91st Convention—Advance Program

This program is as complete and accurate as possible as the March *Journal* goes to press, but a few additions or changes may be made before the convention date. Members who are planning to attend to hear specific papers are advised to inquire during the week before the convention by telephoning to SMPTE Headquarters in New York (LOngacre 5-0172) or to Edward P. Ancona, Jr. (HOllywood 9-2411, Ext. 546).

SUNDAY—APRIL 29

12:00 – 6:00 Registration

MONDAY—APRIL 30

9:00 Registration

10:00 OPTICS and OPTICAL SYSTEMS

The Optical Tunnel — A Versatile Electrooptical Tool

D. J. PARKER and L. J. KROLAK, *Radio Corp of America, Camden, N. J.*

The optical tunnel consists of four front-surfaced mirrors carefully aligned to form a tunnel of exactly square cross-sections. In combination with the lens this device is capable of projecting several hundred images of one object on a screen. The converse is also true, namely, that it makes possible the projection of several hundred different objects into one position. The principle of the optical tunnel and the parameters which need to be considered in its design are outlined. This unique device makes possible the solution of several different electrooptical problems. Applications include: an electronic ideographic (Chinese characters) composing machine; a universal print reading machine; and a random access memory.

Design of Special Illuminating Systems

WALTER WALLIN, *Wallin Optical Systems, Inc., 18523 Ventura Bouleward, Tarzana, Calif.*

Classical principles of condenser design are given as a point of departure for discussing Luneburg's criterion for assessing uniformity of illumination on the basis of calculations made from lens data. Attention is called to pitfalls in the form of physical impossibilities that can be avoided early in a design effort. Those features of an illuminating system that distinguish between an easy and a difficult design are set forth, along with some techniques for relieving the difficulties. Also discussed is the influence of various types of light sources on the design.

Lasers and Laser Applications

I. J. D'HAENENS and D. A. BUDDENHAGEN, *Hughes Research Laboratories, Malibu, Calif.*

Recent advances in solid-state physics have provided the scientific community with a number of coherent light sources—optical masers or lasers—laser being an acronym for *L*ight *A*mplification by *S*timulated *E*mission of *R*adiation. This true light amplification, first demonstrated in ruby, is discussed in terms of the fluorescence process, and the concept of a "light oscillator" is developed. Laser applications are discussed with particular emphasis on photographic applications. A demonstration of an operating ruby laser is given.

The Four-Color Theory — A New Way for Color Television

WERNER BORCHMANN, *Muenchen-Solln, Festingstr. 15, Germany*

With the introduction of the three-color theory about the middle of the last century, by Young-Maxwell and Helmholtz, substantial difficulties were encountered in attempts to find a physiological explanation for the color sensation yellow. If green and red of the three-color theory are mixed, in an additive manner, they create the color sensation yellow. Proponents of the three-color theory attribute this sensation to a specific property of the human eye. Contrary to that belief this effect is here considered to be a continuation of ideas by the well-known physiologist Hering, a contemporary of Helmholtz, and it is shown that the three-color theory, strictly speaking, is actually a four-color theory. On first glance, it appears that the four-color theory would increase rather than decrease the technical difficulties of color TV since such theory would require four-color separations as compared to three. In reality, however, it is possible, by ingenious mixing, to reduce the color separations down to two without diminishing the total spectral response.

12:15 Get-Together Luncheon
Guest Speaker — "Hollywood's Disregard of Research and the Price It Has Paid for That Disregard"

Max Youngstein
Executive Vice-President
Cinerama, Inc.

MONDAY AFTERNOON

2:30 BUSINESS MEETING

3:00 LABORATORY PRACTICES and PHOTOGRAPHIC MATERIALS

Color Reproductivity of the Fuji Color Film for Motion Pictures

HIDEMITSU SEKI and AKIRA KODAMA, *The Japan Color Research Institute, Tokyo*

The Fuji Color Negative Film Type 8512 and the Fuji Color Positive Film Type 8816, when used in combination, have been investigated as to their reproductivity of hues, values and chromas within the color solid indicated in the JIS Standard Color Charts (based on the Munsell Renotation Color Charts), and they also have been compared with the combination of the Eastman Color Negative Type 5250 and the Fuji Color Positive Type 8816. In the process of color reproduction of the FUJI films, achromatic

color whose reflectance reproduced faithfully to be 19.77% has been adopted as the reference. Various reproduced colors, when projected on the screen, have been measured by the comparison method, and the values of three attributes thereof thus obtained have been compared with those of three attributes of the objects photographed.

