Summaries of the Technical Papers Program

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Following are abstracts of most of the papers presented at the Conference. For information on the Symposium on Television Broadcast Monitoring the reader is referred to pages 958-961 of this issue.

MONDAY MORNING — November 11

TELEVISION ONE

(Concurrent with Laboratory Practices One)

#1

The Design and Construction of the CN Tower

MALACHY GRANT, CN Tower Limited, Toronto, Ontario

At 1,850 ft (550 m), CN Tower will be the highest freestanding structure in the world. Its prime purpose is to support television and FM radio antennas serving the region centered on Toronto. The design which commenced in early 1969 continued to change in detail even as the structure was being built. It was decided very early in the concept stage that a design and construction team approach was essential rather than the conventional design, bid and build method. It was also necessary from the early stages to have all broadcaster users involved in the design. The design allows for the incorporation of all antennas and transmission equipment necessary for all present and future TV channels and FM stations allocated to this area. In the early spring of 1975, it is planned to install the 300-ft (91.5-m) steel antenna support above the 1,500-ft (457.2-m) concrete shaft. The tower should be open to the public in the fall of 1975 and is likely to be considered one of the great engineering feats of the world.

#2

Multiple Antenna System — CN Tower

J. K. MAC DONALD, Canadian Broadcasting Corp., Montreal, Que.
Presented by BOB SMEE, Canadian Broadcasting Corp.

The top 300 ft (91.5-m) of the CN Tower being created are reserved for TV and FM broadcast antennas. A condition imposed in order to get air clearance for a structure of this height was that it should be capable of accommodating all present TV and FM radio broadcasters, and in addition, provision should be made so that any FM frequency or TV channel allocated to Toronto and presently unoccupied could also be accommodated. The original broadcasters who plan to use the antenna facilities are CBC, for both English and French TV, and English FM Radio, with provision for future French FM Radio, CFTO-TV, CHFI, CHIN, CKFM and CHUM-FM. The antenna system comprises: a single FM antenna for all FM users, a Channel 5 antenna for CBLT, a Channel 9 antenna for CFTO-TV, a Channel 19/25 antenna for CBLFT and CICA-TV (the educational station of the Ontario Educational Communications Authority). There is also provision for a Channels 45, 51 and 57 UHF antenna and provision for a Channel 79 antenna (CITY-TV, who occupy this channel have subsequently made separate arrangements with CN Tower Ltd. to relocate to the Tower). The entire antenna aperture is to be protected from the weather by a radome of glass-reinforced plastic. The contract for the design, fabrication, erection and putting into service of the complete antenna, radome and transmission line system was awarded to E.M.I. Sound and Vision Equipment Limited of England. Erection of the steel antenna supporting structure and a radome is scheduled to start in December 1974 with completion of the antenna system scheduled for July 1975.

#4

A Comprehensive Special-Effects Generator

A. W. CRITCHLEY, I. A. FAIRBAIRN and E. W. TAYLOR, E.M.I. Sound & Vision Equipment Ltd., Hayes, England
Presented by J. A. WILKINS

The E.M.I. Type 7100 special-effects generator is the latest addition to the well-established 7000 Series of modular high-specification switching and mixing equipment. The modular concept has been continued and the options cover Positioner, Pattern Modulation, Color Matte and black or colored edging. Several video keyers can also be operated from the same pattern generator to give independent wipes. The comprehensive range of facilities includes genuine all-round soft-edging, "fan" wipes, momentary contact pattern and mode selection (computer-compatible and easily assignable) and vertical and horizontal multiplication of all patterns including circles. Contrary to the modern tendency to digitize circuits, this effects generator is more "analog" than its predecessors, all pattern control logic functions being carried out by analog transmission gates. Keeping the wipe signal in analog form in this way allows one pattern generator to drive several independent keyers and permits "true" soft edging without contouring or beats. The controls and the effects achievable are covered.

#5

High-Speed Bi-Polar Memories Used for Video Signals Storage and Processing

S. M. DOUAIHY, Television Microtime, Inc., Bloomfield, Conn.

A bi-polar random-access memory has been developed to store digitized video signals at clock rates in excess of 10 MHz. The processing of information through the memory is done without multiplexing or time-sharing techniques. The video, which might originate from a VTR, is converted to a digital format at an average rate of 10.7 MHz for NTSC or 13.3 MHz for PAL. Time-base correction is accomplished by writing into the memory at a rate varying as a function of time-base error and reading the stored data at a fixed and precise rate. The bi-polar memory has a cycle time of less than 50 ns and a capacity of 3K $\times$ 8. Addressing and digital/analog conversion are discussed.

#6

The Philosophy of the Fernseh Hand-Held Color Cameras

H. D. SCHNEIDER, Robert Bosch GmbH, Darmstadt, Germany
Presented by PETER BOBEK and ANTHONY R. PIGNONI, Robert Bosch Corp., Saddlebrook, N.J.

Since the 1973 Montreux Exhibition, the Fernseh hand-held reporter color television camera has been further improved. Functions other than the camera head have been made yet smaller and combined into a single compact unit, the KCN. With supplementary apparatus, the KCN can also be operated via a type KA 64 camera cable. Thus, the camera can be used in studios or in big OB vans (pool operation) as well as for the equipment of small OB vans. Manual control and automated operation are both possible. Additional accessory equipment is under consideration to enable application as a satellite camera remotely controlled via an air link or coaxial cable.

#7

Television Frame Synchronizer

KEN-ICHI KANO, MASAO INABA and ATSUMI SUGIMOTO, Nippon Electric Co. Ltd., and YUTAKA ITO, Tokyo Broadcasting Systems, Inc., Tokyo, Japan

A new television frame synchronizer has been developed by

employing the latest digital techniques to eliminate the problems associated with genlocking and rubidium-standard operation. The synchronizer helps to solve technical problems resulting from the handling of a nonsynchronous video signal from multiple remote sources and various studios and it permits expanding program production techniques and saving personnel expenses. Eight-bit A/D and D/A converters are used with sufficient digital memory (approximately 3 megabits) and associated circuits. The resultant output signal is completely synchronized with the local reference sources in frequency and phase.

#8

Operational Implementation of a Frame Synchronizer

ROBERT J. BUTLER, National Broadcasting Co., Inc., New York, N.Y.

The first permanent installation of a frame synchronizer in the U.S. and a successful processing of various signals are discussed. The frame synchronizer is well suited to overcoming problems in video switching due to: videotape servo instabilities, Doppler effects in satellite video distribution and instant event integration without genlock in electronic journalism. It has become a powerful tool in the broadcast business.

LABORATORY PRACTICES ONE

(Concurrent with Television One)

#9

Microdemand® Drive: A Key to Cost-Effective Film Processing

JACK P. HALL, Filmline Corp., Milford, Conn.

A new film drive is described which is designed specifically to contain the waste factors which so aggravate the problem of rising costs in film processing laboratories. Advantages accruing with the use of the film drive include: minimum film losses due to physical damage traceable to machine design and construction; minimum down-time minimum requirement for maintenance; minimum chemical loss and contamination; minimum pollution control costs; minimum operator fatigue and aggravation (and consequently higher productivity); and minimum lost time in format changeovers. "Cruising" speeds of 300 ft/min (91 m/min) are a reality.

#10

L.A.D. — A Motion-Picture Laboratory Control System Based Upon Laboratory Aim Densities

ALFRED W. FLEISCHER and JOHN P. PYTLAK, Eastman Kodak Co., Rochester, N.Y.

In a proposed and demonstrated new laboratory control system, a film patch — designated LAD for Laboratory Aim Density — whose red, green, and blue densities are standardized at values corresponding to a midtone gray normally exposed onto camera negatives is spliced in with each original (or dupe) received by the laboratory. This patch is treated as a scene and is printed at the midrange of the printer (usually light value 25). All other scenes are timed with respect to this LAD standard using a color analyzer, scene printer or trial print. Aim print-through densities and tolerances are specified for the LAD standard patch for each film type onto which the original or dupe may be printed. These laboratory aim densities are chosen to be at the center of the usable "straight-line" portion of the duplicate film's sensitometric curve. Timing all scenes with respect to the LAD standard assists in achieving optimum and consistent curve-placement and final print uniformity. The basic system may be easily expanded to multi-stage printing.

#11

Application of Ozone for Chemical Recovery and Pollution Control in the Photographic Film Processing Industry

GEORGE A. LORENZO and THOMAS N. HENDRICKSON, CPAC, Leicester, N.Y.

