

Advance Program

This Program is as complete and accurate as was possible at press time. It may contain errors, and some changes and additions are expected before the Final Program is printed for the Conference. For example, the process of clearance, required for certain papers, may result in unforeseen delays prior to final scheduling. If very brief Conference attendance has to be planned to hear only one session, or a specific paper or papers, members are advised to inquire the week before the Technical Conference by telephoning the Society Headquarters in New York (212 TN 7-5410) or Program Chairman *John M. Waner* at Eastman Kodak Co. in Hollywood (213 HOLlywood 9-3101).

Outline of Program

Sunday

10:00-4:00 Registration

Monday

8:00 Registration
9:00 Motion Pictures, Television and Education
12:15 Get-Together Luncheon — Guest Speaker
2:30 Television Engineering and Production
7:45 Television Engineering and Production

Tuesday

8:45 CONCURRENT SESSIONS
Laboratory Practices
Television Engineering and Production
12:15 High-Speed Photography Luncheon
2:30 Instrumentation and High-Speed Photography
8:00 Soviet Motion-Picture Industry

Wednesday

8:45 Equipment Papers and Demonstrations
1:45 CONCURRENT SESSIONS
Sound Recording and Reproduction
Instrumentation and High-Speed Photography

Thursday

8:45 CONCURRENT SESSIONS
Special Photographic Effects and Cinematography
Instrumentation and High-Speed Photography
1:45 Special Photographic Effects and Cinematography
8:00 Time-Lapse Photography

Friday

8:45 Small-Format Films
1:45 Projection Practices

Association of Cinema Laboratories

Spring Meeting, April 11, 1964
Ambassador Hotel, Los Angeles

8:00 Breakfast Meeting for ACL Board of Directors — Garden Room.
10:00 Meeting of ACL Members — Regency Room.
12:00 Luncheon — Colonial Room.
2:00 Equipment and Techniques Forum — Regency Room. (This Forum is open to SMPTE members.)

SUNDAY—APRIL 12

10:00-4:00 Registration

8:00 A Pre-Release Feature Film

MONDAY MORNING—APRIL 13

8:00 Registration

9:00 MOTION PICTURES, TELEVISION and EDUCATION

An Experimental 8mm Film Production Workshop for Teachers

LOU T. WISE, *Toronto (Ont.) Board of Education*

The Toronto Board of Education, Teaching Aids Department, is conducting an 8mm film production workshop for 35 teachers. The objectives are four: to encourage teacher production of 8mm films peculiar to individual requirements; to promote programs of student film production; to encourage teachers to suggest ideas for 8mm single-concept films to be produced in the Teaching Aids Department; and to encourage wider use of motion pictures in the classroom and, through involvement in production, a greater awareness of the effectiveness of films.

Considerations in the Establishment of a Television Instructional Communication System

KEN WINSLOW, *University of California, Berkeley, Calif.*

Rapidly developing television technology offers a solution for some of the communication problems of education. Specific application of a television technique requires consideration of many design, application and utilization alternatives. Administrative, academic and physical points of departure are considered. Origination, distribution, display and delay functions, and voice, picture and control services of a television instructional communication system are considered and grouped by operating elements. The resulting analysis is reviewed as to architecture and engineering, standards, staffing and cost.

A Branching Teaching Machine Incorporating Sound Motion Pictures

DONALD G. PERRIN, *University of Southern California, Los Angeles*

A research project at USC required a teaching machine to present sound motion-picture information in a stop-start manner with the capability of branching to different sequences on the basis of the student's response. Four projectors allow immediate access to the branches, while relay logic maintains synchronism between the units. The unit, which employs standard film production procedures and off-the-shelf equipment, is low in cost and simple to program.

A Method for Time Compression of Instructional Television Materials

JAMES LOPER, *California State College at Los Angeles*

An experimental study in the visual and aural comprehension of compressed speech required the development of techniques for synchronization of sound and picture elements. Original video-tape recording, electronic film transfer, skip-frame printing, and compressed audio tape recordings are used in the process. Samples of original and compressed material are presented.

Filming of Speech Therapy Clinic Sessions Via Tape to Film Process

LAWRENCE J. SCHRAM, *Orange County Schools, Los Alamitos, Calif.*

The California Speech and Hearing Association produced 6 five-minute films of clinic sessions with speech handicapped children. Shown at the CSHA Conference, the films provided quality sight and sound reproduction by utilizing a tape to film process. Thus the association was able to produce a thirty-minute black-and-white film with sound at a minimum cost. The use of two cameras, plus the ability to do retakes almost immediately, eliminated the need for film editing and provided a more relaxed setting for the children.

Auto-Instructional Technology and the Motion-Picture Engineer

LEO PERSELIN, *Aerospace Corp., Los Angeles*

The technology of teaching machines and programed learning refers not so much to special kinds of hardware as to how hardware can be put to use. This is clearly reflected in the way today's proliferation of teaching-machine hardware shows an increasing emphasis on use of the motion picture. Devices commercially available and under development utilize as many as four motion-picture projectors in synchronous operation. This emphasis strongly suggests that the creative motion-picture engineer stands in the same relationship to the field of automated instruction as he does to other major areas of applied motion-picture technology.

Professional or Amateur Television?

CHARLES A. CALLACI, *Anaheim City School District, Anaheim, Calif.*

A professional broadcasting approach is necessary for efficient communication in educational television. This approach can only be made through professional standards for equipment and facilities, personnel and procedures. Where educational TV operations have limited funds for equipment and flourish, the on-camera personality is of utmost importance.

12:15 Get-Together Luncheon



Guest Speaker:
WILLIAM DOZIER
President, Greenway
Productions, Inc.
Beverly Hills, Calif.

MONDAY AFTERNOON

2:30 TELEVISION ENGINEERING and PRODUCTION

The Plumbicon TV Camera Tube

E. F. De HAAN, *NV Philips Gloeilampenfabrieken, Eindhoven, The Netherlands*

The Plumbicon TV camera tube is basically a vidicon with a photoconductive layer of microcrystalline lead monoxide. The tube is 20 cm long and has a useful sensitive area 2 cm in diameter, and resolution is claimed to be comparable with that of the 3-in. image-orthicon. The Plumbicon is being used in experimental color TV cameras in The Netherlands and England.

The Electronic Lap-Dissolve

FRANK BAIRD-SMITH, JR., *National Broadcasting Co., Burbank, Calif.*

After a brief review of the history of electronic lap-dissolve mechanisms, the principles and embodiment of an advanced design utilizing balanced emitter-followers feeding light-controlled resistors are discussed.

Test Device for Closed-Circuit and Broadcast TV Camera Systems

GIDEON FIAT, *Photo Research Corp., Hollywood*

The Spectra TV Optoliner is a test instrument that provides measurable and reproducible illumination at known levels and color temperatures. Integrated illumination and interchangeable test patterns, mounted to tolerances of 0.002 in., are self-contained. Optoliner permits accurate comparisons of performance of TV camera systems.

Stabilization Techniques in a New Video Processor

ROBERT A. DISCHERT and NORMAN P. KELLAWAY, *Broadcast and Communications Div., Radio Corp. of America, Camden, N.J.*

The video processor of the RCA TK-22 film chain utilizes a gain control system that contributes materially to the overall stability of the camera chain. Included in the processor is a clamp, clipper, gamma correction, remote control of gain and black level, and a control system that stabilizes the entire process.

Review of Telecine Systems

D. R. MORSE, *British Broadcasting Corp., London*

The Non-Additive Mixing of TV Signals

W. L. HURFORD, *Radio Corp. of America, Camden, N.J.*

A new approach to the problems of the generation of self-keyed inserts, special effects, and lap dissolves is presented. The present additive method of producing video dissolves is contrasted with the non-additive technique, and the many operational advantages which may be obtained by the extension of the non-additive mixing idea to title insertion are described. This technique also lends itself to the generation of special effects in the same equipment used for dissolves and keyed inserts, thus making possible a single device for the performance of all three functions.

