the essential production functions of conventional six-bus switchers.

### **Design Considerations of Tape Transports for Video-Tape Recorders**

**STANLEY WHITEHEAD, Ampex Corp., Redwood City, CA**

The design of quadruplex video-tape recorders has so far included a transport whose design has adhered basically to that of a classical professional audio-tape recorder. The rationale for this transport design philosophy is reviewed in terms of the performance requirements for the longitudinal audio, cue and control tracks, as well as the requirements for tape interchangeability with respect to registration of the video tracks. New requirements for optimizing effectiveness in the interchange of color recordings have emphasized deficiencies in the present transport design. These requirements are discussed in detail, and possible solutions are presented for the design of future equipment.

## **TUESDAY AFTERNOON**

### **2:00 TELEVISION III**

#### **An Improved Servo System for Quadruplex Video-Tape Recorders**

**HAROLD V. CLARK, Ampex Corp., Redwood City, CA**

All quadruplex video-tape recorders require servo systems to control both tape motion and rotational speed of the rotating head. The several manufacturers of these recorders use various combinations of synchronous, induction and dc motors in their equipment designs. In addition, some later special purpose video-tape recorders employ servo loops which control tape tension. The types of motors used naturally affect circuit details of the servo loops: these details are considered along with describing a servo which could make use of motors and servo loops adjusted to yield maximum stability with minimum circuit complexity and maximum circuitry stability. The system is examined theoretically, and then practical results of an experimental system are given and their significance insofar as future VTR design is discussed.

## ECLAIR'S GV16: HIGH-SPEED AND PORTABLE

Most high-speed cameras are big and heavy bench instruments. Changing their magazines takes two minutes, sometimes more.

But this one is the Eclair GV16.



The GV16's body weighs 3 lbs., measures 4¼ x 4¼ x 2 inches. Magazine changes take 5 seconds. Loads from 100 to 400 ft. 0 to 250 frames per second. Any lens you want. Very handy.

Very versatile, too. The GV16 comes with an Eclair mount or a C mount, whichever you prefer. And since all GV16 magazines can be removed literally in one second, (even in mid-roll), you can bore sight through the aperture, which is right before your eyes when the magazine snaps off. Or, of course, you can mount a lens with a reflex finder and view as you shoot.

The magazines themselves are versatile. When you run out of film, you simply snap off the old magazine and snap on a new one. No film to thread; no loop to form. That's all done inside the magazine when you load it, before shooting starts. Reloading the magazine is fast and easy, too; and you can do it in day-

light if you want to. Both the 400 foot and the 100 foot magazines accept core wound film and daylight loading spools. They both use 16mm film, of course.

The 400 foot magazine measures 17 x 8 x 1½ inches, and weighs 5 pounds. It mounts on the *back* of the GV16's body, which balances the camera and gives it a low profile. The super-compact camera body, (without motor or lens), weighs only 3 pounds and measures 4¼ x 4¼ x 2 inches. The motor weighs another 3 pounds. Stop motion to 250 frames per second with the same gears. 27 volt DC battery operation.

Film movement is rock steady. A double claw engages two perforations at once; an adjustable registration-pin engages the perforation below that. Spring-mounted side pressure-plates guide the film, as well as the one in rear. What else? Pulsing and marking are built in. Numbering is available; and it can be controlled by events, time base or contacting. Tachometer. Heating. Variable shutter. Versatility. GV16.

For more GV16 information, contact Eclair at 7262 Melrose Avenue, Los Angeles, Calif. 90046. No obligation.

For more GV16 information, contact Eclair at 7262 Melrose Avenue, Los Angeles, Calif. 90046. No obligation.

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# The beer pours and Niagara stops: ARRIFLEX® 35 shoots both "as usual" for Holland-Wegman Productions, Inc.

In the age of specialization, the commercial film producer may be likened to the Renaissance Man—facing new situations and challenges each day. So it is with Holland-Wegman Productions of Buffalo, New York whose credits encompass TV commercials, industrials, documentary features, educational films—virtually the full spectrum of in-and-out-of-studio assignments. Two jobs recently completed by the firm indicate the diverse—and often fascinating—nature of the work handled by the commercial film producer.