Some Aspects of 8mm Sound Color Print Quality

C. J. STAUD and W. T. HANSON, JR., *Research Laboratories, Eastman Kodak Co., Rochester, N.Y.*

A growing interest in the production of 8mm release prints is evidenced by many papers on this subject during the past few years. These have dealt with the picture quality obtainable by various printing techniques and sound quality obtainable by optical and magnetic methods. Suggestions have been made for changes in perforation size to permit improvement of sound quality. These publications have emphasized the difficulties encountered in obtaining satisfactory quality in 8mm release prints, and have led us to consider many additional factors which may influence quality. Optimum utilization of the 8mm sound color print area requires consideration of such factors as minimum practical perforation size, optimum perforation pitch, maximum picture area and appropriate position of picture, type, positioning, and economics of soundtrack, and similar factors. A number of these factors are discussed, and a demonstration is presented.

While many problems are anticipated in reaching a decision concerning a modification of 8mm format to obtain improved picture quality consonant with suitable soundtrack, it is felt that these can be resolved to afford better results than are obtainable using the present 8mm format. It is anticipated that the study and evaluation of the many factors involved will require critical consideration before the situation can be formalized.

The Re-Halogenation of a Photosensitive Color Material

C. W. WYCKOFF, *Edgerton, Germeshausen & Grier, Boston, Mass.;* and E. L. SCOTT, *Mead Corp., Mead Research Center, Chillicothe, Ohio*

The re-halogenation of a photosensitive color material is proven as developing schedule which produces black-and-white prints and transparencies, or color prints and transparencies from one negative. The initial development is accomplished using standard black-and-white developers and fixers. No chemical or physical additives are required for black-and-white prints or transparencies; however, some "CC" filter correction is required for color printing owing to a color shift in the initial development stages.

A New Color Negative Film for Better Picture Quality

W. I. KISNER, Motion Picture Film Dept., *Eastman Kodak Co., Rochester, N. Y.*

An outstanding gain in picture quality is realized with a new camera negative film, designated as Eastman Color Negative Film, Type 5251. This film is intended to replace the present Type 5250 film of the same name. It has the same speed as the present film but has substantially lower granularity and certain other characteristics that lead to better color reproduction in the final prints. Processing and printing procedures are the same as those required for the present film. Projection demonstrations illustrate the improvement in picture quality obtained through use of the new material both for prints made directly from the original negative and for prints made from a color duplicate negative.

A Higher Speed Color Print Film

W. I. KISNER, *Motion Picture Film Dept., Eastman Kodak Co., Rochester, N.Y.*

A new color print film, designated Eastman Color Print, Types 5385 (35mm) and 7385 (16mm), has been designed to replace the present Type 5382 and Type 7383. The new film has approximately four times the effective printing speed of present materials with no sacrifice in granularity. Prints made thereon also show a slight improvement in picture definition. The increased speed is expected to benefit laboratories by providing greater production output or by overcoming difficulties associated with limited printer illumination levels. The film also incorporates modifications that result in better color reproduction. Projection demonstrations illustrate the picture quality obtained with the new films as compared with present films.

Application of Two Analytical Test Methods to Predict Image Stability of Processed Black-and-White and Color Products

GEORGE W. LARSON, DAVID C. HUBBELL and LLOYD E. WEST, *Color Technology Div., Eastman Kodak Co., Rochester, N. Y.*

Two existing test methods for measuring retained chemicals in processed films and papers have been modified. They are used to predict image instability during storage. The methods are relatively insensitive to time-lapse between processing and analysis, and measure as low as 0.02 mg of sodium thiosulfate per square inch of sample. One method is a titration and the other is a silver stain test that is measured densitometrically. One practical application of the methods is illustrated by a survey of Eastman Color Films processed by 28 motion-picture film processing laboratories.

Factors Affecting Color Film Dye Stability: Related Printing Problems and Release-Print Quality

ROBERT O. GALE, *Color Technology Div.;* and ALLAN L. WILLIAMS, *Film Testing Div., Eastman Kodak Co., Rochester, N.Y.*

Improperly processed and/or stored color film will undergo some dye fading and, in the case of color negative films, may also show changes in the residual colored couplers. These changes in the film may produce serious problems in the printing laboratory as well as a degradation of the color quality of the release print. The effects of certain processing conditions on dye stability have been studied and are illustrated both sensitometrically and photographically. Processing variables that contribute to dye fading are emphasized. Emulsion pH and chemical retention levels of the processed film have been measured, and correlation of these analyses with the photographic results has been made. The split-frame camera and printing technique is used to illustrate some of the results of this study.

Tension-Free Film Processing Machine

MERVIN E. FULTON, *Fulton Productions, Inc., Tulare, Calif.*

A film processing machine has been developed to function without clutches or film sprockets. A low-friction film path enables the processor to be driven with a low-torque drive motor. The unit is of PVC plastic construction. Tubular tanks have removable double concave elevators designed to displace approximately half of the solution. Each tank is used as a non-mechanical, air-powered pump which recirculates the solutions through heat exchangers. Where required, solutions are submerged sprayed against the film through perforations in the elevators.