MONDAY EVENING

7:45 TELEVISION ENGINEERING and PRODUCTION

Empirical Correction Factors for Television Filming

EDWARD P. ANCONA, JR., *National Broadcasting Co., Burbank, Calif.*

Visual characteristics of the image from a television film are influenced by the projector, the TV camera tube, video operation, the receiver, and home viewing conditions. A tutorial discussion, oriented to the background and experience of the cinematographer rather than the electronic technician, is given of these factors. Empirical corrections that should enhance the art and effectiveness of television film images are suggested.

The Color Television Dilemma: A Technical Survey of Color TV Systems

JOSEPH ROIZEN, *Ampex Corp., Redwood City, Calif.*

The very nature of color television is so complex that a number of solutions to the problem can yield relatively similar results. Since its introduction in the United States, the NTSC color TV system has been subjected to considerable competition from other systems claiming to be simpler, cheaper or more precise. There are technical details that separate the NTSC's 525-line system from its 625-line counterpart, and from the specific modes of operation of the color systems being proposed for European television, such as the line-sequential French (SECAM) system and the phase-alternating (PAL) German system.

Field-sequential color television for broadcast applications has not been completely discarded. Dr. Camerena of Telesistema, Mexico, is currently conducting experimental transmissions with a bi-color TV system using a rotating filter on a monochrome camera. Pickup and display devices for color TV developed abroad will also affect future color systems.

Considerations in Color Film Production for Color Television

JOHN M. WANER, *Committee Chairman*

A joint subcommittee of the Television and Color Committees has been working to establish recommended practices for density and contrast range for color films for color television. During the subcommittee's work it became evident that optimum control of release print density range could be achieved only if the original photography were carefully controlled; therefore, it was felt essential to provide an appendix to the recommended practice which would discuss in some detail the "Considerations in Color Film Production for Color Television."

Certain factors in color TV film transmission and reception make it desirable to control the characteristics of the color print, and the degree and type of controls which can be applied are affected by properties of the color film. The density range of the color print is most effectively and economically controlled in the staging and photography, rather than in the final printing. Reflectance of fully illuminated scene elements which are to be reproduced with good detail should be held between recommended maximum and minimum limits to control the "reference white" and "reference black" of each scene, and face tones should be properly related to these limits. For a fully lighted day interior scene, a lighting ration of 2:1 is recommended. Higher ratios may be used for special effects and night scenes.

Setup of Color Monitors by Instrumentation

ALEX QUIROGA, *National Broadcasting Co., Burbank, Calif.*

The television control room might be regarded as the equivalent of a motion-picture screening room. For the screening room, precise standards regarding screen brightness and color temperature (degrees Kelvin) are prescribed by the ASA. The FCC also suggests precise standards to balance the color monitors. Many of the present setup techniques fall short of meeting these standards because of psychophysical viewing conditions, which are described. Subjective evaluation is eliminated through an instrument that measures low and high lights on the TV receiver.

Film Requirements for Color Television

W. H. CHEEVERS, *British Broadcasting Corp., London*

An Economical and Simplified System for Color Television

GUILLERMO GONZALEZ CAMERENA, *Telesistema Mexicano, S.A., Mexico City*

A bicolor, field-sequential TV system has been planned with the primary purpose of obtaining full-color television by the most economical means possible, and at the same time resulting in a more simplified and practical system. The system is demonstrated with video tape and an adapted receiver.

TUESDAY MORNING—APRIL 14

CONCURRENT SESSIONS

8:45 LABORATORY PRACTICES

An Editing Bench for Industrial Film Production

GEORGE W. TRESSEL and STANLEY J. ANDREWS, JR.,
Argonne National Laboratory, Argonne, Ill.

A unit editing bench serves as the basic building block for a flexible industrial film editing room. The bench, a self-contained, free-standing unit, incorporates multiple-track sound equipment, as well as most of the equipment normally desired for industrial editing. Dimensions have been chosen to create privacy and a comfortable work center. The bench incorporates a sound wall that acts as a partial room divider and lends itself to changing space and location problems.

A Modern Concept of Optical Printer Construction

HAROLD A. SCHEIB, *Cinema Research Corp., Hollywood*

To satisfy present-day operating requirements, recently developed construction techniques were employed in building a new type of optical printer. Many problems of high manufacturing costs and awkward equipment maintenance were eliminated by utiliz-

ing commercially available components for the drive system and assembling them in modular fashion. A variable-speed motor drive, an electronic programing system, a large, stable optical bench, and an automatic fader mechanism complement the operating versatility of the unit.

Use of Xenon Flashtubes as a Light Source in Color and Black-and-White Scene Testers

CARL W. HAUGE, EDWARD H. REICHARD and LEONARD L. SOKOLOW, *Consolidated Film Industries, Hollywood*

The Cinex Exposure Tester has been widely used for many years to make timing tests from black-and-white negatives. By replacing the incandescent lamp in this tester with a xenon flashtube, with its capacitor-discharge power supply and resulting stable and reproducible light output, a superior testing machine has been developed. The exposure gate has been modified to contain a series of neutral density steps matched to the printing machine lights; for color, a selected range of color filters is added to the neutral densities. The resulting intensity-scale tests closely match printing-machine exposure times, thereby resolving film reciprocity differences normally present in Cinex tests.

These modified units have been used for several years in black-and-white testing with 30 w/sec to the xenon lamp. By increasing this input to 300 w/sec, the tester is adaptable to color scene testing.

An Automatic 35mm "A & B" Composite Color Printer

SIDNEY P. SOLOW and EDWARD H. REICHARD, *Consolidated Film Industries, Hollywood*

A high-speed color printer for making composite prints from 35mm original color negatives is described. The printer, operating at 120 ft/min, incorporates fades and dissolves in the prints without the use of duplicate effects-negatives. Scene-to-scene color and intensity changes, as well as variable length effects, are monitored by means of a transistorized radio frequency proximity cue detector.

The lamphouses, readers and fader systems, with slight modifications, are of the latest Bell & Howell design, similar to those used in the B & H Additive Printers. A single light valve is employed for intensity control, and color control is accomplished by a system of multiple-layer, single-frame color filters. The lamphouses are designed for future installation of two more light valves and dichroic mirrors, should conversion to additive color printing be desired. The printing machine is controlled by a punched paper tape that programs predetermined intensity changes and fade lengths.

A New Medium-Speed Reversal Color Film for Motion-Picture Use

H. W. VOGT, *Photographic Technology Div., and T. J. MURRAY, Research Laboratories, Eastman Kodak Co., Rochester, N.Y.*

Eastman (or Kodak) Ektachrome MS Film is a daylight-balanced, reversal color film for 16mm and 35mm motion-picture and instrumentation use. Film structure, sensitometric characteristics and recommended printing methods are discussed. Measurements reported include granularity, modulation transfer function and reciprocity failure characteristics. Standard processing yields optimum quality at an exposure index of 64. Process modifications also make possible the use of effective exposure indices from 16 to 256. For special engineering applications, an effective exposure index as high as 1,000 can be obtained, but with considerable loss in quality. A picture demonstration is presented.

A History of Spray Processing

RALPH D. WHITMORE, JR., *Oxberry Corp., New Rochelle, N.Y.*

Spray processing has been commercially successful since the middle thirties when it was first used at DeLuxe Laboratories in New York. Since that time, many laboratories have installed spray equipment and in some cases have completely eliminated immersion processing. Some of the data resulting from the industry's extensive research on spray processing are discussed.

Lubrication of Motion-Picture Film

FREDERICK J. KOLB, JR., and EDWARD M. WEIGEL, *Manufacturing Experiments Div., Eastman Kodak Co., Rochester, N.Y.*

Projection performance of processed motion-picture film is improved by lubrication whereby the coefficient of friction is controlled within the range that gives steady, reproducible positioning of successive frames with the least strain on the perforations. Printer effectiveness can also be improved by lubricating the negative to facilitate a constant pitch relationship to the raw-stock, and to minimize minor abrasions. In spite of extensive research work on film lubrication and the wide experience gained over the years, considerable misunderstanding of this subject still exists. The pertinent background is reviewed, processes and materials for lubrication are examined, and several procedures of proven effectiveness are described.