One included a 60-second commercial for a brewer in West Virginia. Here, the job required H-W crews to show a foursome relaxing on the patio, chatting amicably over bottles of beer. Although such a spot might easily have been shot on location, H-W felt it best to stay in the studio. Here, sound and lighting both are far more malleable in the director's hands—both able to make or break the viewer's appetite for the sponsor's beer.

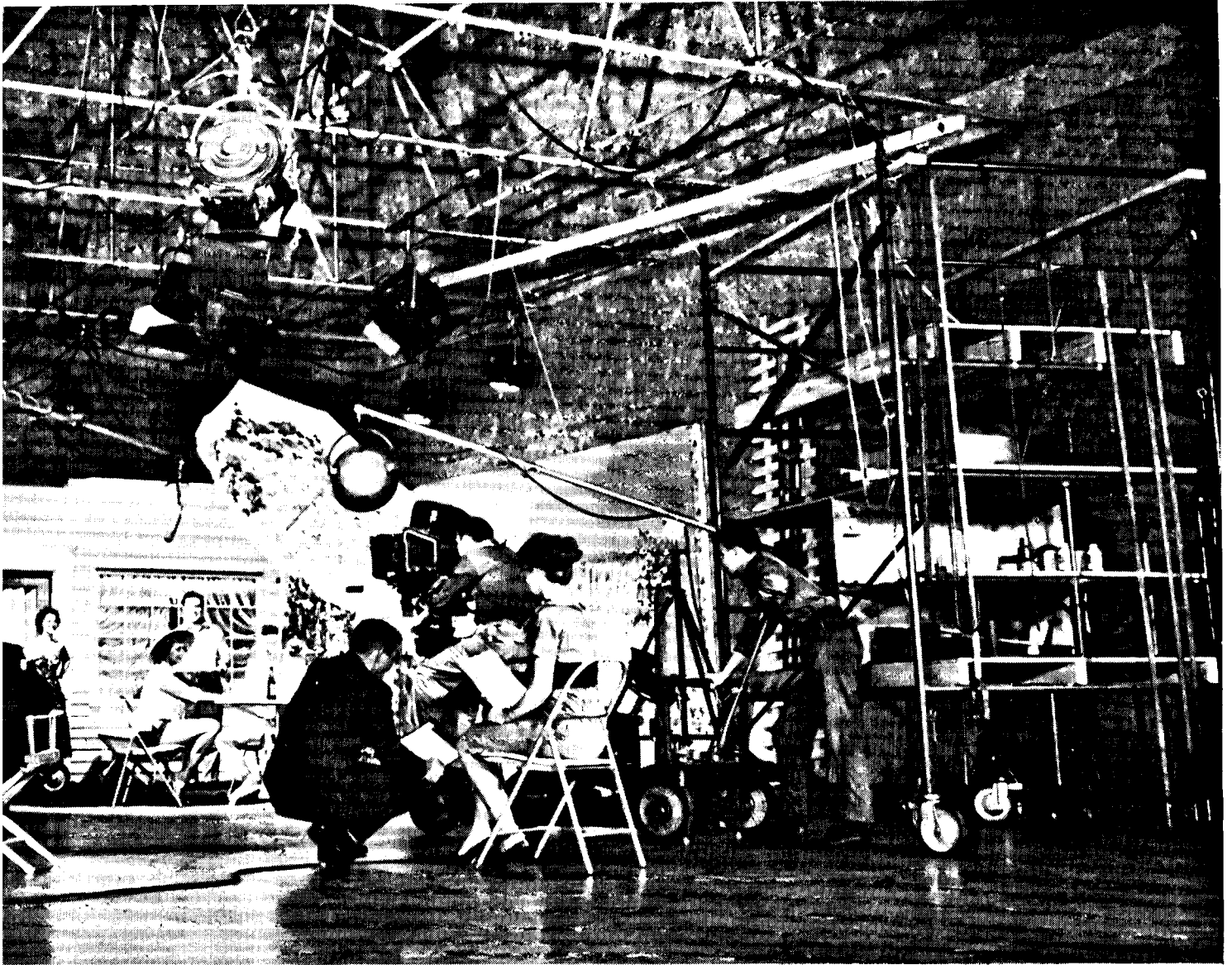
But on another job, no studio could have housed the subject—Niagara Falls. H-W had been in the midst of a film concerned with the geology of the world famous waterfall, when a separate government sponsored geological survey ordered the water "turned off" in order to investigate the land mass beneath. Writes H-W President, Paul Sciandra: "How lucky could we get? Right in the middle of our project, someone decides on this never-to-be forgotten and never-to-be duplicated event. At the moment the water stopped, revealing to the eyes of mankind the land beneath for the first and only time, our Arriflexes were really recording a piece of history. But as far as the 35's were concerned, it was just business as usual—in, out and around the setting as quickly as feasible, as reliably as always."