MONDAY EVENING

8:00 SPECIAL TUTORIAL SESSION ON COLOR

Chemistry and Color Photography

P. W. VITTUM, *Kodak Research Labs., Rochester, N.Y.*

Chemistry has played a major role in the development and perfection of modern color photographic systems which utilize color development to produce the dye images. The mechanism of the reactions of color development are now known in some detail and the effects produced by side reactions are beginning to be understood. The factors influencing fidelity of color reproduction, speed-graininess, sharpness and dye image stability have been the subject of continuing chemical research. A review of some of this chemical research shows how it has led to a steady improvement in color photographic materials.

Hue, Saturation and Lightness in Photography and Television

RALPH M. EVANS, *Color Technology Div., Eastman Kodak Co., Rochester, N.Y.*

This is a tutorial paper covering a number of perceptual factors as they affect color photography and color television. There is first a discussion of the perceptual variables hue and saturation, followed by a somewhat detailed discussion of the concepts involved in the terms lightness and brightness. This discussion is in terms of the "modes of appearance" of colors. This is followed by consideration of the consequences of the facts of metamerism and color and brightness adaptation. The paper concludes with a study of the relationship of the above variables to the C.I.E. system.

TUESDAY MORNING—MAY 1

9:00 HIGH-SPEED and INSTRUMENTATION PHOTOGRAPHY

Improved Nanosecond Light Source

HEINZ FISCHER, C. C. GALLAGHER and PETER TANDY, *Air Force Cambridge Research Laboratories, Hanscom Field, Bedford, Mass.*

A line-type, open-air nanosecond light source, which has previously been described, had a light rise of $\sim$ 2.0 nanosec, a half-width of $\sim$ 7 nanosec and a luminescence of approximately 10^7 cd/cm^2. The capacitor was plated directly on the transmission line. The light output of this source has been improved considerably and the pulse width further reduced by increasing the capacitance through precision control of the insulation sheet thickness of the capacitor. Also, the residual inductance resulting predominantly from termination and gap itself was lowered to $\lesssim$ 0.5 nanohenries by changing the gap to a carefully analyzed arrangement utilizing a back loop feed-in of the current. Different types of the improved source are described and shapes and amplitudes of the light source presented. Techniques of measurements and their limitations are explained.

An Underwater Photographic Surveillance System

PAUL J. KRUSE, JR., *U. S. Fish and Wildlife Service, Moss Point, Miss.*

The combined and separate use of a closed-circuit television and photographic system and some of the results obtained are given as examples of the importance of such equipment in underwater research. Underwater photographic work involves an understanding of the nature of natural underwater lighting, in respect to color, quantity and behavior. Some of these problems and methods used to help overcome them are discussed.

The Practice of High-Speed Photography — A Survey of Its Status

WILLIAM G. HYZER, *Consulting Research Engineer, Janesville, Wis.*

A survey was conducted in 1960–1961 among industrial and government users of high-speed photography to determine how the technique is being applied in the field. Statistical data including most frequent application areas, range of frame rates, lighting requirements and film consumption are presented and discussed.

The Role of Photography at the Flight Test Center, Edwards AFB

LT. COL. JOHN R. LYALL, *Edwards AFB, Calif.*

TUESDAY AFTERNOON

CONCURRENT SESSIONS

2:00 HIGH-SPEED and INSTRUMENTATION PHOTOGRAPHY

CONCURRENT SESSION

2:00 SET CONSTRUCTION and SPECIAL EFFECTS

Art Direction: The Technical Approach to the Problems of Design and Construction

E. PRESTON AMES, *M-G-M Studios, Culver City, Calif.*

First considerations involved in art direction include picture aspect ratio, color or black-and-white photography and choice of location or studio operation for specific sequences. Backings, back projection, traveling mattes or matte shots and miniatures are used to accomplish the job at home. Of prime importance is the size of the production and its budget. Art directors' ideas are put into the form of sketches and scale drawings, sometimes substantiated by countless hours of research. In design, consideration must be given to acting and story requirements, but just as important is the function of the set in regard to ease of operation for lights, camera and sound technicians. All materials chosen for construction of sets relate to the design requirements and permanency of construction.

Scope and Function of Motion-Picture Set Construction

IVAN C. MARTIN, *Twentieth Century-Fox Film Corp., Beverly Hills, Calif.*

The organization, activities and responsibilities that belong to a major studio motion-picture and TV set construction department are described. Specific technical subjects not commonly known, such as stage flooring, studio transportation and storage of set units are discussed. Reference is made to the involved relationship of construction to other technical and production activities such as plant and equipment maintenance, permanent construction, cost estimation and supervision of varied personnel within this large scope.