The use of ozone as a viable method for the regeneration or destruction of bleach solutions and as a means of pollution control for other chemicals in the photographic processing industry is discussed. A review of recent research in this area, along with specific examples of installations now using ozone treatment for photographic wastes, is presented.

#12

Cost and pH Controlled Acetic Acid Solutions

FRANK P. BRACKETT, Consultant, North Hollywood, Calif.

A pH recording controller is used to continuously monitor and regulate the ratio of two replenisher solutions to maintain the acidity of an acetic acid stop bath at a pH of 3.3 ± 0.1. One solution is simply glacial acetic acid and city water, at a concentration of 3.5 ml/l. The other solution contains the same concentration of acetic acid but it contains also 31 ml of concentrated sulfuric acid per liter of solution. Accordingly it is 0.06 N in acetic acid and a little over 1 N in sulfuric acid. The stop bath services 180 ft/min (55 m/min). The replenishment rate is 1,500 ml/min. At 3.3 the pH is high enough to avoid the dissolving action of a lower pH on the very soft gelatin involved in the process. The same principle should be useful in fix solutions, particularly where electrolytic silver recovery is involved in a recirculating loop from the machine tank.

#13

Image Quality with Reference to the Elimination of Particulate Contamination

RONALD NORMAN HAIG, Lipsner-Smith Co. Ltd., Uxbridge, England

With the ever increasing cost of filmmaking and the high standards now set for professional print quality, it has become essential to exercise the maximum possible care and protection of both negative and print film from particulate contamination. Factors which bear on image quality and acceptance standards are discussed; they include: establishing specially selected clean areas; film cleaning; eliminating static electrical charges; maintaining clean film handling equipment; determining that the laboratory cleaning service itself not be a hazard to film being handled; assuring that ancillaries are not overlooked as sources of contamination; and training personnel to be quality conscious. The filtration of processing machine solutions, which should be the subject of a separate paper, is not discussed.

#14

The Economics and Advantages of Silver Recovery

KENNETH BURGESS, Hydrospace Industries, Inc., Buffalo, N.Y. and Recycling Laboratories, Burlington, Ont.

Consideration is given to the various methods available for recovering silver from film-processing chemicals. Emphasis is on the current stringent ecological guidelines, the economics of the methods and the flexibility now allowed due to the rapidly changing price of silver.

MONDAY AFTERNOON

TELEVISION TWO

(Concurrent with Laboratory Practices Two)

#15

Slow-Scan TV System for Balloon-Borne Telescope

NOBORU NIWA, Institute of Space & Aeronautical Science, University of Tokyo, Tokyo, Japan

A narrow-band television system for space observation utilizing an image-memory tube has been developed and used as a finder system for balloon-borne solar telescope. Slow-scan video signal from the camera or FM receiver is supplied to a slow-scan monitor. The pictures on the screen are recorded by a motor-driven 35mm film camera. The slow-scan pictures are converted to the standard scanning rate by a scan converter with two memory tubes. This system has been used with 15,000 m^3 balloons since 1971 as a finder system for a balloon-borne solar telescope jointly with a group of the Tokyo Astronomical Observatory, University of Tokyo. The image of the telescope is divided by a half mirror. One of the optical paths is for an on-board motor-driven film camera. The other is for the television camera. The usefulness of the television system as a real-time finder was proved by the test flight in 1971 using a 48-mm-diam solar telescope. In 1972 and 1973, 100-mm-diam and 17-m composite-focal-length solar telescope was used to get photography of the solar surface.

#16

An Automated Network Control Center

J. BOWIE DICKSON and M. W. S. BARLOW, Canadian Broadcasting Corp., Montreal, Que.

The previous network operation in Toronto is briefly outlined and the reasons for updating the facilities given. The Network Control Center, two new transmitter booths and the Machine Room are located on the fourth floor of the Toronto TV building in what was a kine-recording and office area. The network and transmitter switchers are housed in Master Control on the second floor. The Machine Room contains two General Electric telecine chains and eight AVR-1 VTRs. Space is provided for

the addition of two more AVR-1s and up to three VTR cassette machines. One telecine is dedicated to each of the transmitter booths. A computer-controlled VTR assignment system permits any of the VTRs to be assigned to the transmitter booths, the network control center and three utility control rooms on the second floor any one of which may be associated with the presentation of the initial network program stream. The Network Control Center is the heart of the CBC's English language network.

#17

The Design of an Automatic Machine Assignment System

M. W. S. BARLOW, Canadian Broadcasting Corp., Montreal, Que.

Certain features of a switching system used to assign, start and stop videotape machines used for recording and playback purposes lend themselves to automation control. The design procedure for a system suitable for assigning 10 VTRs to record from 35 sources (including dubbing) and to playback to 27 destinations is described. The system is not operational as designed. To improve the reliability of the system, it has now been revised so that 8 VTRs and 2 video cassettes are automatically assigned only to the Network Control Center switcher, and that assignment and machine control is done by the NCC computer. All clutter of secondary control systems and secondary assignments (such as to studios) have been removed from automatic control and left as manual operations. The control center responsibility is now unambiguous, and the redundant assignment computer has been reprogrammed to act as a backup for the presentation computer. Only minor hardware changes were required, but the software associated with the scheduling features is not presently in use. Thus, although extensive changes in operation have been made, the split of hardware and software in the original design has permitted these changes to be incorporated neatly and economically.

#18

An Automatic Control System for the ORTF Microwave Network

MARIE FRANCOISE LEVIEUX, Office de Radiodiffusion Television Francaise, Meudon, France

A system which allows central supervision in Paris of the whole ORTF microwave network is shortly to become operational. An increasing number of different signals made it necessary to study this system, so that with a computer it would be possible to optimize the management of the network to reduce to a minimum the investment in new microwave equipment. This system has been planned to help operator decisions for the dispatching of signals on the network. Its main object is thus planning, but it also enables the operator to find quickly another solution if a channel cannot be used as previously planned, to visualize the state and occupation of the network at any moment and to list automatically the different events of the day. Essential elements of the system are: a CII Mitra-15 minicomputer, display units (color video with keyboards and other units with light pens) and several teleprinters.

#19

Derivation of a Correction Matrix for Nonstandard Color Television Display Phosphors

L. E. DE MARSH, Eastman Kodak, Rochester, N.Y., and C. B. NEAL, GTE Sylvania, Batavia, N.Y.

The problem in recommending a means for deriving the correction matrix for non-NTSC display devices involves selecting a method which either gives the best distribution of residual color errors or places the residual color errors in some part of color space where the errors will be least objectionable. When applied to different sets of phosphor primaries, the means selected should result in color reproduction as uniform as is practical with different phosphor color gamuts. We have evaluated four possible procedures for computing the correction matrix. The first method is simply a transformation of primaries assuming a linear system. The second method uses a least-squares fit to minimize the color errors for a group of colors distributed throughout the phosphor gamut. The third is to specify the matrix to produce zero color error for three colors such as skin, grass and white. And the fourth method uses the direct-transformation method to correct for some percentage of the change in primaries from NTSC to the actual display. Advantages and disadvantages of each method are examined.

LABORATORY PRACTICES TWO

(Concurrent with Television Two)

#20

Electronic Color Analysis for 16mm Film

ALBERT ARBEENY, Hazeltine Corp., Greenlawn, N.Y.

The use of electronic color analysis is treated as it applies to 16mm film. Electronic color analyzers are used to predict the correct exposure values for negative film before it is printed or processed. A description of a new color analyzer for 16mm film is given, and its relationship to the increasing use of 16mm negative film is considered.

#21

Our Shrinking Film Heritage

A. C. SCHIEMAN, National Film Board of Canada, Montreal, Que.

Film shrinkage has long been a problem both for the laboratory and archivists. This shrinkage is most noticeable in 35mm nitrate films and in 35mm and 16mm acetate films, both black-and-white and color. A status report is presented on an evaluation project regarding a process that actually stretches the film to zero shrinkage and can be maintained in this state for a reasonable length of time. This process was developed primarily for an archival program, where rare films that are badly shrunken can now be reproduced onto duplicating preprint materials, using conventional continuous or optical step printers.

#22

Film Preservation and Restoration

SAMUEL H. BUNCHEZ, Vacuumate Corp., New York, N.Y.