Photographic Evaluation Parameters

SAMUEL BOUSKY, *Ampex Corp., Redwood City, Calif.*

Photographic science terminology is reviewed as an outgrowth of silver halide background, with present-day extension to encompass (1) increased variety of non-silver halide processes, (2) transition to more fundamental physical concepts and (3) modification to analytical methods of communication and information theories. Although theoretical developments and mathematical derivations are avoided, simplified transitions are indicated from such established parameters as exposure index, resolution, latitude and granularity to the more recent concepts of energy sensitivity, spatial frequency response, dynamic range and signal-to-noise ratio.

CONCURRENT SESSION

8:45 TELEVISION ENGINEERING and PRODUCTION

Operational Adjustment of Picture Monitors in Television Studios

C. A. SIOCOS, *Canadian Broadcasting Corp., Montreal*

Results are given of surveys and subjective tests made seeking a consistent method for the day-to-day adjustment of picture monitors in order to secure relatively constant picture conditions. Expressions are derived giving the desired degree of uniformity of ambient light falling on a row of monitors and others giving the white-to-ambient and black-to-ambient luminance relations producing the highest degree in similarity of appearance between monitors in different ambient light. Considerations regarding the practical application of the above expressions are also discussed. These considerations include guide posts derived from a survey of operational preferences of many practicing technicians.

CBC Vidicon Telecine Operating Standards, With Particular Reference to the Gray-Scale Characteristic

S. F. QUINN and J. BOWIE DICKSON, *Canadian Broadcasting Corp., Montreal*

The various factors influencing the choice of vidicon operating parameters for telecine are considered together with the consequent vidicon light-transfer characteristic. Measurements have been made on the components affecting the overall telecine gray-scale characteristic, which has been computed graphically. Further computations have been made using the telecine characteristic and a typical film print-through characteristic, and the resultant curve is shown to be similar to that of the image-orthicon camera. The usefulness of a gray-scale slide in general telecine operation is shown to be limited by shading errors.

New Animation Production Techniques Using Video Tape

MILT ALTMAN, *National Broadcasting Co., Burbank, Calif.*

Recent developments in the field of video-tape recording make it possible to create animation effects. These are accomplished by recording images on a single-frame, "stop motion" basis.

The recorded images can be artwork, three-dimensional objects, live action, or a combination of the three. Various aspects of an electronic animation system are discussed, with emphasis on its value as a new production tool. Examples of animation using the new system are shown.

The TP-66 16mm TV Projector

A. E. JACKSON, *Broadcast and Communication Div., Radio Corp. of America, Camden, N.J.*

A 16mm film projector designed to cover present and predicted future needs of broadcast television is described. A system of rapid sound stabilization has been developed to eliminate the need for pre-roll. Automatic loop restoration, servo-driven screen brightness control and pulse-operated control circuits make the projector suitable for use with automated systems.

A New Television Switching Equipment

H. MIRZOWSKI, *Marconi Co., Ltd., Chelmsford, England*

With the growth of television there has been an increasing demand for larger and more sophisticated switching equipment. The use of relay or semiconductor matrices is not economical in cost or space with increased size. In a search for an alternative switching element, the choice fell on the standard type of Post Office uniselect or stepping relay. The unit and its advantages are described.

New Solid-State Sound-Mixing Equipment for Television

D. B. MANNING, *Marconi Co., Ltd., Chelmsford, England*

Modern television studios call for more and more microphone channels. Sound-control desks have, therefore, become increasingly complex. The introduction of transistorized modules has enabled the production of compact designs giving full facilities. A typical transistorized sound-control desk is described and subsequent developments are discussed.

Image-Orthicon Operation

EARL FARIS, *American Broadcasting Co., Hollywood*

The critical, complex, little understood and controversial image-orthicon operation is further confused by the characteristics of the increasingly used 4 1/2-in. tube. This study includes a partial investigation of the "saturated target" and "linear" modes of operation with a review that includes "redistribution" and "spurious signal" phenomena and a comparison between the commonly used 3-in. 5820 (7293 screen-mesh version) and the 4 1/2-in. 7295. The various operating modes of the 7295, including the linear mode with its limited light-contrast capability that requires control of set reflectance and lighting, are explored.

TUESDAY NOON

High-Speed Photography Luncheon

Guest Speaker:

H. E. BAUER, *Douglas Aircraft Co., Santa Monica, Calif.*
Economics of Photooptical Instrumentation

The economic value of photooptical instrumentation analysis has long been recognized by the aircraft, missile and space-vehicle industry. It is proposed that engineers may significantly increase their effectiveness in developing and utilizing photooptics by applying certain economic disciplines that are now available. These techniques have been developed through the efforts of industry and the government to improve the effective management of major development programs. Typical of such techniques are value analysis, PERT-time and PERT-cost. The modern engineer must update himself not only in his technical specialty but also in economic and management specialties.

TUESDAY AFTERNOON

2:30 INSTRUMENTATION and HIGH-SPEED PHOTOGRAPHY

"Seeability" and Resolution in Space Reconnaissance
CHARLES R. JEFFS, JR., and KINGDOM KERR, *Douglas Aircraft Co., Santa Monica, Calif.*

Reconnaissance of the earth from space platforms located at an altitude of 100 miles may be impractical if only resolution criteria are used. The results of Cooper's flight during the Mercury program indicate that preconditioned resolution leads to a reconnaissance capability that may be defined as "seeability." Factors affecting "seeability" and attempts to reduce the confusion of "seeability" with resolution are discussed.

Photographic Instrumentation for Reentry Measurements

W. G. PLANET, *Barnes Engineering Co., Stamford, Conn.*

Photographic instruments have aided immeasurably in the acquisition of data during the reentry phase of ballistic missile tests. These include ballistic cameras for trajectory determination, spectral cameras for chemical and thermal studies, and an assortment of non-dispersive, high-resolution or high-speed cine cameras for spatial and aerodynamic studies. Some typical photographic systems used on these tests and details of their choice by function and performance capabilities are discussed.

New Frontiers in Ultra-High-Speed Photography

K. R. COLEMAN, *Atomic Weapons Research Establishment, Aldermaston, England*

Use of Time-Lapse Motion-Picture Photography in the Study of Cloud Dynamics

C. E. ANDERSON and L. R. KOENIG, *Douglas Aircraft Co., Santa Monica, Calif.*

Many characteristics of the formation and development of clouds may be profitably studied by photography. The application of time-lapse photography to the acquisition of data concerning the dynamical properties of clouds is reviewed. Tools of acquiring, reducing, and interpreting data are discussed. Time-lapse photographs of developing convective clouds are shown.

Use of Color Film in Manufacture of Large-Area Color Map Transparencies

E. E. GRIFFITH, *Technicolor Corp. of America, Burbank, Calif.*

Large (36-in. by 36-in.) color transparencies are being manufactured for use as land mass simulation. Information is coded in each of three color images to permit simultaneous readout of three information channels. Factors in the selection of the color film for this unusual application are discussed. There are highly specialized procedures for the printing, processing, retouching, and cementing of color maps. Problem areas in manufacture, including crosstalk, register, and printed-in defects, are discussed.

Instruction in Photooptical Instrumentation

D. B. HOWARD, *Douglas Aircraft Co., Santa Monica, Calif.*

The history of one of the first practical courses in photooptical instrumentation offered in this country is traced. The great demand for such instruction is noted.