Technical Activities of the Staff Department

CARL C. STOUT, *Columbia Pictures Corp., Hollywood*

The function of the Staff Department is to provide structural units and parts wherever set design requires such items. Imitation brickwall, shingle roofing, rocks, terrazzo, cobblestone and many other effects belong to this artcraft. Although plaster of Paris is still the basic working material for molds, casting and lay-up, a number of synthetic materials have been added over the past years, such as vinyl hot melts for flexible molds and various thermosetting plastics. Facilities, techniques and material in staff operations are discussed and examples demonstrated.

Motion-Picture Paint Technology

WALTER JOLLEY, *Twentieth Century-Fox Film Corp., Los Angeles*

Paints and coatings are used in large quantities and great varieties for day-by-day studio requirements. They may serve decorative or functional purposes such as flameproofing or corrosion protecting. Although standard commercial formulations are satisfactory for most applications, it is shown that coatings of unique properties are often required. The techniques of antiquing, creating metallic effects, preserving foliage, protecting props and structural units under water and other typical studio challenges to the formulator and applicator are discussed in detail. An outline of present-day facilities, equipment and materials and a forecast of certain trends are included.

Materials and Processes for Prop Fabrication

IVYL S. BURKS, *Paramount Pictures, Inc., Hollywood*

The major studio propmaking departments face possibly the greatest variety of requests and corresponding tasks among the back-lot shops. There are, therefore, few materials and fabrication methods which are not of some interest to these highly versatile craftsmen. Various examples of prop fabrication are described, such as break-away props, plastic sheet farming, mechanization and animation of props, sponge rubber and slip casting and other techniques. An outline of the various functions and facilities of the propmaking department and a brief historical review are given.

Scenic Art in the Motion-Picture Industry

GEORGE GIBSON, *M-G-M Studios, Culver City, Calif.*

The technical and artistic problems encountered in the production of high-grade color-backings are described. The important function of backings in extending exterior and interior sets requires of the scenic artist a high degree of technical know-how and artistic capability. A detailed report is given on the materials, tools and methods used in the preparation and finishing of backings for various purposes. Additional information covers some interesting historical aspects and certain trends in this little publicized field.

Special Effects — A Segment of Motion-Picture and Television Production

FREDERIC L. PONEDEL, *Warner Bros. Pictures, Inc., Burbank, Calif.*

Of particular importance is the mechanical phase of special effects that become an audible or visual part of a motion-picture or TV production. An endeavor is made to present the beginning and the background of the craft and the people who practice it. Progress and expansion of the craft is explained in terms of accomplishments over a 20-year period. Chemicals and commercial equipment of recent formulation and design adaptable to the production of atmospheric effects are enlarged upon. Explosives, an integral part of this work, are discussed in terms of function, responsibility and safety. Changes effected as a result of the accelerated rate of TV production are also covered.

TUESDAY EVENING

7:30 TELEVISION RECORDING

"Straight Line" vs "Toe" H&D Methods for Video Recording

W. A. PALMER, *W. A. Palmer Films, Inc., San Francisco*

Two approaches to photographic video recording can be described as "straight line" and "toe," depending upon the type of film stock and the part of the H&D curve used for the negative exposure. A particular case is made for using the straight line method when the primary need for the recording is for direct projection, since this method is much less critical and yields gray scale rivaling regular photography.

A New Television Film Recording System

A. M. MILLER, *Radio Corp. of America, Hollywood*

Recent design objectives to develop and demonstrate a high-quality system making film production by electronic recording technically excellent and economically practical have been achieved. Each major element of the system is discussed but emphasis is given to the complete system considerations as they relate to simplicity of operation and consistent ability to produce a good film product.

High-Resolution Kinescope Recording for the Ranger Television System

P. B. KORDA and J. L. PARSONS, *Radio Corp. of America, Van Nuys, Calif.*

The Ranger spacecraft (NASA-JPL) will carry a complement of high-resolution (>1000 lines) TV cameras in the final four trips to the moon. These cameras will provide man's first detailed view of possible sites for subsequent soft landing on the moon's surface, with resolution much greater than that expected from earlier Ranger flights. The equipment described here provides complete TV ground support for the Ranger high-resolution TV mission. High-quality kinescope recording on 35mm film is the primary record with pre-detection magnetic recording provided as a back-up. Photographs of actual test video recordings are shown to illustrate the quality of TV recording achieved.

Thermoplastic Recorders

W. E. GLENN, *General Electric Research Laboratory, Schenectady, N.Y.*

After description of the thermoplastic recording process, there are given a number of specifications of a practical recorder such as resolution, sensitivity, developing time, erasing time, heating and cooling requirements, optimum film thickness and optical light output. Several pieces of equipment, including a portable video recorder and a radar display recorder, are described. A recording is demonstrated.