Archivists in their efforts to salvage and catalog photographic memorabilia are learning that lack of knowledge and/or interest in preservative techniques for photographic records, motion or still, in the past has resulted in the loss of many pictorial records, historical, artistic and personal. Proper treatment and proper storage of the finished film would have preserved many of the photographic records of the past that have deteriorated, many beyond redemption. This is a description of preservative techniques, as well as redemption techniques.

#23

High-Speed Automated Breakdown of 8mm Materials

W. D. CARTER, Carter Equipment Co., Inc., Inglewood, Calif., and SHERWIN BECKER, Allied Film Laboratory, Detroit, Mich.

First-generation breakdown machines (which prepare film for processing) utilizing predetermined footage counting systems are discussed, as are current models which utilize logic-gated optical pickups. Sophisticated logic networks recognizing a distinct six-frame pattern are explained in detail. Transport system and platter takeups used for cartridge loading are considered. Comparative output capabilities of conventional techniques are compared to those of these sophisticated high-speed breakdown tables. Operation of the tables in conjunction with an entire production line for cartridge loading is illustrated.

TUESDAY MORNING — November 12

SOUND

(Concurrent with TV and Film in Education)

#24

Design Parameters for Future Data and Entertainment Magnetic Recording Media

MALCOLM BOTTRILL, Racal-Zonal Ltd., Surrey, England

The various fields of expertise in the area of magnetic film and tape manufacturing are reviewed. Emphasis is on the "degree of manufacturing difficulty" in producing magnetic media for audio, video, film data and instrumentation applications. Results from the development program of a low-noise film are presented, and the degree of success achieved in transferring such a product from the laboratory to the production floor is demonstrated by a number of statistical plots.

#25

Computer Simulation of Photographic Sound

JOSEPH J. CHARLES and CHARLES F. MITASIK, Eastman Kodak Co., Rochester, N.Y.

A photographic sound-simulation program is described, and an examination is made of how photographic characteristics affect the quality of 16mm variable-area photographic sound. Sound-

tracks were simulated on a statistically selected series of hypothetical 16mm negative and print film combinations. The dependence of several soundtrack quality factors on the photographic characteristics was determined. These simulations help clarify the behavior of more complex film systems such as multilayer color films, and of the effects of different recorders, printers and projectors. The present model is restricted to sound negatives and prints which can be described adequately by a single characteristic curve, a single modulation transfer function and a single chemical spread function. The results of a test simulation were in good agreement with experimental tests.

#26

Contemporary Technology of Registration and Reproduction of Sound on Film in the Soviet Union and its Further Development

B. G. BELKIN and O. I. IOSHIN, Cinema & Photo Research Institute (NIKFI), Moscow, USSR

The present state of the Soviet film industry is described in some detail in terms of the facilities and equipment in widespread use. Modern equipment and the currently used traditional techniques on the whole meet the requirements of both film associates and moviegoers. However, quite an urgent problem for cinematography is the need to further improve sound quality and production methods and widen creative possibilities for cinema workers. In our opinion further development of sound engineering in cinematography can be achieved by using new techniques based on digital recording and processing of signals. The physical realization of digital recording is examined along with the advantages that will accrue and the difficulties of implementation. Cooperation between Canadian, American and Soviet specialists in developing this aspect of cinematography is considered a possibility.

#27

The Design, Installation and Operation of a High-Speed Re-Recording Complex

BILL O'NEILL, Mirrophonic Sound Ltd., Toronto, Ont.

The design layout of a complex of three studios, nine editing rooms, a sound-effects library, magnetic and optical transfer facilities, an engineering department, offices and a reception area is discussed. Digital Logic is used throughout the equipment design to provide substantial flexibility in operation. The capability of the equipment to slew forward or reverse in interlock at 540 ft/min (165 m/min) with picture or at 900 ft/min (274 m/min) without picture in recording or ADR and FOLEY operations plus on-console advance and retard in interlock of any source, with all functions programmable, makes down-time in rock-and-roll pick-up recording a minimum. By means of an additional synchronizer, the complex of twenty eight 35/16mm dubbers and multitrack pick-up recorders can interface easily with VTRs employing the SMPTE time code.

#28

Technical Innovation and Development in Sound-Dubbing Systems

A. H. LAVENDER, P. SURMAN, D. HAMILL and G. POWELL-EVANS, P.A.G. Films Ltd., London, England

The first requirement of any recording device is that its speed and transport stability be as near perfect as is possible. Research into the design of a full-compliance film-transport system with a new approach to this problem is reviewed. Also embodied in this review are damping systems and a brief mention is made of a device which will assist a faster run up of a film transport system without the need to drive the flywheels directly. The advantages of a completely modular dubbing system are considered. Stepping motors provide an easily controllable drive for a film-transport-mechanism plate. A machine with this type of drive can be used in various modes including running locked to an optical encoder, or running synchronously with either mains or an external reference such as time code on tapes. The control circuitry can be switched to enable the motor to be slaved from the encoder or to run synchronously. A brief review is made of the specification necessary for the audio electronics of a high-quality dubbing machine. A specific requirement for rock-and-roll dubbing is the facility of entering and leaving the record mode in the middle of a soundtrack without audible effect; solid-state circuitry was developed which achieves this. A solid-state footage counter fed by an optical encoder can be used in conjunction with the film recorders. The circuitry consists of transistor-transistor logic with solid-state drivers for the display lamps. A brief description of the circuit is given.

#29

A Film Re-Recording Theatre Telecine System

WILSON MARKLE, CLARKE DA PRATO and LEO O'DONNELL, Film House, Toronto, Ont.

A presentation facility is described which is a film projection and telecine system in the re-recording or mixing theatre. With this facility, the present sophistication of a re-recording theatre technique is available to the pure video post-production sound requirements. The transfer of videotape to film with the inherent problems of time, cost, sync and quality is not required just for the mix. With a Sony ¾-in color VTR to record picture and final sound, the final product, save for titles and opticals but with the final sound and fine cut picture, is obtained at the conclusion of the mix. Such a system provides television film producers the extra convenience of viewing their results on both the normal screen and television monitor.

#30

A Demonstration of the Use of Dolby Noise-Reduction Equipment and Cinema Equalization Techniques as Applied to State-of-the-Art 35mm Optical Soundtracks

IOAN ALLEN, Dolby Laboratories Inc., London, England

#31

Performance Parameters of the Hue-Modulated Multi-Channel Push-Pull Color Soundtrack

PETRO VLAHOS, AMPTP Research Center, Hollywood, Calif.

The three-channel 35mm version of the hue-modulated color push-pull soundtrack has the appearance of three 30-mil (0.76-mm side-by-side variable-density tracks. The total transmission of scanning beam light through the track is a constant. Only the color or hue of the track is varied. The hue is yellow for zero modulation. The hue shifts between green and red to represent an audio modulation. At one modulation peak the track is fully red. At the other polarity, the track is fully green. Playback employs two PIN-type photodiodes per channel, with corresponding red and green separation, connected to a push-pull input stage. Because the push-pull halves of each track are superimposed (green over red), all dirt, scratches, lamp voltage fluctuations and density changes for grain noise reduction, are symmetrical in-phase inputs that do not induce an output signal. The system is therefore inherently noise-free and essentially immune to the effects of dirt and scratches. The push-pull color arrangement makes the track essentially distortion-free over a wide range of density and gamma variations. Data are presented from tests conducted to determine numerical values for SNR, common mode rejection (dirt and scratches), distortion, frequency response and tolerance limits of density and gamma.

#32

A New Photographic Recording System for the Multi-Track, Variable-Density, Hue-Modulated, Push-Pull, Color Soundtrack

FRANK E. PONTIUS, Westrex, Inc., Beverly Hills, Calif.

A brief review of the possible recording methods for the new soundtrack developed by the AMPTP is given, and a system designed specifically for recording this track is described. Preliminary quality-control procedures and specific recording parameters are outlined. Single- and multi-channel recordings are compared in a demonstration.

A Sound Demonstration related to papers presented by Petro Vlahos and Frank E. Pontius

TV & FILM IN EDUCATION

(Concurrent with Sound)

#33

An Educational Technology Program for Canada

JOHN deMERCADO, Canadian Federal Government, Ottawa, Ont.

A review is given of the structure, operation and present and future activities of an Education Technology Program established for Canada in 1972. The program is intended to provide assistance in the area of technological information to educators and others. The rapid advances in new technology pose difficult problems for many educators who do not have ready access to the specialized knowledge required for assessing the merits of various technological systems that might be applied to their educational needs.

#34

Measuring the Performance of Audiovisual Equipment

RALPH W. CURTIS, National Film Board of Canada, Montreal, Que.