TUESDAY EVENING

8:00 PANEL PRESENTATION

Soviet Motion-Picture Industry

DEANE R. WHITE, *SMPTE Engineering Vice-President*;
WILLIAM E. GEPHART, Jr., *Governor, SMPTE*; and ETHAN
M. STIFLE, *SMPTE Executive Vice-President*

As reported briefly in the December 1963 *Journal* and quite extensively in the March 1964 *Journal*, a delegation of the SMPTE officers noted above and Frank Capra, the motion-picture director-producer, visited the USSR as a delegation forming one unit of the Cultural Exchange Program negotiated between the Soviet Union and the United States. The visit dealt with the technical aspects of motion-picture production and presentation, as developed in the USSR. Eighteen sites were visited in five cities: Moscow, Leningrad, Kiev, Odessa and Alma-Ata. These included studios, theaters, processing laboratories, an equipment factory, a television station, a design bureau and a research center. Much of the equipment seen was quite similar to corresponding items in the USA and elsewhere. A few units showed independent design features that appeared interesting.

Many photographs were made of units seen; these photographs describe the equipment in greater detail than could be done by words. Samples were obtained of processed color negative, color negative raw stock (masked) and color print raw stock now in use in the USSR. The report is given in three parts:

(1) Plans for the trip; changes suggested in Moscow; cooperation received in making the visits scheduled; incidents of the trip; observations and general conclusions;

(2) Technical description of equipment, illustrated with many color slides; and

(3) Report of tests made on Soviet color film—particularly, raw stock samples and processed color negatives—obtained on the trip. Screen quality is shown with US color prints made from Russian negatives.

After these presentations, the delegates will be available to answer questions from the audience.

WEDNESDAY MORNING—APRIL 15

8:40 EQUIPMENT PAPERS and DEMONSTRATIONS BY EXHIBITORS

New ColorTran Light (Paper and Demonstration)

HERBERT A. HOLLANDER, *ColorTran Industries, Burbank, Calif.*

Model 120S Arriflex Sound Blimp for Arriflex-35 Cameras

VICTOR JAMES, *Arriflex Corp. of America, New York*

Remote Control Lenses for Vidicon Cameras, With and Without Automatic Diaphragm Control, and Zoom Lenses for Professional Motion-Picture Cameras With and Without Viewfinders (Paper)

WALTER STEUER, *Zoomar, Inc., Glen Cove, N.Y.*

Luminance Standard and Precision Log-Linear Photometer (Demonstrations)

HAROLD P. FIELD, *Gamma Scientific, Inc., San Diego, Calif.*

Eclair GV-35 High-Speed Camera With Transistorized Speed Control; Eclair GV-16; Gear Head (Demonstrations)

J. P. CARSON, *Eclair Corp., Los Angeles, Calif.*

New Special-Effects Optical Printer for Motion Pictures, Including Related Devices and Innovations (Paper)

HAROLD A. SCHEIB, *Research Products, Inc., Los Angeles, Calif.*

Two New Models of "Vista-Sell" Projectors (Demonstration)

HOWARD TURNER, *DuKane Corp., St. Charles, Ill.*

The Palmer Television Film Recorder and a New 16mm 2400 ft Modular Magazine (Paper)

JOHN CORSO, *W. A. Palmer Films Inc., San Francisco, Calif.*

16mm "JAN" Projector Modified for Use With a 450-w Xenon Light Source (Demonstration)

FRANK H. RIFFLE, *Carbons, Inc., Boonton, N.J.*

Atlas Portable Projector (Demonstration)

WALTER E. MCCORMICK, *Atlas Projector Corp., Culver City, Calif.*

New Modular Optical Printer and 16mm High-Speed Film Inspector (Paper and Demonstration)

ROBERT TROY, *Oxberry Corp., New Rochelle, N.Y.*

New Improved Model 224-A Photooptical Data Analyzer (Demonstration)

R. H. LAWRENCE, *L-W Photo, Inc., Van Nuys, Calif.*

Underwater Camera Housings and Underwater Lighting Equipment—SeAQUArTz (Demonstrations)

CLIFFORD SAWYER, *Birns & Sawyer Cine Equipment Co., Inc., Hollywood, Calif.*

Transist-O-Sound Wireless Microphone for Television Newsreel Sound on Film (Paper)

DOM CAPANO, *S.O.S. Photo-Cine-Optics, Inc., New York*

New Transmission Densitometer 0—4.0, With Certified Kodak Status "M" Printing Density Filters and Visual Filter for Soundtrack (Demonstrations)

FREDERIC MCCURDY, *Macbeth Instrument Corp., Newburgh, N.Y.*

Development of Lawlette Film Processing Machines (Paper)

F. W. SYLVESTER, *Newman & Guardia Ltd., England*

WEDNESDAY AFTERNOON

CONCURRENT SESSIONS

1:45 SOUND RECORDING and REPRODUCTION

Cinerama Theatre Acoustics

M. RETTINGER, *RCA Broadcast & Communication Products Div., Burbank, Calif.*

Acoustic problems arising in hemispherical enclosures are discussed, and then the acoustic design and the results of acoustic measurements of the recently completed Cinerama Center Theatre in Hollywood are described. This theater features a "geodesic dome," or quasi-hemispherical vault.

A Simple Approach to the Quality-Control Problems of 16mm Variable-Area Soundtracks for the Smaller Studio and Laboratory

GORDON WILLIAMS, *Walt Disney Studios, Hollywood*; and MICHAEL STRONG, *World Wide Pictures, Sherman Oaks, Calif.*

Commercial negative and print tolerances produce some prints with unacceptable sound quality, so additional control is necessary. 6,000-cycle cross-modulation tests are found to give more accurate control than the conventional 4,000-cycle tests. Use of a short, one-shot cross-modulation test on the negative and a simple cross-modulation distortion meter, designed for operators with no special training, indicates both direction and amount of density correction necessary to obtain optimum results.

An Improved Method of Level Control for Broadcasting and Recording

JAMES F. LAWRENCE, JR., *Teletronix Engineering Co., Los Angeles*

An improved audio compressor-limiter system has been developed, making use of a new linear optical attenuator. The shortcomings of existing systems are overcome by producing light instantly and in direct proportion to audio level through the use of electroluminescence. The light controls amplifier input level by means of a photo-conductive cell. There is no distortion due to limiting, and the attack time for the system is 10 μ sec.

The Performance of Photographic Soundtracks on Eastman Color Print Film, Type 5385, With Special Reference to 8mm Usage

J. G. STREIFFERT and J. F. FINKLE, *Research Laboratories, Eastman Kodak Co., Rochester, N.Y.*

It is shown that a top-layer dye soundtrack reproduced with an S-4 type photosurface compares very favorably with multilayer dye-plus-silver tracks. With high-quality reduction printing and reproducing equipment, substantially the same performance can be achieved at equivalent wavelengths and track widths on 8mm film as on 35mm. Tracks on 8mm film made to be scanned with a slit 0.020 in. in width have been found to have more than adequate commercial quality if proper attention is given to sensitometric conditions and dirt and damage control.

A Prefabricated Acoustical Window

RALPH LANE and CLYDE TUCKER, *Miller Sliding Glass Door Co., Burbank, Calif.*

A new prefabricated acoustical window maintains an hermetic seal and provides a chambered frame assembly. The window has a minimum certified rating of sound transmission Class 48, and will receive any type of glass from 7/32 to 1/2 in., including heat-absorbing, one-way mirror, tinted and safety glass.

Simplified Blooming, Synchronization, Camera Drives and Slating

LOREN L. RYDER, *Ryder Sound Services, Inc./Magnetic Sales Corp., Hollywood, Calif.*

New techniques for blooming, synchronizing, camera drives and slating are now available. Advancement into the new techniques may be made in steps, but each step must fit into an overall, feasible pattern. The relative merits of several systems are discussed, and specific recommendations are presented.