Photographic Data Recording by Direct Exposure with Electrons

A. A. TARNOWSKI and C. H. EVANS, *Research Laboratories, Eastman Kodak Co., Rochester, N. Y.*

The photographic properties of electrons accelerated by potentials below 50 kilovolts have been investigated, with the general problem of data recording in mind. Direct electron recording systems offer advantages, particularly in speed, photographic resolution, and absence of phosphor grain, over systems using conventional cathode-ray tube photography. A strictly experimental system of this type has been developed for TV film recording.

Reproduction of NTSC Color Signals by a Magnetic Tape Television Recorder

PETER W. JENSEN, *Ampex Corp., Redwood City, Calif.*

The timing errors in the playback signal are reduced to less than 7 nanosec. Positional errors of the video heads are corrected by Amtec* and Colortec,* two electronically controlled compensating units. The relative timing between the luminance and chrominance signal components is maintained without any loss in bandwidth; no modifications are made to the NTSC signal.
(* Trademark, Ampex Corp.)

The VR-8000 Closed-Circuit Television Recorder

ROGER HIBBARD, *Ampex Corp., Redwood City, Calif.*

A single-head helical recorder has been developed for closed-circuit TV use. Emphasis is placed on high performance, low cost, operational simplicity and low maintenance requirements. A description of the machine and its performance is given, including the scanning characteristics and design factors which determine time-base performance.

The VR-8000 Tape Transport: A Helical Recorder for Closed Circuit

NICK LASAREV, *Ampex Corp., Redwood City, Calif.*

The past six years of helical recorder technical development have led to design choices and parameters which are discussed briefly with regard to performance, reliability and simplicity. The components of the tape transport and their function with particular attention to the closed-loop capstan and scanning assembly are described in detail, followed by information about operation and maintenance of the recorder.

The RCA Video File Storage and Retrieval System

E. W. MOULTON, *Radio Corp. of America, Van Nuys, Calif.*

The RCA Video File System is a means of storing documentary or pictorial information on magnetic tape as video images and is addressed in digital fashion according to data retrieval concepts. Each picture frame is treated separately and is reproduced by an Electrofax type of printer. Both the camera and the printer utilize fiber-optics techniques, and the system may be addressed directly by a computer.

Two-Speed Operation of Television Tape Recorders for Tape Economy

A. H. LIND,, *Radio Corp. of America, Camden, N.J.*

Recent developments in video magnetic heads have made possible the design of heads that permit recording TV signals in the quadruplex format at a tape speed of 7.5 in./sec. All RCA tape recorders can be modified in the field to record and play back tapes at this lower tape speed while also retaining the currently standard 15 in./sec tape speed. After modification the recorders are two-speed machines with the operating speed being selectable by means of a switch. The changes required in the recorders and a comparison of performance between the two modes of operation are discussed.

WEDNESDAY MORNING—MAY 2

9:00 EQUIPMENT PAPERS and DEMONSTRATIONS BY EXHIBITORS

Stereo-Color Television System (Paper)
JAMES F. BUTTERFIELD, *Stereotronics Corp., Hollywood*

Simultaneous-Writing High-Speed Streak & Framing Camera (Paper and Demonstration)
L. R. TEEPLE, JR., *Beckman & Whitley, Inc., San Carlos, Calif.*

Automatic Power Rewind — Audio Reader for Video Tape — High-Speed 16mm Film Viewer (Demonstrations)
GEORGE KENDALL, *Moviola Mfg. Co., North Hollywood*

Electronic Timing Generator to Trigger Pulse Cameras in Frequency Range of 1 Each 15 Sec to 5 per Sec
BOB LAWRENCE, *L-W Photo Products, Inc., Northridge, Calif.*

High-Speed Inspector Projector (for Laboratory Use) (Demonstration)
HARRY TEITELBAUM, *Hollywood Film Co., Hollywood*

New Model DBM 9 Underwater Scuba-Diver Camera: 400 ft. of 16 mm; Film Contained in Package Without the Use of a Blimp. Size of Camera: About one-third that of the present Sampson Hall Unit. (Paper)
T. H. TRUESDELL, *D. B. Milliken Co., Arcadia, Calif.*

Kalart Soundstrip Projector (Demonstration)
HY SCHWARTZ, *The Kalart Co., Inc., Plainville, Conn.*

Portable Lighting for TV, Newsfilm and Film Production Uses (Demonstration)
JOHN W. SCHLAGETER, *The Telequip Co., New York*

A Unique Card Recorder. The "Re Kard" Uses a 5 by 7-in. Card With Visual Information on the Front Side and Audio Information on the Oxide-Coated Rear Side (Paper)
R. S. SOGGE, *Magnasync Corp., North Hollywood*

Arri Silver Recovery System and Plant (Paper)
VICTOR JAMES, *Arriflex Corp. of America, New York*

Fireball Reflectors, Kliegl Lilliput Lights, Acmade Splicers (Demonstration)
ARTHUR FLORMAN, *Florman & Babb, Inc., New York*