The equipment-evaluation laboratory at Canada's National Film Board has long been familiar territory to many audiovisual equipment manufacturers. Objective reporting on the performance of their new models has been valuable to them, as it has to the National Film Board and other Federal Departments. Now through the Educational Technology Program, the laboratory will also serve the Canadian educational community. This Film Board operation will thus represent a new channel of communication between education and industry, one that will surely prove beneficial to all concerned. With the discussion centered on the educational testing program, the evolution of the testing and reporting system is described. Comments are made on some of the approaches that the laboratory takes to the problems of evaluating audiovisual equipment.

#35

Individualized Audiovisual Instruction in Tomorrow's World

G. HARRY McLAUGHLIN, Ontario Correctional Institute, Brampton, Ont.

A proposal is made that conventional audiovisual instruction be made interactive and individualized to eliminate the student's passive role in the learning process. This might be done by providing each student with high-information-density recordings for replay on a television screen under the control of a mini-computer. Teachers would be freed to conduct seminars and give individual attention to students. With such an approach, learning could take place more in a club or home environment than in a factory environment. Education would become a lifelong process of personal growth and enrichment.

#36

A Demonstration of Computer-Assisted Learning Involving Equipment Set-Up and Run by I.P. Sharp Company Using Programs from Erindale College of the University of Toronto

G. HARRY McLAUGHLIN, Ontario Correctional Institute, Brampton, Ont.
Presented by FORD CLANCY

#37

Open Education in Ontario: The OECA as Catalyst

LEW MILLER, Ontario Educational Communications Authority, Toronto, Ont.

Recent trends in "open education" in Ontario are reviewed and related to similar trends throughout the world. The importance of the Ontario Educational Communications Authority's role in serving open learning in Ontario is indicated. Topics discussed are the mandate of the OECA, its goals and objectives, and its structure designed to try to meet these needs; OECA activities in support of the objectives, such as, the structure of the Educational Media Division, and some of its programming; the establishment of the Working Group on Open Education; and current research projects designed for the purpose of establishing existing needs and interests.

#38

Super-8 Double-System and Single-System Sync Sound Equipment for Use in Filmmaking Education

ROBERT O. DOYLE, Super 8 Sound, Inc., Cambridge, Mass.

Recent developments in super-8 sync sound are reviewed. A survey is presented of available super-8 sound equipment — sync cameras and recorders, editing equipment, projectors and transfer facilities. An argument is offered for the adoption of the single pulse/frame super-8 sync track as an industry standard.

Panel Discussion with selected speakers from the session, moderated by Jim Miller, Toronto Board of Education

TUESDAY AFTERNOON

LIGHTING

(Concurrent with Small Format)

#39

Television Lighting Control Manual or Memory?

TOM C. NUTT and C. WILLIAM SHEARER, Canadian Broadcasting Corp., Montreal, Que.

The contribution of lighting to the composition of a television picture is outlined, the nature of the control facilities required is established and a diagrammatic concept of the flow process from luminaire brightness to lighting control is presented. Facilities provided in manual control systems are compared with those in memory-type control systems in terms of reliability and repeatability. A glossary of control system terms is presented as an aid to comparing various memory systems which are presently available.

#40

Television Outside Broadcast Lighting

B. P. WILKES, British Broadcasting Corporation, London, England

Recent developments in compact source and other metal halide lamps, with their higher lumen output of 80 to 90 lm/W, are offering the outside broadcast lighting man greater flexibility with the advantages of less power consumption and higher correlated color temperatures. Techniques are being established with these new luminaires in the mixed-light conditions that are part of outside broadcasting. Specifications of lighting requirements for color broadcasts of sports events are considered. A lighting control system using thyristor dimmers has been developed which enables complex lighting changes to be memorized and recalled easily, so that large scale productions, particularly light entertainment can be undertaken. If camera sensitivity increases in the future as is hoped, outside broadcast lighting equipment could probably be based on two or three multipurpose units. The present disadvantage of metal halide lamps which cannot be dimmed may be overcome yielding the advantage of having light sources with color temperatures remaining constant at all levels of intensity. The significant addition of metal halide luminaires and their uses in outside broadcast lighting are considered along with the scale of lighting operations that are now part of the established outside broadcasting field carried on by the BBC.

#41

The Use of Metal Halide Lamps on Exteriors

C. RYLE GIBBS, O.R.T.F. (French Television) Paris, France

The increasing use in Europe of projectors equipped with metal halide lamps, manufactured by Osram Federal Germany, on exteriors for shooting in color both for film and video, has considerably decreased the use of the conventional incandescent light source projectors and automatic carbon arcs. This article describes their characteristics and the parameters to be followed for their successful utilization.

#42

The Development and Application of Metal Halide Lamps for Color Filming and Television

ROBIN C. ALDWORTH, Thorn Lighting Limited, London, England

The development of high pressure discharge lamps over the years has had three main objectives: to improve color rendering, efficiency and life. The compact-source iodide (CSI) lamp was initially developed in 400-W and 1000-W ratings for projector applications, but it was the new demands of outside broadcast color television in 1969 that lead to the introduction of this lamp housed in a PAR64 sealed-beam outer for floodlighting sports stadia lit from high corner towers. For sports areas the alternative side lighting system used did not lend itself to lighting with the symmetrical beam CSI floodlights, so to meet this demand a second metal halide lamp with an unjacketed linear arc tube, the MBIL lamp in 750-W and 1600-W ratings, was introduced. It was found that this lamp performed exceptionally well as a fill-in source with daylight. The MBIL luminous efficiency of 90 lm is 5 to 6 times greater than tungsten halogen lamps used with blue filters to correct the daylight, and four lamps are approximately equivalent to a 225-A brute arc. Topics of discussion include: choice of lamps for different applications, control gear needed, and the problem of "beat" when filming with discharge lamps and ways of solving it. Detailed information is presented regarding the electrical and photometric data of the CSI and MBIL lamps and their associated lanterns, and some of the equipment and examples of film taken with these light sources are illustrated.

#43

TV News Applications of HMI Lamps

GIDEON FIAT, ABC News, New York, N.Y., MICHAEL McGOVERN, MacBeth Sales Corporation, Newburgh, N.Y. and THOMAS LEMONS, TLA-Lighting Consultant, Inc., Salem, Mass.

The operation of a TV news department raises a number of unique requirements for the equipment used by film crews. Ver-

satility and ease of operation is of utmost importance for all equipment because the assignments may involve working under all possible environmental conditions. Lighting equipment must be characterized by high performance, efficiency, light weight, compact size and ruggedness. The beam should be variable from spot to flood to provide key light performance in direct sunlight and large area fill when general lighting is inadequate. The color quality should be compatible with available film and normal general lighting encountered in all field conditions. The cameras and film used by film crews vary considerably, and their requirements for light intensity, film speed shutter angle and f-stop add to the considerations especially for ac arc lamps. The HMI lamp was developed to meet the needs of TV news application. These applications, however, have been limited by problems encountered due to "dark frames" when ac arc fluctuation and film speed are not synchronized. The complexities of the HMI lamp and ballasting equipment result in a high unit operating cost which must be justified against present system usage. The advantages, limitations and cost of HMI lamps used in TV news applications are detailed.

#44

Investigation of the Causes and Recommended Solutions to the "Dark Frame" Phenomenon in 60-Cycle HMI Arc Lights

A. GUY OBOLENSKY, Technethion Corp., Sloatsburg, N.Y. and GIDEON FIAT, ABC News, New York, N.Y.

Experiments were carried out by ABC News in May of 1974 investigating the dark-frame phenomenon — the flickering or "beat" problem that arises when a film is exposed at 24 fames/s under 60-Hz HMI arc lights. The phenomenon was found to be frequency dependent and not necessarily caused by shutter angle. Further experiments were conducted to define the causes of the problem and determine the limits to which conventional power supplies could be used. A new type of power supply was then used which reduced the fluctuation in the arc by a factor of three, and experiments were made to determine the limits of this supply. High-speed filming, wild cameras and all other normal techniques were used.

Panel Discussion with selected speakers from the Session, moderated by Bob Coyle, Canadian Broadcasting Corp.

SMALL FORMAT

(Concurrent with Lighting)

#45

Super 8: Friend or Foe of the Producer?

PETER McKENZIE-SANDERS, McKenzie-Sanders Communications, Toronto, Ont.
Presented by PETER ELLIOTT, Super 8 Center of Canada, Toronto, Ont.