CONCURRENT SESSION

1:45 INSTRUMENTATION and HIGH-SPEED PHOTOGRAPHY

Pinhole Optics

JOHN M. FJELD, JR., *Douglas Aircraft Co., Santa Monica, Calif.*

A space-flight simulator is being designed that utilizes closed-circuit television cameras that translate along a track and view a

model. As the distance from the cameras to the model changes, conventional glass lenses would require continual refocusing. A pinhole requiring no refocusing was considered and was found by experiment to produce quite adequate images for this application. Thus the pinhole assumed an important part in a large-scale space simulator. The problem of finding the optimum diameter for the pinhole is discussed. Several mathematical methods for determining an optimum pinhole diameter are presented. The basic theory and the primary assumptions for each method are discussed, and the results of the various methods are compared.

Pinhole Optics and Simulators

A. H. GALLAS, C. A. GILBERT and A. B. HITTERDAL, *Douglas Aircraft Co., Santa Monica, Calif.*

A description of the operational advantages gained by use of pinhole optics in the design of a visual flight simulator is presented. Television engineering problems associated with the use of pinhole optics, particularly with regard to the scene lighting required, are outlined. The trade-off between a common lens system and a pinhole lens system is discussed. The need for unique manufacturing and quality control methods to produce satisfactory pinholes also is considered, along with some associated problems in designing peripheral visual display equipment. Finally, a theory of the choice of pinhole focal length and aperture size is discussed.

Physical Characteristics of Xenon Flashtubes

FRANK S. BARNES, *University of Colorado, Electrical Engineering Dept., Boulder, Colo.*

The physical characteristics of xenon flashtubes are reviewed. In particular, the spectral output of xenon lamps is discussed in terms of watts per unit wavelength for different wavelengths and current densities. Attention is given to the effects of varying the pressure, length and diameter of the flashtube on the total light output, and the conversion efficiency of electrical to optical power. Additionally, the influence of the exciting pulse shape on the conversion efficiency is described, along with some problems in impedance matching for the driving source.

Reconnaissance and Surveillance Photography

JEROME S. GOLDHAMMER, *Chicago Aerial Industries, Barrington, Ill.*

Current capabilities of photo-reconnaissance and surveillance techniques are neither as limited as commonly believed pre-Cuba nor as omnipotent as claimed in the lay press post-Cuba. Photo capabilities and limitations are compared with the performance potentials of other possible reconnaissance sensors, such as television, infrared and radar. Choices of sensors for specific needs are indicated, and growth possibilities are discussed.

Photography in Astronomy

R. M. CAMERON, *Douglas Aircraft Co., Santa Monica, Calif.*

Astronomy was one of the first sciences in which photography was used as a prime means of qualitative and quantitative analysis. However, photography in astronomy is filled with problems of great magnitude—figuratively and literally. The intensity and spectral range encountered in studies ranging from the Sun to the faintest stars and galaxies within reach of the larger telescopes require meticulous considerations of the spectral and sensitometric characteristics of photographic emulsions. Highlights of problems encountered are discussed along with past and current techniques employed in astronomical photography. Anticipated advancements in techniques also are discussed.

Time-Lapse Photography of Chromospheric Phenomena

JOHN FRITZEN, *Lockheed California Co., Burbank, Calif.*

In an observatory monitoring the chromospheric phenomena visible in the hydrogen alpha emission of the Sun, a telescope, together with an 0.5A filter and camera, is used for time-lapse photography. The resultant films are separated or recombined through the use of standard optical printing techniques for the study of various solar events.

Photooptical Instrumentation in Medicine

IRVING REHMAN, *University of Southern California, School of Medicine, Los Angeles*

Photooptical instrumentation, with special reference to techniques and problems in medical photography, is briefly reviewed. Specialized instrumentation in endoscopy, infrared, ultrasonics, photomicrography and electron microscopy is discussed, along with instrumentation, recording and monitoring problems in cineradiography and other x-ray techniques. The application of closed-circuit TV in medical training, surgery and research also is discussed.

Automatic Lens Design Illustrated by a 600mm, f/2.0, 24° Field Lens

BERLYN BRIXNER, *University of California, Los Alamos Scientific Laboratory, N.M.*

Representative prescriptions, together with performance evaluations, are given for six designs in a sequence developed to improve performance of an eight-element, ballistic missile camera lens. The lens was redesigned with the LASL computer program, which analyzes lens performance statistically by multiple ray tracing and minimizes image defects by the least squares method. The design giving best performance uses ordinary low-index glasses. This work was done under the auspices of the U.S. Atomic Energy Commission.

WEDNESDAY EVENING

6:45 Cocktail Party, Banquet and Dance

THURSDAY MORNING—APRIL 16

CONCURRENT SESSIONS

8:45 SPECIAL PHOTOGRAPHIC EFFECTS and CINEMATOGRAPHY

Traveling-Matte Photography and the Blue-Screen System

WALTER BEYER, *Universal Pictures Corp., Universal City, Calif., and Chairman of Research and Education Committee of American Society of Cinematographers*

Traveling-matte systems available for feature film production are summarized. The blue-screen system as it is presently used, including all specifications for equipment and photography on the set, is discussed in detail. Emphasis is given to use of the blue-screen system with transparent subjects and fast-moving objects.

Technique for Composite Motion Pictures

JOSEPH WESTHEIMER, *Westheimer Co., Hollywood*

A method for making composite motion pictures for black-and-white presentation is described and illustrated. This technique, which employs the use of the blue-screen traveling-matte system, provides a greater degree of flexibility to the producer, with a saving of both time and money. Demonstration material consists of illustrations from current television film shows and commercials.

Demonstration of Modern Composite Cinematography

LINWOOD G. DUNN, *Film Effects of Hollywood, Inc., Hollywood*

Excerpts from the 70mm Technicolor Ultra-Panavision production, *It's a Mad, Mad, Mad, Mad World*, are shown to illustrate modern techniques in photographic effects. A composite scene that required twenty-one exposures in the camera is shown in breakdown form. Other examples of special-effects cinematography also are shown.

A New Rear-Projection Process

A. ARNOLD GILLESPIE, *Metro-Goldwyn-Mayer, Inc., Culver City, Calif.*

Standard rear-projection process uses "center-line" single or superimposition projection of background plates on a translucent screen. M.G.M.'s new "laced" process uses extracted halves or thirds from a single original negative and "spread" projectors. Two or three extractions are used to make a single photographable background, the segments having been "laced," or blended together. Considerable gain in quality and scope is reported with the new process.

An Aerial-Image Unit for Industrial Animation

GEORGE W. TRESSEL and STANLEY J. ANDREWS, JR., *Argonne National Laboratory, Argonne, Ill.*

The aerial image unit is a valuable tool for inserting diagrams in industrial motion pictures. The principal problems associated with such a unit are design of the field lens for minimum spherical aberration, and critical alignment of the optical train. High-quality projection lenses and large aperture are also necessary to prevent color fringing caused by the condenser system.

Electronic Control Unit for an Industrial Animation Camera

GEORGE W. TRESSEL and STANLEY J. ANDREWS, JR., *Argonne National Laboratory, Argonne, Ill.*

Industrial animation involves specialized camera controls inasmuch as a minimum of cell-by-cell animation is used. Instead, a great deal of cyclic, scratch-off, and build-up animation is involved. An electronic control unit with parallel time-delay controls greatly simplifies these operations. The usual elaborate animation camera log is replaced with a simple cue sheet. The board includes control for an aerial image unit with provision for multiple framing. Visual indicator controls provide an immediate check for camera modes and conditions to minimize possible error.

Considerations in the Design and Construction of a 360° 16mm Ten-Camera Rig

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

A number of cameras are coupled for the synchronous photography of a 360° field. Special consideration must be given to the selection of these cameras as well as their mechanical coupling, optical integration, the structure of the assembly and electrical controls. Some of these alternatives are strongly influenced by the script and reliability considerations. The relationships between photography and projection also play a part in the philosophy of the design.

Variable-Beam Reflector Spotlight for Quartz-Iodine Lamps

ROBERT E. LEVIN, *Sylvania Electric Products, Inc., Lighting Div., Salem, Mass.*

A variable-beam spotlight utilizing the compact quartz-iodine lamp has been developed. Significant gains in optical performance and reduction of size and weight over conventional units are realized. The small source size permits new forms of reflector optics to replace the conventional lens systems. The theory of design and operation are discussed, and the photometric performance is reported. The system is planned for use in cinematography, television and related areas.