CF-2 Ultrasonic Film Cleaner as Used in Conjunction With Tape or Positive Prints With Striping (Paper)
JERRY LIPSNER, *Lipsner-Smith Corp., Chicago*

WEDNESDAY AFTERNOON

2:00 TELEVISION EQUIPMENT and TECHNIQUES

The Development of Closed-Circuit Television as a Tool in Maintaining Nuclear Reactor Systems
JOHN H. BURTON, *Atomics International, North American Aviation, Inc., Canoga Park, Calif.*

Closed-circuit TV is being utilized as the viewing means for directing remote manipulators in the maintenance and disassembly of compact nuclear reactors being tested in windowless rooms. The use of closed-circuit TV as a tool rather than as a simple surveillance device has required the development of unique techniques and special equipment. Mentioned are the traverse TV system, through-the-roof TV equipment, evaluation of stereo TV, and procedures for remotely handling and setting up the TV equipment.

Television Recording Applied to U.S. Naval Carrier Aviation
CAPT. COLIN J. RICKETTS, *Naval Air Station, San Diego, Calif.*

The U.S. Navy is currently evaluating a closed-circuit TV and recording system aboard the aircraft carrier *USS Coral Sea* (CVA 43) to assist aviators in maintaining professionalism in executing carrier landings. This system consists of three camera chains, a tape recorder, power and control equipment and a distribution system supplying selected signals to various monitors throughout the ship. The system was installed in August, 1961, and has been enthusiastically received.

A System of Narrow-Band Visual Communications
STANLEY DOBREN, *Radio Corp. of America, Van Nuys, Calif.*

A system for increasing the efficiency of TV facsimile transmission has been developed and instrumented. Statistical redundancy of the TV image is partially removed by taking advantage of horizontally oriented element-to-element correlation, utilizing a technique of run-length coding. The resultant signal, in binary coded digital form, is suitable for transmission over inexpensive narrow-bandwidth communication channels.

The Jerrold Wide-Band Video Transportation System
FRANK J. RAGONE, *Jerrold Electronics Corp., Hatboro, Pa.*

The Jerrold wide-band system allows the transmission over a single coaxial cable of as many as five video channels, each having a full 8-mc video bandwidth. The terminal equipment of the system consists of a wide-band modulator and a wide-band demodulator. A third unit, a repeater amplifier, is used to extend the system's length to as far as 25 miles. The system's performance meets critical specifications in regard to response, differential gain and phase, signal-to-noise ratio and use time.

Three-Dimensional Television
JAMES F. BUTTERFIELD, *Stereotronics Corp., Hollywood*

Proposed and operational systems of stereo TV are broadly surveyed, and the advantages and disadvantages of each are presented. Text and schematics illustrate the cubic-display and flat-display, two-channel systems and one-channel systems. Alternate-frame, two-color and divided-frame single-channel systems are considered. The divided-frame system is given considerable attention as being the more practical and, at the present state of the art, presenting the optimum three-dimensional TV picture.

An Electrostatically Focused Vidicon

J. E. KUEHNE and R. G. NEUHAUSER, *Radio Corp. of America, Lancaster, Pa.*

An electrostatically focused and magnetically deflected vidicon produced improvements in picture geometry and corner focus, in addition to providing a lightweight small-diameter camera package. The tube, together with lightweight and small deflecting yokes, is well suited for transistorized cameras and employs a low heater-power gun for minimum current drain and low-temperature gradients. The performance and design of the tube are described and compared to those of the magnetically focused vidicon.

The Design and Performance of a High-Resolution Vidicon

R. G. NEUHAUSER, B. H. VINE, J. E. KUEHNE and G. A. ROBINSON, *Radio Corp. of America, Lancaster, Pa.*

The performance characteristics of a $1^1/_2$-in. high-resolution vidicon are described and an insight is given into its design. Techniques of obtaining and measuring the high resolution are related. N_s values of equivalent resolution are developed. The electron optical design of the tube yoke and focus coil combination are shown to produce zero beam landing error, excellent geometry and uniform focus. Other factors that have guided the choice of the design features, such as the availability of 35mm lenses, adequate signal output level for wideband amplifiers and a compromise between sensitivity and lag, are described.

Operationally Simplified Television Network Program Integration Switching

F. L. FLEMMING and D. R. WELLS, *CBS Television Network, New York*

CBS Television Network during 1961 placed in service at Television City, Los Angeles, a new program control room designed to provide a maximum of flexibility with a minimum of operating effort. In this room, program material from film, slides, video tape, audio tape, studios, remotes, and other sources is combined into scheduled continuity for distribution to one or more network station groups. By means of combined audio/video switching, extensive signal preselection, and careful attention to human engineering, the new facility enables a single operator to handle easily, without automation, complex program integration switching including simultaneous transmission of separate short inserts to two networks.