The shifting market conditions are pointed out that dictate the need for further exploration into less expensive forms of communication. Some of the technical ramifications of super 8 as it relates to the film producer's ultimate goal of communications are discussed. In doing this, the current state of development of super 8 as a professional medium is considered and its role as a financially viable format is suggested.

#46

Super 8: Yesterday, Today and Tomorrow

MURRAY FALLEN, Bellevue Pathè, Toronto, Ont.

The way that super 8 has matured during its short life, the particular problems that did exist and what has been done about them are examined. Also covered are: how super 8 is being used presently and why super 8 continues to show exciting promise in the future both for production and presentation.

#47

Magnetic-Prestripe Audio Performance on Eastman Kodak Super-8 Motion-Picture Films

DAVID L. CARR, Eastman Kodak Co., Rochester, N.Y.

Audio engineers designing magnetic record and playback equipment for magnetic prestriped super-8 motion-picture films require an understanding of the magnetic and electroacoustic properties for optimum system design. Magnetic-tape manufacturers most often provide these technical properties in specification data sheets, frequently comparing the record-playback electroacoustic performance on the magnetic media against a laboratory reference normally not available to equipment designers and customers. Therefore, we report the magnetic and electroacoustic properties in both absolute and relative terms for the convenience of audio engineers. Using intermodulation and harmonic distortion measurements and the saturation output levels relative to an absolute short-circuit flux level, the properties of the magnetic prestripe are given and are compared with similar measurements on a full-width-coated magnetic film. The prestripe frequency response together with the desirable surface characteristics are shown to be similar to good quality audiotapes. Prestriped film is shown to have better performance than full-width-coated magnetic film.

#48

A 22-lb Portable ¼-in Color Video Camera/Recorder System

DENNIS RODY and MANFRED N. KLEMME, Braun Electric-Canada Ltd., Mississauga, Ont.

#49

A Super-8 Magnetic Film Recorder

ROBERT O. DOYLE, Super 8 Sound, Inc., Cambridge, Mass.

A sync-sound recorder is described that uses fully-coated super-8 magnetic film as the recording medium. Photoelectric sensing and servo control are incorporated into the portable machine, giving it the capability of self-resolving to match the speed of an external sync signal such as the 60-Hz standard pilotone, or the new once-per-frame digital sync pulse (tone burst or voltage spike) that is the preponderant practice in existing super-8 sync-sound equipment. Models available include a 24-frames/s one and an 18 frames/s one (the amateur model), as well as 250 frames/s export models that work on 220-V, 50-Hz current. The availability of super-8 fullcoat magnetic film now gives the super-8 filmmaker the same straightforward double-system editing techniques enjoyed for years by 16mm and 35mm film editors.

#50

The Potential of Super 8 in Television

CBC SUPER-8 STUDY GROUP, Toronto, Ont.
Presented by KARL KRUGER, CBC, Toronto, Ont.

In 1970, the CBC Super-8 Study Group began work which showed the possibility of utilizing super-8 film in television programming. It then turned to promoting standardization, testing super-8 equipment and systems, developing production techniques and assembling demonstration materials. Facilities discussed include: super-8 telecine synchronous playback equipment for sepmag sound and commag cameras and automated processing equipment. The work of the Study Group since 1970 is summarized and a demonstration is given of a Super-8 Quality Reference Videotape consisting of representative scenes shot with a variety of cameras, sync-sound systems and various types of super-8 film exposed under different conditions.

WEDNESDAY MORNING — November 13

TELEVISION AND FILM

(Concurrent with Photoinstrumentation)

#51

Suggestions For a New Standardized Three-Dimensional Test Chart For Color Films

FRITZ SPIESS, TDF Film Productions Ltd., Toronto, Ont.

The proposition is offered that there is a need for a lower-contrast negative color film, and it is suggested that currently accepted methods for exposing color-film test strips be revised, up-dated and standardized. At present, manufacturers are supplying the film industry with test wedges of a flatly front-lit girl sitting behind a two-dimensional gray-scale and color-chart. These wedges are supposed to represent certain standards for the industry. The suggestion is to create a new three-dimensional curved test chart, possibly in form of a hemisphere, which should be lit in a more directional way than is presently common under such test conditions. Furthermore, it is suggested that manufacturers as a result of using such a new test-chart consider the production of a reduced-contrast negative film-stock which will be able to reproduce blacks in shadow areas and whites in highlight areas when photographed under lighting conditions which approximate more realistically what the present-day cinematographer is most likely to encounter in the field.

#52

Telecine Colorimetry 1 — A Colorimetric Comparison of Film and Television

L. E. DeMARSH, Eastman Kodak Co., Rochester, N.Y.

In recent comparisons of television images obtained directly from a live TV camera and indirectly from film via telecine of the

same subject matter, the image from film has appeared lower in color saturation. One could conclude from these demonstrations that film is not capable of producing color quality as high as a TV camera. Yet current experience with prime-time TV shows indicates that film can produce high-quality images that are compatible with live-camera material. We compare the color reproduction of a projected Eastman color print (5254⟶5381) with that of a television system using current equipment and operating practice. When we compare the color reproduction of a current television system with current motion-picture film, we find that the television system does produce brighter and more saturated color than the film system. When we compare the television reproduction to the original colors, however, we find that the TV system reproduces all colors as too bright and too saturated. Therefore, TV stages are relatively drab to compensate for this color-reproduction defect. (It is held that this is not a fundamental defect of television; it is the result of current operating practice.) When we compare film reproduction to the original colors, we find that film reproduces most colors at nearly the correct saturation, but that cold colors are dark and there are hue errors. Thus one finds bright, saturated colors on a film stage. Finally this analysis suggests that with current film and television practices, there could be different telecine colorimetric objectives leading to two reference telecines. They are: the broadcast of "cine" telecine and the production or electronic telecine. In the long run, as both film and television improve (hopefully toward the same color objective), this telecine would become the same as the broadcast telecine.

#53

An Automatic Editing System Using a Minicomputer and Color Negative Film in Telecine

TOSHINORI MIURA and HIROSHI TANIMURA, NHK (Japan Broadcasting Corp.), Tokyo, Japan

Among the many efforts now being made to improve the picture quality in color television, one of the most promising approaches is scanning color negatives in telecine instead of using the usual positive print or reversal film. This approach results in improved gradation, color fidelity, steadiness and resolution. Besides these advantages, this method eliminates the time-consuming task of negative film conformation. A sophisticated system has been developed which simplifies the editing process and can shorten by at least one fourth the time and manpower formerly required to produce a finished program. The work is automated by using automatic threading telecines, remote-controlled quadruplex VTRs and a minicomputer. Other features of the system include: a newly developed telecine which can be loaded with ten 1,200-ft 16mm reels at once and a unique electronic color-timing system.

#54

Why Film?

JACK H. MEWETT, British Broadcasting Corp., London, England

[Published on pp. 973-975 of this issue.]

The question is examined of why, in the face of increasing competition from electronic systems, film not only survives, but finds increasing use as a serious program-making medium, both in television and for the larger screen. The effects of recent technical developments are considered — developments such as color negative film, crystal-controlled motors, lightweight cameras and large-aperture high-performance lenses. The electronic viewfinders which should become available during the next few years are examined, and the operational and quality consequences with particular reference to 16mm film are discussed.

#55

Computer Animation: NRC/NFB Collaboration

N. BURTNYK, National Research Council, Ottawa, Ont., R. JODOIN, National Film Board, Montreal, Que., and M. WEIN, National Research Council, Ottawa, Ont.

A presentation is made of the recent National Film Board animated film, *La Faim — Hunger*, by Peter Foldes, awarded the Prix du Jury in the short-film category at the Cannes Film Festival in June 1974. All the imagery in this film was generated by a computer technique in which the animator designs and draws the key frames in a sequence and the computer provides the intermediate frames by interpolation. A brief discussion of some of the experiences associated with the production of this film is presented.

#56

Gevachrome II: A New Color-Reversal System for Film Productions and News Gathering

R. J. H. HUYBRECHTS and R. G. L. VERBRUGGHE, Agfa-Gevaert, Antwerp, Belgium

Gevachrome II is an improved color-reversal system comprised of three camera films: T7.00, T7.10, and T7.20 and a print film, T7.80. Type 7.00 is a color-reversal film with an ASA rating of 80, optimized for usage in film production. Types 7.10 and 7.20 have an ASA rating of 125 and have been optimized for news gathering. Types 7.10 and 7.20 can be force-processed two stops. All Gevachrome II films are processed in a common, low-temperature, but rapid, process. The Gevachrome II system features enhanced pictorial and photochemical qualities which are described. Aspects like definition, graininess, sensitometric characteristics, color reproduction and processing are discussed in detail.