Even when the action can be repeated, such as in the studio, H-W's personnel approach each shot as if it were now-or-never. This professionalism helps explain the firm's success with such clients as Xerox, Ford Motor, Marine Midland and many other national names. It also explains the company's selection of Arriflex 352C cameras. Noted for their lightweight and compact design, they combine total mobility with the proven reliability of their rock-steady film movement. And with its complete accessory system, the same Arriflex masters equally the requirements of sound stage or river bed.

But this was the thinking behind the Arriflex's creation: to be as versatile as the filmmakers who consistently rely upon it.

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## **A Current View of Time-Based Stabilization Techniques for Video-Tape Recorders**

**CHARLES H. COLEMAN, Ampex Corp., Redwood City, CA**

The first video-tape recorder produced in 1956 reproduced a signal whose lack of time-base stability caused reproduced sync to deviate from its average frequency by as much as one picture line and at rates which made it difficult for receiver sync circuits employing AFC to follow the deviations. Integration of a VTR output signal with other signals in a studio was therefore very difficult. These limitations plus the demands of color reproduction fully meeting FCC specifications resulted in a series of products being developed from 1956 to 1967 which gradually reduced timing instability by four orders of magnitude. Because these accessory products were developed sequentially and over such a long period, the complete set of them needed for a fully equipped high-band color video-tape recorder contained a good deal of redundant circuitry, consisted of several separate chassis, resulting in large-sized equipment. After reviewing briefly the basic problems of stabilizing a VTR, an analysis is given in detail of the simplifications and economies possible through new design philosophies. A specific approach is chosen, and a hypothetical system developed from it to show what might be expected in equipment of the future.

## **Standardization in the Video-Tape Recorder Industry**

**R. N. HURST, Commercial Electronic Systems Div., RCA Corp., Camden, NJ**

Basic standards derived by the pioneers in the field and the resulting documents become part of the foundation of the industry. As the industry matures, however, there is a tendency for the original reasoning behind these standards to be lost or dimmed with time, resulting in loss of respect for certain standards. In the video-tape-recording industry, this is most notable in penetration, because of the ease with which the standard may be violated, the lack of immediate dire consequences from its violation, and the superficial advantages which accrue from under-penetration. The technical basis for the SMPTE Recommended Practice which specifies vacuum guide radius and position (hence, penetration), and emphasizes the critical need for adhering strictly to this specification is described. The reasoning behind other standards of the VTR industry, and how the industry benefits from careful respect for these standards, is reviewed.

## **Developments in TV Tape Servo Systems**

**KOICHI SADASHIGE, Commercial Electronic Systems Div., RCA Corp., Camden, NJ**

New technology and material science utilized in the design of the new servo system include such items as ultra-low-inertia capstan motor with 1/100 of mechanical time constant of a conventional ac motor; completely digital means for the control of headwheel motor-power input level in both forward and reverse directions; digital velocity and phase detector; solid-state means for upgrading of the servo operational modes; and hybrid method of electronic circuit-packaging technique. Although the technology utilized improves reliability, long-term stability and power efficiency of the system, the most fundamental feature of the system is the fast lock-up time, improved time-base stability and wider correction bandwidth. The servo performance, especially the fast and predictable lock-up time, is a fundamental prerequisite of the short program cycle time of cartridge video-tape equipment.