Slow-Motion Playback of Television Film Recordings

J. R. WHITTAKER, *CBS Television Network, New York*

In the television coverage of sports and news events, frequently it is of interest to replay fast action shots at a slow rate in order to observe details not readily apparent in normal transmission. This cannot be accomplished conveniently with conventional intermittent projectors. An arrangement using continuous-motion projection is described which permits playback of 16mm film at rates as low as 4 frames/sec. Combined with TV film recording equipment and a rapid film processor, immediate playback to the television audience is possible.

WEDNESDAY EVENING

6:45 COCKTAIL PARTY, BANQUET

THURSDAY MORNING—MAY 3

9:00 SOUND RECORDING and REPRODUCTION

A Varidirectional Condenser Microphone

MICHAEL RETTINGER, *Radio Corp. of America, Hollywood*

This condenser microphone has a self-contained power supply and uses hearing-aid type batteries. Cable connection is by means of a conventional two-conductor shielded cable. The microphone, already somewhat more directional than a unidirectional microphone, can be made still more directional by applying an 18-in. long tubular attachment weighing only 5 oz. Total weight of unit, including mounting and windscreen, is 1 lb 12 oz. Open-circuit output voltage at 250-ohm tap is 1.6 mv/dyne.

Handheld 16mm Sound and Picture Newsreel Camera

E. C. MANDERFIELD, *Mitchell Camera Corp.*; MICHAEL RETTINGER and KURT SINGER, *Radio Corp. of America, Hollywood*

A new 16mm professional sound and picture newsreel camera was developed for CBS News by Mitchell Camera Corp. and RCA. The lightweight handheld camera features a register-pin movement, a reflex viewfinder, a three-lens turret and a 400-ft magazine. An adapter permits tripod mounting and use of magazines up to 1200-ft capacity. Magnetic heads, located in the film path, allow recording and simultaneous playback of sound by means of a magnetic stripe located on the base side of the negative material. The transistorized electronics, consisting of a two-channel mixer, monitor amplifier, bias oscillator and playback amplifier are housed together with dry batteries in a separate case, which is carried by the operator on a shoulder strap.

A Survey of Television Intercom Systems

DON McCROSKEY, *American Broadcasting Co., Hollywood*

The current state of large intercommunications systems in TV broadcasting is reviewed. The conventional common battery non-amplified configuration is analyzed, with emphasis on improving its shortcomings on an expandable basis. Similar systems using headset listen amplifiers are discussed, particularly in relation to a large number of stations. Local battery circuits are mentioned as having certain advantages in some applications. Combination systems employing microphones and loudspeakers in the control room are described, special attention being given to feedback problems.

Application of Electronic Music to Dramaturgy of Film and Concert Performances in Theaters

FRITZ WINCKEL, *Technische Universität Berlin, Berlin-Charlottenburg, Germany*

The action of a film takes place for the cinema visitor in an imaginary room. The real room is optically and acoustically excluded, thus becoming better fitted than all other auditoriums for the production of illusionary effects. From an acoustical point of view, these characteristics provide a way to produce music of optimum impression. There have been experiments with space music in Europe which could be used favorably, especially in cinemas, for intermissions or as a part of a show program.

A Proposed 8mm Sound-Film System

JOHN A. MAURER, *JM Developments, Inc., New York*

A perforator and printing equipment have been built to produce film in accordance with the proposed 8mm sound-film standard shown on page 623 of the SMPTE *Journal* for August, 1961, which uses perforations 0.050 in. square and provides for a variable-density soundtrack 0.050 in. wide. Prints made on color print stock are demonstrated. Design and performance aspects are discussed.

THURSDAY AFTERNOON

2:00 PROJECTION PRACTICES

The Projection of Freshly Processed Motion-Picture Film

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

Many articles have been written on film lubrication and film properties. This paper describes some experiments with materials other than steel that may be used for projector film shoes, to prevent emulsion build-up and film sticking.

Development of an Extreme-Wide-Angle Motion-Picture System for Seattle Fair

WILLIAM D. LITTSCHWAGER, *Cinerama Inc., Los Angeles*

An extreme-wide-angle motion-picture system has been developed and introduced by Cinerama, Inc., at the U.S. Science Exhibit in the Seattle World's Fair. The exhibit is titled "The Spacearium," and will serve as the vehicle for a realistic trip to outer space. Especially developed equipment includes a 160° angular field lens used in photography and projection, a $2^1/_4$ by $2^1/_4$-in. format animation camera, $2^1/_4$ by $2^1/_4$ format projectors, the sound system, the miscellaneous auxiliary equipment and the 75-ft diameter domed projection screen.