#56A

Application of CMOS Logic to Motion Picture Devices

DEREK W. MOORE, Moore and Gentry Engineering, Rexdale, Ont.

An increasing variety of CMOS devices are available, with many advantages over older forms of logic. They have many applications in the motion-picture industry where low-power freedom from interference and compactness are objectives generally sought. Examples and alternatives are presented taken from recently designed products including: a precise 60-Hz-regulated 115-V power supply, a synchronizing device for Nagra tape recorders, a multivoltage dc source and equipment for cordless interconnection and cuing between cameras and sound equipment. The discussion will be of principle interest to logic designers, but users will be interested in many of the possibilities now available.

PHOTOINSTRUMENTATION

(Concurrent with TELEVISION AND FILM PRODUCTION)

#59

Kinesiology — Films for Analysis of Human Movement

MAVIS E. BERRIDGE, University of Toronto, School of Physical and Health Education, Toronto, Ont.

The use of cinematography in the study of human movement is almost as old as is cinematography itself. However, the goal of such study has usually been either to find how a particular action is performed or to permit improvement to be made in a skill or performance in a sport. Nowhere has the teacher of a beginner class in kinesiology (the study of the principles of mechanics and anatomy in relation to human movement) been able to find commercially film taken at sufficiently high speed and appropriate anatomical detail to show the action of joints and muscles in the identified basic human movement patterns. The rationale behind, and the production of, *Kinesiology — Films for Analysis* at the University of Toronto in 1972 are outlined. Suggestions are included for its development from the point of view of the user.

#60

A Simple Low-Cost Zero-G Cloud Physics Camera and Optics System

BURTON J. ASKOWITH, Sperry Support Services, Huntsville, Ala.
Presented by DR. RICHARD L. HUMMEL, University of Toronto

A description is given of the cloud physics camera and optical system originally developed for use in 1975 on the joint American–Soviet Apollo–Soyuz Test Project (ASTP) to investigate salt particle break-up, particle acceleration and cloud formation in a zero-gravity environment. The experiment was aimed at viewing and still photography of particles of 5-μm diameter. Lack of room and priority caused the experiment to be excluded from the mission, but advances made during the development stage should go on the record to help workers on similar projects in the future.

#61

Acceleration Analysis of Crop Cutting by High-Speed Photography

GRAEME R. QUICK, White Equipment, Brantford, Ont.

A study was made of the use of photoinstrumentation as an aid in determining the proportion of soybean seed loss attributable

to stem cutting. Another objective was to study cutting with a view to improving the process for more efficient crop recovery. Soybean seed loss during harvesting may exceed 10% of the crop, mostly due to losses encountered at the combine cutterbar. Cutterbar losses are also significant in many other crops. Laboratory cutting analyzers were built that enabled cutting to be studied under controlled conditions of speed and blade–stem interaction. Both repetitive flash (stroboscopic) still photography and Hycam motion-picture analyses were made of the cutting and pod shattering process. Finite differencing and the Taylor's series expansion were used in the development of a computer program for the reduction of displacement vs elapsed time (or frame number) data from motion-picture records to provide velocity and acceleration graphical printouts. Shatter loss with single impact cutting was found to be severe but declined gradually with increasing speed of knife up to 12,000 feet/min. At high blade speeds, stems were often subject to multiple cuts before severance as they were being fed into the cutter. Seed loss was substantially lower for the multiple-cut stems. The film record showed that there was less transfer of energy along the stem in this case. The lateral vibration of the stem was measurable on film and provided quantitative information on energy transfer into the stem.

#62

Hail Photography: An Example of the Use of High-Speed Techniques Under Adverse Conditions

EDWARD LOZOWSKI; MYRON OLESKIW and MICHAEL MORROW, University of Alberta, Edmonton, Alberta

An account is given of how high-speed photographic techniques were used to record the aerodynamics of natural hailstones falling near the ground. Two photographic systems were employed: a high-speed 16mm camera with two 1,200-W light sources and a pair of motor-driven 35mm cameras with stroboscopic illumination. Exposure times had to be on the order of 100 μs or less with Tri-X film. Both systems were powered by a portable 3-kW gasoline-powered generator. One or the other of these systems was deployed in several hailstorms during the summers of 1973 and 1974. The photographed stones were allowed to impact in a sawdust-filled box and were stored in a portable freezer for subsequent analysis. A hailpad consisting of a styrofoam square covered with aluminum foil was also set out during the photography to record size distributions and collision energies. Some preliminary results obtained for the films, the advantages and disadvantages of the two systems, and the techniques used to facilitate high-speed photography under the adverse conditions typical of severe hailstorms are examined.

#63

Photographic Measurement of Smoke-Plume Heights from Industrial Stacks

F. H. FANAKI and G. LESINS, Atmospheric Environment Service, Downsview, Ont.

Photographing the smoke plume from an industrial source is the simplest technique for determining its height. Photography is economical and provides a permanent record of the instantaneous shape of the plume. Such information is valuable in determining an area's air quality. The photographic technique applied in the measurement of smoke-plume rise using a single camera is described in detail, and the data obtained using this technique are analyzed. Several interesting features of the smoke plumes observed and recorded photographically are also described. The merits of using this technique to study environmental problems and the errors to be expected in the measurements are examined.

#64

Real-Time Cinetheodolite Data System

ANTONIO CHAVEZ, U.S. Army Yuma Proving Ground, Yuma, Ariz.

Yuma Proving Ground has a fully instrumented aircraft armament evaluation range for aircraft and aircraft-armaments evaluation. Since March 1974, it has been enhanced by the addition of a real-time cinetheodolite data system (RTCDS). The RTCDS allows for instant computation for visual numeric presentation and immediate plotting of the target position and permits immediate comparison of test parameters and increases range safety.

WEDNESDAY AFTERNOON

FILM PRODUCTION

(Concurrent with Photoinstrumentation)

#65

Trilent 35 System: A New Method of Making Wide-Screen Motion Pictures

MIKLOS LENTE, Mike Lente Films Ltd., Soundmix Ltd., Toronto, Ont.

Filming in 35mm for the 1.85 : 1-aspect-ratio flat wide-screen format and for television at the same time has always required compromises that were artistically bad. A new and better way is to use a 35mm camera that pulls the film down only three standard-length perforations per frame while using a 1.66 : 1 aspect ratio aperture in the camera and a 1.85 : 1 aspect-ratio ground glass in the viewfinder. This Trilent system covers all phases of production: camera, editing, sound transfer, mixing and printing. The final release print can be either three perforations per frame or four, depending on the availability of projectors. Savings of 25% in stock and laboratory costs are assured.

#65A

A Quiet Non-Intermittent Film-Transport System for Cameras, Projection Systems and Telecine Chains

ULRICH M. FRITZLER, The Intercraft Corp., New York, N.Y.

A description is presented of a non-intermittent, no-shutter, film-transport system. It records or projects images by optical immobilization (by means of a dissolving effect from frame-to-frame). Its features are: absolute noiseless and flickerless operation at speeds of 0–1000 frames/s, forward and reverse, with an absolutely stable image, projected or recorded. The color-corrected multifaceted polygon system enables dead sync with sound and is perfectly quiet. For telecine applications, any non-modified TV camera may be used with the motion-picture film running at any speed. Shrinkage adjustment and framing is provided for. In continuation of the pioneering work done by Dr. Kudar in 1953, improvements and practical applications will be emphasized.

#66

Producing *The National Dream*

JAMES MURRAY, Canadian Broadcasting Corp., Toronto, Ont.

An outline is given of some of the production and technical problems of making eight one-hour drama documentary films for television on the building of the Canadian Pacific Railway. The films were based on the best selling books, *The National Dream* and *The Last Spike*, by Pierre Berton, tracing the epic story of political intrigue and engineering skill.

#67

Modern Working Technique for Editing Tables

GUNTER BEVIER, W. Steenbeck & Co., Hamburg, Germany
Presented by WILLIAM A. ENGSTLER, General Enterprises, Kensington, Md.

Two problems are dealt with: the cutting of films exposed simultaneously with different cameras; and the cutting of film-material with sychronization guaranteed by time coding. The use of the Steenbeck ST 928 editing table to overcome such problems is examined. The possible working procedure for precise cutting on tables that have time-coded film is explained in detail. The far-reaching possibilities of automation for saving time are considered.