## **A Helical-Scan Color Video-Tape Recorder for the Broadcaster**

**KEITH Y. REYNOLDS, International Video Corp., Sunnyvale, CA**

A low-cost helical-scan color video-tape recorder for the broadcaster has many of the features previously found only on quadruplex recorders, and provides some features never before found on a video-tape recorder. Until recently, most helical-scan video-tape recorders introduced time-base errors too large to meet the EIA and FCC broadcast specifications and did not have a sufficient signal-to-noise ratio for the discriminating broadcaster, and until recently, electronic editing, color reproduction, missing video information and other similar problems remained unsolved. This helical-scan VTR can record the full NTSC color signal in its original form with a 4.2 MHz bandwidth and excellent signal-to-noise ratio.

## **The Future of Video-Tape Recorders**

**CHARLES W. CRUM, Ampex Corp., Redwood City, CA**

Discussed in detail are the functions of a video-tape recorder in an automated studio operation, and the strengths and weaknesses of video tape are analysed in comparison with both presentday and expected future film and other recording techniques. Suggestions are made to improve present equipment to simplify setup, extend reliability, minimize maintenance and upgrade quality to optimize the ability of tape to match or exceed other storage techniques. Extensive data on present equipment performance are reviewed and approaches are suggested for using such data to provide better and more economic service.

## **The Role of the Video-Tape Recorder in Partially or Fully Automated Station or Network Operations**

**DAVID FIBUSH, Ampex Corp., Redwood City, CA**

Today there are a few highly automated, computer-controlled stations and network facilities, and their number is going to increase to a degree that will change the whole television broadcast industry. Today in an automated studio can be seen a handful of people performing their work in a calm fashion where many people once worked at a frenzied pace to do the same tasks. To achieve this startling change, engineers, owners and equipment manufacturers must redirect their thinking. No piece of major equipment, including tape recorders, is exempt from change in such an environment. They must operate more efficiently, require less maintenance and setup, and they must have the built-in capability of interfacing directly with computer-directed control systems. These requirements are covered in detail; it is shown how a VTR can be adapted to operate successfully in an automated environment. Future designs can be more specifically aimed at automated operation.

## **Contact Duplication of Transverse Video-Tape Recordings**

**DANIEL ESTERLY, Ampex Corp., Redwood City, CA**

Broadcast-quality copies of quadruplex transverse video-tape recordings have been produced in the laboratory by the contact-duplication process. The program material is recorded on high-coercivity tape in a mirror-image format. The oxide surfaces of this master tape and a conventional tape are pressed together and are passed through a transfer field to effect the duplication of the video material, while the audio, cue and control tracks are played back from the master and rerecorded on the slave. Topics discussed include choices of production techniques for obtaining the

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high-coercivity master recording, comparison of the two basic configurations for a duplicating system, the copy rates obtainable with each of these configurations, and the major parameters to be considered in selecting a copy tape as well as a high-coercivity master. Performance characteristics which can be expected on distribution copies made by the contact-duplication technique are presented.

### **A Time Code for Electronic Editing and Control Systems**

**JOHN S. BAUMANN, Datatron, Inc., Santa Ana, CA**

A time code recorded in the cue track of video-tape recordings may be utilized to search for points in the recordings at which edits are to be made, and then to control the operation of electronic editing equipment, to preview and make the edits. In designing a code for this purpose the function of the code must be defined, and the characteristics, capabilities and limitations of video-tape recording equipment must be considered. Codes used in indexing, search and control on other types of magnetic tape recorders were examined, and one of these — IRIG B — was selected as a model. This code, with some modification, meets all the requirements in the video-tape editing application. The Vidicue time-code system is unaffected by tape speed, insensitive to frequency or phase, self-clocking and easily distributed. It has minimum interface requirements, failsafe features and utilizes proven search and control techniques. Since there is nothing proprietary about this code, it is proposed for consideration as a standard code by the industry.