CONCURRENT SESSION

8:45 INSTRUMENTATION and HIGH-SPEED PHOTOGRAPHY

Photographic Flame Analyses

JOHN H. WADDELL, *Douglas Aircraft Co., Santa Monica, Calif.*

The photography of self-luminous subjects has always created problems. Among these subjects have been missile launchings,

nuclear explosions, arc welding and burning hydrogen. Each of these types of luminous bodies has individual characteristics, and a logical pattern for these analyses requires a knowledge of brightness and spectral characteristics of the flame, color and neutral filters and film sensitivity. A hydrogen flame is practically invisible but when photographed on infrared-sensitive film through a deep red filter, the flame becomes observable. Another example is the photography of arc welding where puddle formation can be photographed, as well as the ionization of the arc at the electrodes. The technique here is to vary the exposure—each phenomenon being studied at a different exposure. The exposure may vary 30,000 times to secure the necessary spread.

Jump and Weave in High-Speed Motion Pictures

JOHN H. WADDELL, *Douglas Aircraft Co., Santa Monica, Calif.*

High-speed motion pictures have a tendency to jump or weave when they are projected. Several causes for this tendency are suggested: (1) Ambiguous American Standards for the perforation of film. The tolerance summations are not equal when using T-2E against 1 + 2C. This discrepancy is compounded by the film manufacturers' hesitancy in giving camera designers their working standards. (2) Pitch variation in the film, which is reflected by slippage on the film on the sprocket at high velocities and accelerations. These velocities may be up to 300 ft/sec, which may be reached in 0.4 sec. It is impossible to design a sprocket tooth that will fill the perforation, and to design 12 teeth 0.3 in. apart in engagement. (3) The use of "green" film, *i.e.*, film that is still maldimensioned after development, in the projector. Processed film should cure for 48 hours before projection.

Accurate Coded Timing-Light Generator

ROGER BOY De La TOUR, *Douglas Aircraft Co., Santa Monica, Calif.*

Photographic techniques are extremely useful in the study of fast phenomena or transient conditions. In such studies, it is necessary to know precisely the time elapsed during the different phases of the phenomenon. If more than one high-speed camera is used, it is important to correlate the time indications for all cameras, so that simultaneous photographs can be assembled.

The easiest way to record time is to mark it on one edge of the film by means of a time-coded light. An accurate coded timing-light generator, giving precision of a fraction of a millisecond, has been built and is described. It is capable of coding many cameras simultaneously at distances of many hundreds of feet. The master unit is triggered by a crystal-controlled oscillator. Transistorized multivibrators generate the timing for the length of the different pulses indicating the seconds, the tenths, hundredths and thousandths of seconds. A transistorized switch applies 350 v to a NE 51H neon bulb. Slave units are used at each camera location. They can work on dry batteries and are fully transistorized. The complete system is composed of the decimal system above, marking one edge of the film, and of a real-time digital master connected to the real-time slave units and lamps that mark the opposite edge of the film.

An Automatic Camera Tracking System

W. J. GIBSON and D. H. SMITH, *Douglas Aircraft Co., Santa Monica, Calif.*

An automatic camera tracking system is one in which the servo control loop is closed by the optical light path. Deviations from the optical axis of the object being tracked result in error signals derived from the television signal. The error signals are used to command a change in camera mount position so that the object being tracked remains on the optical axis of the tracking system. Either negative- or positive-contrast objects may be tracked.

Analysis of Stress Wave Propagation by Photoviscoelastic Techniques

CHARLES W. FERGUSON, *Douglas Aircraft Co., Santa Monica, Calif.*

An experimental procedure for determining stress wave action in a dynamically loaded model structure is developed. A high-speed framing camera is used to record dynamic fringe patterns in photoviscoelastic materials. The theory of linear viscoelasticity is then used to relate fringe time histories to stress (or strain) histories. The materials used for the models exhibit linear viscoelastic behavior. Response to load is a function of rate of load application. Theoretical analysis of complex viscoelastic structure materials is usually difficult, and in some cases, not possible. The need for a quantitative experimental technique for the assessment of such structures clearly exists. Results of research indicate that quantitative photoviscoelasticity techniques are feasible.

A Cine Spectrograph for Reentry Measurements

BERNARD D. PLAKUN and WILLIAM C. SCHUPP, *Barnes Engineering Co., Stamford, Conn.*

The cine spectrograph records a reentry event as a consecutive series of spectrographic records. Wavelength and time resolution, wavelength coverage and running time are the principal performance factors. Frame rates of from 10 to 30 frames/sec and a capacity of 1800 frames are considered adequate for reentry observations. Spectral performance is affected by target size and the accuracy of target tracking. A dispersion element using a pierced grating and prism combination enables considerably improved spectral resolution over a grating alone.

High-Speed Photoinstrumentation for a Hypersonic Wind Tunnel

ROBERT L. LEIGHTON, *United Aircraft Corp., East Hartford, Conn.*

Applications of high-speed cameras and short-duration light sources to measure pressures, forces and flow patterns in a high-velocity (up to Mach 25), short-duration (10 msec) wind tunnel are described. Details of the measuring techniques are given, including the optical layouts, lighting, synchronization methods, data reduction procedures and measurement accuracy.

Far-Infrared Photography

A. T. IRELAND, *Douglas Aircraft Co., Santa Monica, Calif.*

Because film does not retain its sensitivity at far-infrared wavelengths, pictures are obtained through the use of other detectors. Methods of obtaining such pictures are outlined. Limitations of the equipment and results are discussed. Several practical applications are mentioned, slides are shown of results obtainable, and equipment is demonstrated.

THURSDAY AFTERNOON

1:45 SPECIAL PHOTOGRAPHIC EFFECTS and CINEMATOGRAPHY

The Mitchell SSR-16

EDMUND M. DI GIULIO, *Mitchell Camera Corp., Sherman Oaks, Calif.*

There is a growing need in television news-gathering for a 16mm, single-system sound camera that is lightweight and silent, with low wow and flutter, yet still retains professional pin-register quality. The solution of many of the problems generated by these stringent and often contradictory requirements is described.

Electronic Cam: A Production Method for Television and Feature Films

ALFRED JETTER, *Bavaria Atelier G.m.b.H., Munich-Geiseltasteig, Germany*

Background of the Electronic-Cam system of producing motion pictures for television is outlined, and current applications of the system in several installations are discussed. Particular reference is made to the application of Electronic Cam to films for color television.

A Portable Industrial Motion-Picture Kit

GEORGE W. TRESSEL, STANLEY J. ANDREWS, JR., and DANIEL S. GIROUX, *Argonne National Laboratory, Argonne, Ill.*

A 500-pound kit incorporates complete field equipment for a highly mobile motion-picture group. Nine uniform cases are sufficiently small and light so that they may be shipped by air and easily handled by one man; yet they contain cameras, accessories, and facilities for tapping power and lighting large pieces of industrial hardware. Tests have led to equipment that delivers maximum light output with flexibility. Using this kit, two three-man units have photographed 90% of the footage for the Atomic Energy Commission's Geneva Conference film program.

35mm Camera Apertures, Composition Areas and Printed Picture Sizes As They Affect Theatrical and TV Presentations

WALTER BEYER, *Universal Pictures Corp., Universal City, Calif., and Chairman of Research and Educational Committee of American Society of Cinematographers*

Present 35mm composition discrepancies between wide-screen and television production are outlined. A solution is proposed and illustrated through slides and motion-picture film.

A Universal 35mm Film Format

SIDNEY P. SOLOW, *Consolidated Film Industries, Hollywood*

Present-day 35mm motion pictures are photographed to be exhibited either in "wide-screen" (1.85 to 1) or in anamorphic "scope" (2.35 to 1). The former always, and the latter frequently, wastes film area and projection light. A universal, mildly anamorphic compromise that would display all of the available image area and utilize all of the projector illumination is advocated. Other advantages are discussed.