3:40 #68

Technical Considerations in Filming a Major Sporting Event

DAVID W. SAMUELSON, Samuelson Film Service Ltd., London, England

Filming the Olympic Games or a Soccer World Cup Series involves planning, technical and operational considerations on a scale unlikely to be encountered in filming any other event. Pre-event planning is dealt with and it is pointed out that the siting of camera positions and the type of lighting to be used in the stadiums are considerations which should be discussed at a very early stage, even with the architect before the stadiums are built. The choice of technicians, film format, filmstock and specialized equipment is discussed in some detail.

#69

The Samcine Mk II Calculator

DAVID W. SAMUELSON, Samuelson Film Service Ltd., London, England

The Samcine Mk II Calculator is an important aid for many

grades of technicians involved in film and television production. Particularly it is helpful to film and television cameramen for calculating depth of field, equivalent exposure, metric equivalent distances, film running times, picture width and height, lens angles and color-temperature compensation. This accessory may be used in addition by film directors, editors and script girls, television directors, art directors and those involved with the control of color temperature.

#70

Forty Years of Film Production in Western Canada

E. W. HAMILTON, Consultant, Vancouver, B.C.

Although at the present time film activity in western Canada is relatively vigorous, for many years, volume was minimal and conventional production equipment was financially unobtainable. For this reason equipment was designed and constructed to save cost, and this is described at some length.

PHOTOINSTRUMENTATION

(Concurrent with Film Production)

#71

Picosecond Framing Photography of Ultrafast Luminous Phenomena

M. C. RICHARDSON and K. SALA, National Research Council of Canada, Ottawa, Canada

A novel form of optical Kerr-effect photography incorporating transverse focal-plane optical gating is described which is particularly applicable to the analysis of various luminous events. The scheme basically consists of a Kerr cell, situated between two crossed polarizers, which is activated by the high electric-field intensity within ultrashort light pulses typical in the output of mode-locked solid-state lasers. An image of the luminous event is formed within the Kerr cell and is gated by the ultrashort light pulse which moves across the focal plane. The transmitted gating pulses within the Kerr-active medium and under suitable conditions can result in the production of a time-resolved "streaked" image on a picosecond time scale. A detailed theoretical analysis of the image transmission characteristics of this photographic technique has been performed. A generalized equation for the transmission of an optical Kerr-effect shutter has been derived and has been used to compare the properties of various gating geometries. The limiting factors on the temporal resolution have been examined, and it has been shown that in principle the technique can be extended well into the subpicosecond range. Investigations of pulse trains and of the development of plasmas are discussed.

#72

Utilization of High-Speed Photography for Blast Peak-Pressure Measurements

GEORGES AUDET, Defence Research Establishment Valcartier, Courcelette, Que.

Charges of dynamite were exploded in containers of various configurations to determine the effectiveness of each design in modifying the shape and strength of shock wave produced by the detonation. Overpressure data in the horizontal plane were obtained with discrete transducers mounted on the ground surface. However this same technique cannot be used in the vertical plane without interfering with the shock propagation, and a photographic method was experimented with by using a high-speed framing camera (Hycam) to record the shock wave position at each frame. The shock is visible because of the shadowgraph effect caused by the sharp change in the refractive index of the medium at the shock front. This photographic method has provided reliable overpressure data which can be correlated with transducer measurements made in the horizontal axis. The method is attractive because of its minimal interference with shock propagation while permitting a full field coverage of the vertical plane and thus leading to a better determination of the shock-wave patterns obtained with various container configurations.

#74

Application of an Image-Converter Streak Camera to the Detection of Ultra-Short Pulses of 10-μm Radiation

A. J. ALCOCK, National Research Council of Canada, Ottawa, and A. C. WALKER, University of Essex, Colchester, England

Work is described in which parametric upconversion in a nonlinear medium is used to transfer the temporal fluctuations of the 10-μm radiation from high-pressure (10-atm) CO_2 lasers to a more convenient wavelength region at which sufficiently fast detectors are available. The detection system is based on phase-matched mixing within proustite of the 10.6-μm radiation and a long 1.06-μm pulse generated by a Nd:YAG laser. The sum frequency radiation at 0.96-μm is then detected by means of a modified STL image-converter streak camera. The recording system consists of an SSR optical multichannel analyzer with a silicon intensifier target tube. Results obtained indicate that the instrumental response is on the order of about 40 picoseconds. The complete detection system is now being used to investigate the output of a transverse discharge CO_2 laser operating at pressure up to 15 atm.

#76

High-Speed Photographic Study of Transient Instability in Cylindrical Shells

D. G. ZIMCIK and R. C. TENNYSON, Institute of Aerospace Studies, University of Toronto, Downsview, Ont.

A technique is described that is used to study transient instability of elastic circular cylinders subjected to short-time square-wave axial compressive impact loading. Such a shape is a basic aerospace structural element. In the study, the shells were made of a birefringent material to facilitate photoelastic study. High-speed framing photography (to 4,000 frames/s) was used, and strain gauges were bonded to the surface of the shell. The high-speed pictures obtained showed for the first time the collapse modes of a circular cylindrical shell under axial impact loading and facilitate a comparison of experimental with theoretical results.

#77

Nanosecond Microscopic Holographic Interferometry of Plasmas Produced by 1-nsec CO_2 Laser Pulses

R. FEDOSEJEVS and M. C. RICHARDSON, Division of Physics, National Research Council of Canada, Ottawa, Ont.

THURSDAY MORNING — November 14

SMPTE SYMPOSIUM ON TELEVISION BROADCAST MONITORING — WHERE IT IS TODAY

(Concurrent with Satellites in Broadcasting)

#77A

Opening Remarks and Report of SMPTE Working Group on Coding Concepts

R. J. ZAVADA, SMPTE Symposium Chairman, Eastman Kodak Co., Rochester, N.Y.

MONITORING SYSTEMS

#78

Smokey The Bear Lives On!

ROBERT MORRIS, Broadcast Advertisers Reports, New York, N.Y.

#79

Teleproof 2 Today, Teleproof 3 Tomorrow

The Technology

JOHN FLETCHER, IDC Services, Div. of Technical Operations, Chicago, Ill.

The Applications

PAUL ROTH, IDC Services, Chicago, Ill.

#80

The Identimatch Story

WARREN MOON, Real-Time Technology/Identimatch, Norwood, Mass.

#81

A Pattern-Recognition System for Monitoring Video and Audio Signals

GERALD AUERBACH, Video Image Analysis Corp., New York, N.Y.

#81A

Audicom System for Auditing Television, Radio and Recordings

ALEX J. RUTMAN, Audicom Inc., New York, N.Y.

QUESTIONS AND ANSWERS & COFFEE BREAK

ELECTRONIC DATA APPROACHES

#82

We Can Improve Things Now!

MICHAEL K. BOWER, Donovan Data Systems, New York, N.Y.

#83

A Perspective on Broadcast-Material Identification

DAVID W. DOLE, ICHTUS, Ltd., Des Plaines, Ill.

#84

What Happened and Who Cares?

GEORGE ARNOLD, Ogilvy & Mather, Chairman AAAA Subcommittee on Broadcast Paperwork Standardization, Chairman IRTS Committee on Coding, New York, N.Y.

QUESTIONS AND ANSWERS

SATELLITES IN BROADCASTING

(Concurrent with SMPTE Symposium on Television Broadcast Monitoring — Where it is Today)

#85

A Network Control System for Television Distribution by Satellite

J. KINIK, Telesat Canada, Ottawa, Ont., and F. J. FOX, Canadian Broadcasting Corp., Montreal, Que.

The Canadian Broadcasting Corporation utilizes the Canadian Domestic Satellite System to distribute three television channels throughout Canada via ANIK-1, the world's first synchronous-orbit domestic satellite, and a network of 33 earth stations. A network control system has been developed to provide the CBC with centralized remote control over the routing of channels to specific areas of the country or the accessing of satellite channels by different transmitting stations. With dual identical control centers — in Toronto (English Network) and Montreal (French Network) — either control center is able to control any earth station in the network to feed regions or specific locations with the desired channel, to control the audio/video output feeds to given regions or communities at the beginning and end of the broadcast day (or to blank out commercial messages), and to control the origination point of the program for any given satellite channel by turning transmitters on and off.