## **WEDNESDAY MORNING—APRIL 29**

### **9:30 EQUIPMENT PAPERS AND DEMONSTRATIONS**

#### **Arriflex 16BL With Factory-Installed, Behind-the-Lens Professional Exposure-Control System (Paper)**

**VICTOR JAMES, Arriflex Corp. of America, Woodside, NY**

#### **Electric Animation Motor; Intervalometer for Arriflex (Demonstration)**

**JACK BEHREND, Behrend's Inc., Chicago**

#### **New Single System Sound for Eclair NPR; New Universal (Crystal Controlled Plus Variable) Motor for NPR (Paper and Demonstration)**

**KEN NELSON, Eclair Corp. of America, Los Angeles**

#### **A New Crystal Controlled Precision Drive System for Mitchell and Other Cameras (Demonstration)**

**LOREN L. RYDER, Nagra Magnetic Recorders, Inc., Hollywood**

## **WEDNESDAY AFTERNOON**

### **2:00 EDUCATION**

#### **A Physical Demonstration of Three-Dimensional Lensless Photography by Laser Light**

**TUNG H. JEONG, Lake Forest College and International Holographics, Inc., Lake Forest, IL**

The basic theory and applications of holography are demonstrated visually with both laser light and incandescent light sources. Various types of holograms are exhibited, including transmission, reflection, cylindrical, focused image and a new type recently developed called the Phasogram.

### **Computer Animation — A Practical Tool for Education**

**SHERRILL F. MARTIN, Joseph Kaye & Co., Inc., Cambridge, MA**

Within the last ten years, a class of machines has become available which have come to be known as computer output microfilmers (COM's). The most common type of COM displays the results of instructions from a computer onto a cathode ray tube. The display is then photographed by a camera to give a permanent record. In the case of a time-varying problem, the logical next step is to feed the computer results into a COM on a sequential basis, and thus produce, frame by frame, an animated motion picture of the solution. This approach has been developed and is expected to be of powerful assistance to instruction, on all educational levels, in such topics as fluid mechanics, geometry, calculus, electromagnetic (EM) wave theory, EM field theory and the theory of standing waves.

### **Computer Graphic Animation: A New Language for Education?**

**MYRON P. SMITH, Computer Image Corp., Denver**

Computers can now reproduce graphics, animation and pictures in motion, and can communicate to the uninitiated and uneducated as well as to the literate and sophisticated. This type of computer is a logical extension of motion pictures and television and may offer a new dimension, a new language for education. It is easily reproduced and distributed.

## **I. R. T. V.**

**A. P. HANWELL, City of Ottawa Public School Board, Ottawa**

### **The Open University — The Use of TV in a Nationwide University Credit Program**

**DAVID G. HAWKRIDGE, The Open University, Buckinghamshire, England**

### **Educational Television in Ontario**

**T. R. IDE, Educational Television Branch, Ontario Dept. of Education, Toronto**

### **Seminar Autolecture — A Low-Cost Multimedia Approach to Learning**

**ALBERT V. BAEZ, Encyclopaedia Britannica Educational Corp., Chicago**

Seminar/Autolecture is an open-ended learning system which utilizes educational and behavioral technologies such as multimedia use of overhead transparencies, 8mm loops, sound-on-tape and programed learning. Some of the features are high student involvement through a potentially error-free and low-distraction medium with emphasis on visual and aural stimuli, a personal approach and programed learning sequences; simplicity, flexibility and low cost of production and revision; student participation; and individual self-paced instruction, rapid feedback and retrieval of information if desired. The tape is 35-min long but usually fills a 50-min time period because of stops for student response. The moderator stops the tape whenever he can explain the subject better than the tape or slide. The written material on a single slide contains about enough information to fill the blackboard space in a small lecture hall. The student is given a reduced photocopy of all the visual material; therefore he does not take notes. Seminars following the Autolecture are unstructured, with discussion of any questions.