Practical Tests Chart for Studios

C. W. BAKER and E. W. KAGE, *Research Laboratories, Eastman Kodak Co., Rochester, N.Y.*

In present motion-picture work, no standard "lily" or gray scale exists for determining exposures and color balancing for printing. A new 6-patch chart that is designed in various sizes for different-sized motion-picture sets and may be used with both color and black-and-white film is described. The chart is made from inexpensive, commercially available materials. The materials

have been tested for batch-to-batch quality and have good color stability, as illustrated with spectrophotometric curves of fading tests.

The reason for the choice of six patches is shown with typical sensitometric curves for these films: Eastman Color Negative Film, Type 5251; Ektachrome Commercial Film, Type 7255; and Eastman Double-X Panchromatic Negative Film, Type 5222. The use of a scene luminance meter with the chart for the determination of camera exposures is described and illustrated. The method of lighting the chart and its placement in several sets also is described and illustrated.

Panel Discussion on Exposure Control

HAL MOHR, *President, American Society of Cinematographers, Moderator*

Exposure Control Devices and Their Use in Original Photography

HAROLD P. FIELD, *Gamma Scientific, Inc., San Diego, Calif.*

Thoughts on spot photometry as applied to motion-picture and TV scene lighting, including some observations on color characteristics, flare, and polarization in spot photometers, both with regard to exposure determination and luminary (brightness) ratio measurements, are presented.

Exposure Control and Stray Light Component

JAMES W. HARRIS, *New Zealand National Film Unit, Wellington, N.Z.*

Stray light needs more attention. Though too much will degrade the image, enough will give overall threshold exposure, which may explain the success of some "magic eye" systems. While existing exposure-control systems all have weaknesses, experience with visual judgment of reflex finder brightness suggests that this is a system which could be made reliable, the need being for a standard brightness or image to be placed alongside the normal ground-glass image. The equipment necessary for this could also provide means of increasing effective emulsion speed by a revival of pre-fogging technique. An Appendix is submitted suggesting a new standard by which cameras could be rated for their stray light component.

Peculiarities of Telefilm Exposure Control

HAROLD WRIGHT, *Canadian Broadcasting Corp., Ottawa, Ont., Canada*

The telefilm medium has exposure-control problems peculiar to that medium. The telecine transfer creates electrical tone-scales, and transmitter modulation requirements place severe limits on tone-scale excursions in the "white" direction. Thus, high-luminance areas in a scene, of little photographic significance, take on a significance far out of proportion to their subjective or aesthetic effect. This significance can be determined, and accommodated, if exposure is controlled by a narrow-angle, telescopic spot-photometer type of exposure meter.

A Compromise Solution: A Reflectance Meter That Incorporates Exposure-Control Advantages of the Incident-Light Meter

BURTON J. ASKOWITH, *Martin Company, Orlando, Fla.*

Accepting the premise that optimum exposure control is a function both of direct incident light (E) and of reflected light (B), it can be shown that the required change in aperture or exposure (ΔA) may be expressed as the sum of two terms, one related to the incident-light meter (M_B), the other to the reflected light meter (M_E):

$$\Delta = f(M_E) \Delta E + f(M_B) \bar{r} \Delta E$$

(The term \bar{r} is the average scene reflectivity.)

Data are shown to indicate that a practical reflectance meter can be built to approximate this sum, using the combined visible and near-infrared reflected light in spite of the variability of the infrared ambient relative to the visible.

THURSDAY EVENING

8:00 TIME-LAPSE PHOTOGRAPHY

Time-Lapse Photography at Moody Institute of Science
IRWIN A. MOON and F. ALTON EVEREST, *Moody Institute of Science, Santa Monica, Calif.*

The techniques of time-lapse photography have added much to the understanding of physical and biological phenomena. Instrumentation for time-lapse applications to specific subjects over the past twenty years are reviewed. There are two broad categories of equipment: that for the camera-controlled exposure used extensively for outdoor situations, and that for intervalometer-controlled exposure for artificially illuminated subjects. Photomicrographic time-lapse arrangements normally fall under the second category.

Some Medical Applications of the Cinematography of Cells

C. GEORGE LEFEBER, *Pasadena Foundation for Medical Research, Pasadena, Calif.*

The use of time-lapse cinematography for biological research is introduced with an example of the well-known technique employed to record the opening of a flower. By way of introducing how animal tissues are studied, the dissection of a salamander to produce a living culture is illustrated. Lung cells from this animal show four phenomena which could not have been understood without cine techniques: Rapid outgrowth of cells, food intake, movement of enzyme-bearing mitochondria, and cell division. Human cells from a thyroid cancer add other activity features: wrinkling and rotation of nuclei. Various cine setups are illustrated, including instruments for recording cell changes produced in perfusion chambers from double microscopes to permit film comparisons of treated and untreated cells. A scanner and electron recording device for the analysis of the contractile motion of certain brain cells are shown.

FRIDAY MORNING—APRIL 17

8:45 SMALL-FORMAT FILMS

An Improved 8mm Film Cartridge

ARTHUR C. MUELLER, *Bell & Howell Co., Chicago*

A cartridge for use in a double-8mm camera simplifies threading, eliminates the need for rethreading for the second-half run, requires less camera power to operate, and aids in obtaining sharper pictures.

Automation for 8mm Single-System Sound

HANS NAPFEL, *Fairchild Camera & Instrument Corp., Plainview, N.Y.*

Many advances have been made to automate the 8mm camera. These range from motor drive, through automatic exposure, to power zoom. Approaches to simplification of the sound-recording aspect and general operation of a single-system 8mm sound camera are explored.

Factors Affecting 8mm Sound Print Quality

E. A. EDWARDS and J. S. CHANDLER, *Film Services Div., Eastman Kodak Co., Rochester, N.Y.*

The balance of functions in obtaining high-quality 8mm release prints is described. Experimental results relating to both picture and sound quality are presented.

System Modulation Transfer (SMT)

Acutance: An Objective Method for Rating Picture Sharpness

EDWARD M. CRANE, *Research Laboratories, Eastman Kodak Co., Rochester, N.Y.*

The areas under the modulation transfer curves of all components in a photographic system, including the observer, are adjusted

for magnification and combined into a formula for "system modulation transfer (SMT) acutance." When film is the variable, proposed standard curves may be used for equipment and observer. Values of SMT acutance range from 70 (passing) to 100 (excellent), and they differ by one unit if a sharpness difference is just perceptible to a critical observer.

Sharpness Calculations for 8mm Systems

J. E. PINNEY, *Research Laboratories, Eastman Kodak Co., Rochester, N.Y.*

A method for computing sharpness ratings for color films based on modulation transfer function data has been described by Crane. Good agreement was found between computed sharpness ratings and qualitative judgments of sharpness for several 8mm color print systems. Hypothetical improvements to a model 8mm system illustrate how the potential sharpness of a system may be estimated and system improvements planned.

Optical Printing With a Small-Diameter Light Source

JAMES D. CLIFFORD, *Photographic Technology Div., Eastman Kodak Co., Rochester, N.Y.*

A concentrated-arc lamp has been used in a typical optical printer to print 8mm color internegatives from 16mm color originals, with considerable increases in sharpness compared with conventional light sources. Engineering requirements and operational characteristics are discussed and exploratory experiments in the use of the light source for other printing applications are described.

Economical 8mm Commercial Prints

C. LOREN GRAHAM and WILLIS L. STOCKDALE, *Photographic Technology Div., Eastman Kodak Co., Rochester, N.Y.*

An economical system for producing quality 8mm commercial prints is described and demonstrated with appropriate motion pictures. The proposed system features contact release printing. Contact release printing is made feasible by significantly improving the quality of the internegative by an improvement in printing technique. This improvement is accomplished through modification of a typical optical printer.