Multifilms in the Theater and Television

HAROLD H. SCHROEDER, *Bausch & Lomb, Inc., Rochester, N. Y.*

Vacuum-deposited multilayer coatings are assuming an ever increasing role in motion pictures and television. After examination of existing applications, current developments and future activity, particular emphasis is placed on applications to professional projection as related to screen brightness and color. Pertinent slides and demonstration material are integrated with the discussion.

FRIDAY MORNING — MAY 4

9:00 MOTION-PICTURES and TELEVISION IN EDUCATION and INDUSTRY

The Communication System Approach to Recorded Lectures

OSCAR E. PATTERSON, *Univ. of Calif., Los Angeles*

The Department of Visual Communication, UCLA, initiated a project for the filming and nationwide distribution of an entire graduate engineering course on Ballistic Missile and Space Vehicle Systems. The overall project was approached as a communication system, each aspect (lectures, production, distribution) representing a subsystem. An integral and unique combination of stage design, shooting technique and distribution procedure was required to allow the project to proceed with great economy of time and money. The factors and approach are given for the problem's solution.

Teaching Film Production in American Colleges and Universities

JOHN H. TYO, *System Development Corp., Santa Monica, Calif.*

The results of a survey of film teaching, conducted in 1959 and 1960 at the ten leading college film production centers, are reported. Data were gathered by personal interviews with 105 instructors and 10 administrators of the film teaching programs. Eleven subject areas, such as cinematography, writing and directing are analyzed from the point of view of what is taught, how it is taught and how student achievement is evaluated.

A Profile of Television Education in American Colleges and Universities

RICHARD J. GOGGIN, *New York University, New York*

Starting originally as an appendage to the already-established curricula in radio, television instruction has in a few short years grown to equal, if not greater, status than that of radio instruction. Further, TV instruction, once restricted to course work in writing, production-direction and some performance, has spread out to the broadest kind of coverage of all aspects of the medium and the industry. It is the object of this paper to provide an overview of an commentary on this spectrum.

The Application and Scope of Television Tape Recording in Educational Broadcasting

JAMES L. LOPER, *Television Services, Los Angeles State College, Los Angeles*

Television tape recording has added a new dimension to educational broadcasting. No longer are class times tied to live performances. Tape interchange of instructional materials is now possible between institutions and stations. A national educational TV network, linking 60 stations by tape, is now in operation. This paper reports on the number and type of recorders at each installation, types of studio facilities, specific applications of tape recording and the number of hours of operation. Data were gathered from a nationwide survey. Supplementary material is added from the author's own experience at Los Angeles State College.

FRIDAY AFTERNOON

2:00 CINEMATOGRAPHY and PRESENTATION SYSTEMS

Considerations in Color Cinematography for Color Television

ALEX QUIROGA, *National Broadcasting Co., Hollywood*

In shooting films for television release, the cinematographer should observe a number of fundamental requirements for telecransmission, and make necessary accommodations for overall transfer characteristics from the film camera to the home television receiver. Color cinematography for color television imposes certain additional considerations, including the generally higher contrast of the color film and simultaneous (compatible) black-and-white reception of the color broadcast. Recommendations are made for lighting, set decoration, wardrobe and makeup. Suggestions are given for procedures which can make a film that is technically satisfactory into one which is, in addition, subjectively pleasing on the home receiver and in the motion-picture theater.

Highlight and Shadow Transfer Problems Between Film and Television

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

The cinematographer who is filming for television must be aware of the characteristic transfer curves of both media and the limitations of the combination in order to achieve best results in this field. This is particularly true for color where the limitations are more severe than in black-and-white. Careful light measurement and accurate exposure calibration of the camera are essential.

The Efficient Use of Light in Macrocinematography

F. ALTON EVEREST *Moody Institute of Science, Los Angeles*

In an eight-year photographic project documenting the life and character of the bee, many of the more traditional aids for macro-realm photography proved to be inadequate. In particular, the demand for greater depth of field and for light sources that do not cook the bees encouraged a re-thinking about optical and illumination systems. The inefficiency of lens extension tubes and bellows was eliminated by the use of a supplemental lens arrangement. Stroboscopic light pulses synchronized with the camera shutter gave maximum photographic exposure with minimum heating of the subject. In addition to the major improvement in optical/photographic efficiency, some very attractive operational advantages result as by-products.

Quartz Iodine Lamps and Reflectors for Set Lighting

S. C. PEEK, *Sylvania Electric Products Inc., Salem, Mass.*

The introduction of compact filaments contained in compact quartz envelopes has provided an opportunity for the design of compact reflectors. Set lighting equipment, up to this date, has had to provide space for large envelopes and therefore is bulky and requires bulky stands to support the structures. The actual light source being, by necessity, at a rather large distance from the reflector causes optical inefficiencies. The theory of operation of the quartz iodine lamp and how short compact filaments were developed is described. A summary of the mathematics that led to the final reflector design is presented. Photometric results are shown in graphical form and, finally, the use of the system in professional cinematography is described.