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**MANUFACTURERS OF SOUND-ON-FILM RECORDING EQUIPMENT SINCE 1931**

## **An Automated Audio-Visual Employee Survey**

**JOHN M. BISINGER**, CompUsound Systems, Inc., Chicago

Most, if not all, of mass communication is unidirectional, i.e., transmitted in one direction simultaneously to many receivers, none of which is able to respond with a counter-message. The consequences of this unidirectionality in the audio-visual (AV) field are that there is an overproduction of hardware and an underproduction of software; that AV is often regarded more as a plaything than a tool; and that the software manufacturers have largely remained print oriented. Recent developments to overcome this stagnation are the multiple-image "press screen," a manipulable projection surface; the MCR-100 (Multiple Channel Response) system, with digital coding and a variable-printout capability; and what is believed to be the first "totally automated employee survey."

## **Production Facilities for a New Film-Training and Education Program at Temple University**

**RAYMOND FIELDING**, School of Communications and Theater, Temple University, Philadelphia

A program of professional film training and education has been initiated within the Dept. of Radio-Television-Film of the School of Communications and Theater. Temple's program is focused entirely upon the use of film as a medium for creative documentary, film journalism, anthropological/ethnographic statements and as a form of cinema verité. The program is housed in a new production center for radio, television, theater and journalism programs. Both the facilities and the production hardware have been designed and selected to meet the particular requirements of a program which stresses location cinematography by small, mobile crews, together with the processing, editing, recording and rerecording involved in bringing documentary film productions to completion. Film studies and research courses on the graduate level seek to develop new techniques and approaches to the production of documentary films, and to develop both hardware and production management systems which are appropriate to this kind of film. Research is also conducted into the effectiveness of documentary films with particular audiences.

## **Random Selection and Branching in the Motion-Picture Audio-Visual Field**

**LEON W. WELLS**, Panopix Research Inc., Lodi, NJ

There is a danger that the current "education explosion" will lead to an unfortunate substitution of quantity for quality. To avoid the disaster of limited education for millions, it is essential to incorporate more and more technological aids into the educational process. However, in this, the teacher must not be allowed to become a mere machine complement, i.e., a projectionist, film splicer or mechanic. In the development of new equipment, audio-visual design engineers must take the educator in as a partner. Concepts of education must be expanded beyond the traditional "25 students per teacher" and the well advanced, but not always pertinent, techniques for the testing and scoring of students. Current philosophies intended to satisfy the individual needs of the gifted, normal and slow student are discussed, including Skinner's "straight-line programing" (fixed sequence of items); Crowder's "branching method" (alternate sequences for extra-bright or extra-slow students); the Cartesian or "single-method" (breakdown of subject into its smallest components); and the "selectivity," "dial-access," and "instantaneous review" disciplines. The Panacolor and multirow film format systems are found to be well suited to most of these modern educational philosophies.

## **WEDNESDAY EVENING**

### **7:45 COCKTAIL PARTY, BANQUET AND DANCE**

Entertainment features **MARGARET WHITING**

## **THURSDAY MORNING—APRIL 30**

### **9:30 FILM PRODUCTION FOR TELEVISION I**

#### **Film in Television**

**JOSEPH A. FLAHERTY, JR.**, CBS Television Network, New York

The use of film in commercial television broadcasting is reviewed. The growth of film in television is traced from the pre-video-tape era when film was the only media for the storage of recorded program material to the advent of practical magnetic recording, and through the complete conversion to color programing. The changes in program and commercial production, news gathering and documentaries and broadcasting which took place after the introduction of video tape are outlined, as are those changes following color conversion. The present situation is examined to highlight today's usage of film and video tape for all types of programs and program elements. Based on these facts, some conclusions are drawn as to the further development of film in television broadcasting.