FRIDAY AFTERNOON

1:45 PROJECTION PRACTICES

Usage and Special Applications of the 70mm Release Print

WALTER BEYER, *Universal Pictures Corp., Universal City, Calif.*

Statistics on 70mm installations are presented, and technical aspects of 70mm drive-in installations are treated in detail. Special applications of the 70mm print as an image carrier also are discussed.

The Cinerama Single-Lens System

GERHARD LESSMAN, *Cinerama, Inc., Los Angeles*

Cinerama, a three-lens process for projecting a 146° true field of view upon a deeply curved screen subtending a large audience angle of view, has two drawbacks resulting from the fact that it is a mosaic projection process. It is almost impossible to maintain perfect registration and picture steadiness between adjacent projected fields or to project the three fields with even illumination and color balance. It is shown to be theoretically feasible to produce the "Cineramic" effect using a single-lens camera and projection system with the conventional deeply curved Cinerama screen. A single-lens system now has been developed and put in commercial use for projecting any so-called wide-screen picture onto a Cinerama screen with appropriate corrections for the perspective transformations involved. This system comprises a special rectifying optical printer lens which transforms the rectilinear perspective of a conventional negative, with or without anamorphosis, into a positive print with appropriate perspective modifications for projection onto deeply curved cylindrical screens. Special projection lenses have been designed to compensate for the

perspective and projective requirements of projection onto curved screens. A camera lens with a 146° field of view has also been designed which, when properly utilized for motion-picture production in the Cinerama single-lens process, will totally simulate the original three-lens system.

Motion pictures taken with the single, wide-angle lens camera with appropriate utilization of auxiliary cues to depth perception are in all respects equal to the traditional three-lens Cinerama projection but without the defects of the mosaic process.

Carbon Arcs for 16mm Film Projection

C. E. HEPPEBERGER, *Arc Carbon Div., Union Carbide Corp., Chicago*; and E. A. BOWEN, *Arc Carbon Div., Union Carbide Corp., New York*

The characteristics, operating data and performance of a high-intensity carbon trim for the projection of 16mm film are described. The color quality, magnification, optical speed, power of the projection lamp, intensity and distribution of the screen light are discussed. Earlier papers are reviewed, and projection improvements consistent with pending trends in illumination are suggested.

Xenon Projection Lamps: A Resumé

DON V. KLOEPFEL, *General Film Laboratories, Hollywood*

Constantly increasing use of the xenon lamp as a projection light source in review rooms prompted a survey which would indicate some of the lamp's distinctive characteristics under typical operation. Data supplied by the survey are presented.

Xenon Light Sources for 16mm Projection

EDWARD LACHMAN and FRANK H. RIFFLE, *Carbons, Inc., Boonton, N.J.*

New xenon light sources have been developed for 16mm motion-picture and small-format slide projection. Modification of a well-known projector is described and operational results evaluated. Additional xenon sources in standard lamphouses also are described.

The New Siemens "2000" 16mm Projector

HORST MASCHGAN, *Siemens & Halske A. G., Berlin, Germany*

The Siemens "2000" Projector, manufactured for over a decade, has been succeeded by a model with these features: Maintenance-free operation; reduced weight; improvements and simplification in layout for easier service; increase in light output; inclusion of a small, transistorized amplifier in the existing modular construction system; improvements of various parts for increased reliability and ease of operation.

Atlas Portable Projector

WALTER R. McCORMICK, *Atlas Projector Corp., Culver City, Calif.*

A portable projector capable of reproducing pictures of all aspect ratios, using magnetic soundtrack and picture, or optical soundtrack and picture, or composite prints with optical sound, is described. The design includes new applications of tight loop sound head, lamphouse techniques, projector drive mechanism, stop-start and reverse, and remote control.

New Test Film Catalog

The Society's 1964 Test Film Catalog was mailed recently to past purchasers of test films. The new catalog, copies of which are available from SMPTE Headquarters, incorporates the latest listings, along with price changes that became effective on January 1, 1964.

The catalog lists sound and picture test films for television, and for 70mm, 35mm (standard, wide-screen and anamorphic), 16mm and 8mm equipment. These films are used by manufacturers for design and inspection; by television engineers; by theater projectionists and other persons responsible for "in service" maintenance of projectors and sound systems; by equipment dealers for demonstration purposes, and by audio-visual equipment users for quick performance checks.

Every Member a Membership Committeeman

The Society's National Membership Committee strongly urges every member to remove the tear-out application blank from the January issue of this Journal and use the form to sign up an associate as a member. Your Committee can contact only a small percentage of prospective members. By bringing others into the Society, *every member* can help maintain SMPTE in its position of leadership.—Edward A. Winkler, *National Membership Chairman*, c/o Eastman Kodak Co., 200 Park Ave., New York, N.Y. 10017.

Equipment Exhibit

Los Angeles Technical Conference

Displays and demonstrations of all the important new developments in equipment for:

- Cinematography—Color and New Photographic Materials—Motion Pictures and TV for Education—Small-Format Films—Instrumentation and High-Speed Photography—Space Technology—Medical Photography—Laboratory Practices—Projection Practices—Sound Recording and Reproduction—Television Engineering and Production

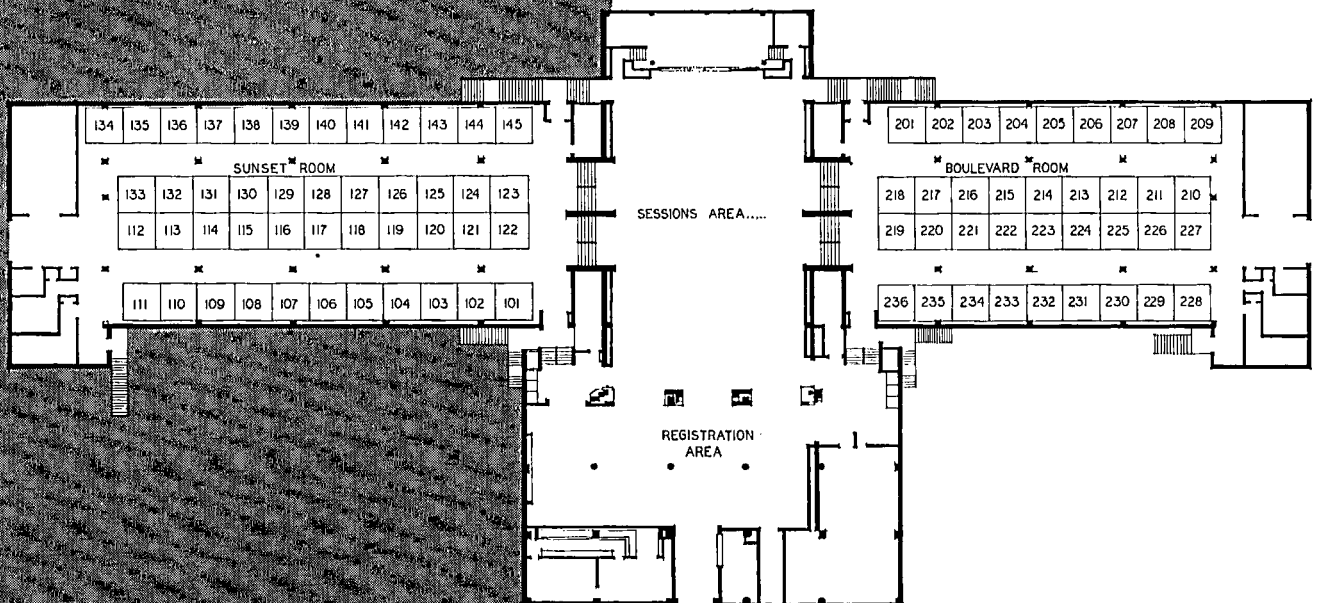


EXHIBIT OPEN APRIL 13-16, 1964

Ambassador Hotel, Los Angeles

Technical Conference