#### **The Production of Filmed Color Commercials for Television—A Symposium**

**Participants:** **CARL STURGES**, Young & Rubicam, Inc.; **FRED J. SCOBAY**, DeLuxe General Inc.; **STEVE ELLIOT**, Elliot, Unger & Elliot; **K. BLAIR BENSON**, CBS Television Network; **EDWARD REINGOLD**, American Broadcasting Co.; **EDWARD P. BERTERO**, National Broadcasting Co.; **E. CARLTON WINCKLER**, CBS Television Network, New York; **JOHN STOTT** and **DAAN ZWICK**, Eastman Kodak Co., Rochester, NY

There is an increasing audience awareness of the variations in the color observed on home receivers. Most of the variations are minor, but some are great enough to detract from the enjoyment of the program or, in the case of commercials, to detract from the intent and impact of the message. Taken individually, each program segment may be extremely good and made with painstaking care, but adjacent to other segments it may not look well; this is unnecessary. The TV industry has recognized the problem and has acted in a positive manner for corrective action. This is a special version of an instructive symposium which has been prepared for presentation to explain production, photographic processing and color-evaluation guidelines for those concerned with all phases of production for commercials. The presentation uses especially prepared films, slides and video tapes to give factual explanations and clear demonstrations of specific problems and how to correct them. This symposium covers judgment of color quality, viewing conditions, television system limitations, color film standards, black-and-white reproduction, production techniques and the 16mm print market.

## **THURSDAY AFTERNOON**

### **2:00 FILM PRODUCTION FOR TELEVISION II**

#### **A Sponsor Looks at His Television Films**

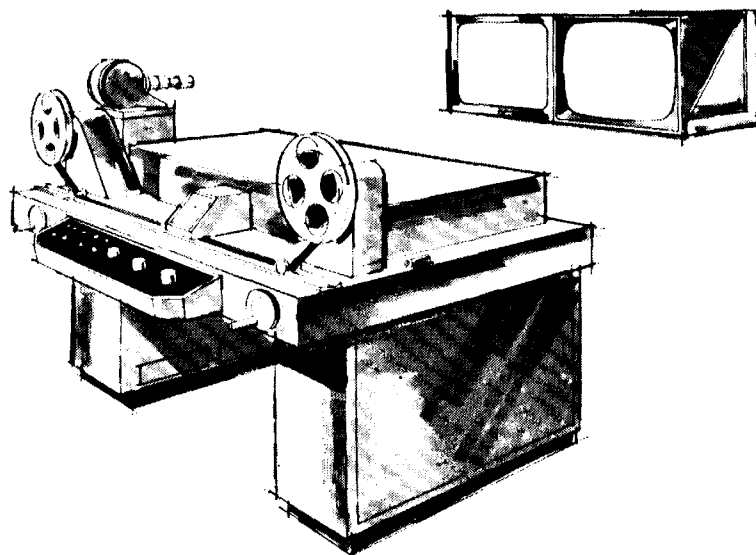
**TED GENOCK**, Broadcast Advertising Div., Eastman Kodak Co., Rochester, NY

#### **Television Commercial Production**

**MIKE CIMINO**, M.P.O. Videotronics, Inc., New York

#### **Television Commercials—A Challenge in Communications**

**FRED A. NILES**, Fred A. Niles Communications Centers, Inc., Chicago



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## **Shooting Motion-Picture Film for Middle Market Television**

**ERNIE CRISP, MP & EM Div., Eastman Kodak Co., Rochester**

Quality motion pictures can be made by middle- and small-market television stations. In many instances this can be done without an increase in total footage exposed, assuming that those in the station currently have or can obtain ME-4 processing facilities and normal newsfilming equipment. The minimum pieces of equipment needed in a small documentary or news unit on into the upper-middle-market operation and optimum equipment are covered, including some information on budget. The education (after employment) of personnel is probably more costly than the equipment itself, but if the man is to use it effectively, he must be taught, motivated and then immediately be given the opportunity to put this motivation to work.

## **European Television Film Quality**

**RICHARD THEILE, Institut fur Rundfunktechnik, Munich**

## **A Program to Improve Telecine Performance**

**WARD VUILLEMOT, Motion Picture & Education Markets Div., Eastman Kodak Co., Rochester**

## **FRIDAY MORNING—MAY 1**

### **9:30 FILM PRODUCTION FOR TELEVISION III**

#### **Sixteen Millimeter Program Production**

**JOHN LANT, Canadian Broadcasting Corp., Toronto**

The CBC is one of the few major international broadcasting organizations which has no 35mm film facilities. The reasons for this decision almost twenty years ago were that 35mm not only did not sufficiently improve quality, but without the necessary microwave facilities enjoyed today, 17 prints of each of some 50 hours of kine-recorded or film programming had to be air-shipped each week to nonconnected network stations, which was a major expense. The cost of the same operation in 35 would have been astronomical. There were problems: the lack of trained film specialists, e.g., cameramen, editors, directors, designers and make-up artists who knew too little about the craft of filmmaking. Although there was a good range of professional and semiprofessional equipment, facilities had to be improved and adapted for television. We all had to live with it while 16mm was lifted from the "amateur" status to the fully professional status it now enjoys.

#### **16mm versus 35mm Program Production**

**ELLIOT BLISS, CBS Television Network, Hollywood**

#### **Television Newsfilm**

**BRUCE DENNIS, WGN-TV, Chicago**

#### **An Electronics Film Marriage**

**CHARLES POWER, Reeves Production Services, New York**

## **FRIDAY AFTERNOON**

### **2:00 FILM PRODUCTION FOR TELEVISION IV**

#### **Electronic Video Recording**

**PETER C. GOLDMARK, CBS Laboratories, Stamford, CT**

#### **Holographic Movies for Television**

**BILL HANNON, Astro-Electronics Div., RCA Corp., Princeton, NJ**

#### **The Design of Film Review Rooms for Color Television**

**S. F. QUINN and E. WACHHOLZ, Canadian Broadcasting Corp., Montreal**

The Canadian Telecasting Practices Committee (CTPC) has issued its practice CTP1, "Viewing Rooms for Evaluation of 16mm Color Film for Television." CTP1 has been applied for the first time in the CBC Toronto Film Dept. Four film review rooms have been built with a common and separate projection room; the rooms can be operated independently of one another. The purpose of each room is to evaluate film quality from the point of view of the television viewer. To this end the screen has been built to look like a 25-in television monitor; a surround light has been provided. The listening environment has been designed to allow adequate evaluation of the soundtrack. A working desk, at the proper distance from the screen, includes remote controls of all projector circuits. It also houses a film timer and audio-level monitoring and control. The decor is pleasing and comfortable, as required for long periods of work by the film evaluators. Salient features of the equipment are described; of particular interest is the method of obtaining the surround light from the side of the lamphouse of the 16mm projector using a separate optical system.

#### **PANEL DISCUSSION: Review Rooms for Television**

**DAAN ZWICK, Eastman Kodak Co., Rochester, moderator.**

**Panelists: CHARLES A. AHTO, Tape-Films, Inc., New York; K. BLAIR BENSON, CBS Television Network, New York; FRANK P. BRACKETT, Technicolor, Inc., Hollywood; TED GENOCK, Broadcast Advertising Div., Eastman Kodak Co., Rochester; WILLIAM D. HEDDEN, Calvin Communications, Kansas City, MO; and STANLEY F. QUINN, Canadian Broadcasting Corp., Montreal**

It is generally agreed that lack of a standard viewing condition contributes to the undesirable color variability among 16mm films intended for television. It is also fairly generally agreed that if there is to be such a special viewing condition, that the color of the projection white be 5400°K. This panel covers such questions as how much more is it necessary to specify to have a working viewing-condition standard; what advantages would result; what difficulties would ensue; how can such conditions be achieved; what are the factors standing in the way of our industries implementing such a recommendation; where does SMPTE stand; how do the advertisers feel; what do the broadcasters think of this problem; will it make the laboratories' work easier or harder; and what experience do we have.