#86

Transmission of Two High-Quality (or Several Medium or Low Quality) Sound Signals Within the Line Blanking Interval of a Video Signal Especially in FM-Television Satellite Systems

MANFRED MAEGELE, Fernmeldetechn Zentralamt der DBP, Darmstadt, Germany

The conventional way of transmitting television sound information on subcarriers leads to a number of difficulties in satellite communications systems using frequency modulation, because of the limited power available. In particular, when high-quality sound is required, modulation products can only be avoided by going to large bandwidths and high power compared with the actual picture transmission — and this is expensive. A method has been found for transmitting two high-quality (15-kHz and better than 60-dB SNR) sound signals with no mutual interference between sound and video signals. No additional bandwidth and little additional power is required. The technique involves using a part of the line-blanking interval after shortening the synchronizing pulse; the sound signals are sampled and companded to a given number of bits in a non-return-to-zero code. At the receiving end the pulses are stored, decoded and read out with the original sampling frequency. After passing through a low-pass filter, the signals are available in the original position. Tests have been promising, and a practical application seems possible soon.

#87

Live Demonstration of the ATS-F Satellite

A lecture will be presented by Dr. Gordon Law which will include a report on the ATS-6 Experimental Program. This presentation will originate live from Denver, Colo. and be transmitted to Toronto via the NASA ATS-F satellite. Through the advance of technology, the earth terminal for this transmission will be located in Toronto City Hall Square. After the demonstration Mr. George Davies from the Communications Research Centre, Ottawa, will be in attendance to accept questions.

#88

Small Earth Stations for Broadcasting Satellite Systems

M. L. CARD and J. D. PALMER, Department of Communications, Ottawa, Ont.; K. LOGAN and N. M. LOPIANOWSKI, Kenneth Logan and Associates, Montreal, Que.

Typical parameters for individual and community earth stations capable of receiving TV transmission from a Communications Technology satellite (which is to use a 200-W travelling-wave tube) are considered in order to determine what is now feasible and what may become so over the coming decade. The state of the art in direct broadcast receivers is reviewed in regard to antennas, microwave integrated circuits, surface-acoustic-wave devices, field-effect transistors and parametric amplifiers. Receiver models considered are of a type suitable for Canadian application, i.e. one of two television channels selectable by tuning, plus one of two audio channels (switched) in the case of individual receivers, and up to six simultaneous television channels, each with two audio, in the case of community receivers. It is concluded that, for economic reasons, direct-to-home broadcasting from satellites will not be a commercial proposition by the early 1980s although some forms of satellite-to-community broadcasting could be operating.

#89

An Experimental Broadcasting Satellite System Using the 12-GHz Band

MISAO MATSUSHITA and TAKEHIRO IZUMI, NHK (Japan Broadcasting Corp.), Tokyo, Japan

An experimental broadcasting satellite system being planned in Japan is described. The emphasis is on the broadcaster's point of view rather than hardware works. The technical difficulty of expanding service in areas of difficult reception (mountains, remote islands and radio-shadowed places in cities) by conventional techniques is rapidly increasing. The NHK's initial feasibility study begun in 1972 is now ready to proceed to its next task: to define an experimental broadcasting satellite system using 12 GHz mainly for community reception. The objectives of this satellite program are to examine the technical characteristics of video and sound transmissions, to evaluate the effectiveness of satellite transmission for broadcasting and to study possible system-operation techniques. In this program the satellite will illuminate all of the Japanese islands by a shaped-beam antenna, using 12 GHz for down-link and 14 GHz for up-link. For transmission of two-color television signals, the maximums e.i.r.p. from the satellite will be about 58 dBW/ch, under the constraints of 350-kg satellite weight and three-years lifetime. Ground receiving antennas 1.6 in diameter will be used at the fringe of the inner part of the projected service area. Furthermore, smaller-size receiving antennas down to about 1 m will probably be used to test TV signal reception in the center of the inner part of the service area. On the other hand, 4.5-m antennas will be installed in remote islands within the outer part of the projected service area for signal-quality reception of grade one.

#90

Investigations of the Applications of Advanced Communications Satellites

B. C. BLEVIS and N. G. DAVIES, Communications Research Centre, Ottawa, Ont.

The potential of advanced satellite communications systems will be investigated in late 1975 when a Communications Technology Satellite is launched into a geostationary orbit at 116°W longitude. The technical objective is to flight test a traveling-wave-tube (TWT) providing 200 W at 12 GHz, a solar-cell array providing 1 kW of power and three-axis stabilization system. Operating in the 12- and 14-GHz bands, the satellite will provide television broadcast services to communities, transmission of television signals from remote areas for network distribution, audio broadcast to and two-way voice telephone between small terminals, and instructional television with an interactive voice or data-return channel. Interested Canadian groups have responded to an invitation to submit additional experiments relating generally to the use of satellites for medical and educational purposes, community development, and data communications and technology. The TWT and the launch vehicle will be provided by NASA; the satellite is being designed and integrated by the Communications Research Centre; and the European Space Research Organization (ESRO) will provide certain spacecraft equipment.

THURSDAY AFTERNOON

SMPTE SYMPOSIUM ON TELEVISION BROADCAST MONITORING — WHERE IT IS TODAY

(Concurrent with Theatre Design & Projection)

NON-ADVERTISING CONSIDERATIONS

#91

The Performers' Interest in Electronic Monitoring

PAUL SIREN, ACTRA, Toronto

CONCERNS AND CONSIDERATIONS OF ADVERTISING AGENCIES

#92

What's Your Blood Type?

JOSEPH W. OSTROW, Young and Rubicam Agency, Los Angeles, Calif., and New York, N.Y.

#93

An Agency's Views on Television Monitoring

JERRY STILL, Tracy Locke Agency, Dallas, Texas

#94

Canadian Agencies' Views on Television Monitoring

ROY CHERNOFF, McKim Advertising, Toronto, Ont.

QUESTIONS AND ANSWERS AND COFFEE BREAK

THE BROADCASTER'S VIEWPOINT

#94A

The Broadcaster Views Commercial Coding

HAROLD A. DORSCHUG, WTIC, Hartford, Conn.
Presented by JOHN WALTER, CFTO-TV, Toronto, Ont.

#94B

The NAB Looks at Monitoring

JAMES PARKER, National Association of Broadcasters

THE ADVERTISER'S VIEWPOINT

#95

It's Only the Beginning

JAMES GIBBS, Media Director, American Cyanamid Corp., Wayne, N.J.

#97

A Test of Monitoring — Results and Conclusions

WILLIAM PEDERSEN, Eastman Kodak Co., Rochester, N.Y.

QUESTIONS AND ANSWERS

REGULATORY CONSIDERATIONS

#98

Subsidiary Signals in Broadcasting

BRUCE S. LONGFELLOW, Broadcast Bureau of the Federal Communications Commission, Washington, D.C.

THEATRE DESIGN AND PROJECTION

(Concurrent with SMPTE Symposium on Television Broadcast Monitoring — Where it is Today)

2:25 #100

The New Theater Technology as an Entertainment Media

PETRO VLAHOS, AMPTP Research Center, Hollywood, Calif.

The role of technology in providing the senses with physical stimuli is examined. Program-generated stimuli that appeal to the intellect are compared with those that appeal to the emotions, in terms of audience attraction.

#101

Some Comments on the Design of Large-Screen Motion-Picture Theaters

WILL SZABO, Will Szabo Associates Ltd., New Rochelle, N.Y.

Large-screen cinemas are defined as those in which the screen appears large to the audience, a necessary condition for "realism" and for "involvement" in the cinematographic process. This condition is approached when the screen occupies 60° × 30° of the viewers' field of vision in the horizontal and vertical planes. Topics covered include: sightlines, oblique viewing angles and dimensional distortion due to projection-angle distortion. A tabulation of screen-brightness measurements for some large-screen theaters suggests that the American National Standard of 16 ± 2 fL may be too bright, and an empirical method for determining screen brightness based on total screen area is proposed. Determination of the proper seating area for a specific large screen cinema is considered, and brief reference is made to the acoustical requirements in terms of reverberation time, uniformity of sound coverage and sound-pressure levels for multitrack reproduction. The need for a meaningful Recommended Practice on cinema design is emphasized.

#102

The New Space Theater

MICHAEL SULLIVAN, Reuben H. Fleet Space Theater, San Diego, Calif.

The Reuben H. Fleet Space Theater of the San Diego Hall of Science opened in March 1973. In the year and a half since opening, 671,509 spectators have visited the complex — far exceeding all other planetarium records. This theater is the first major installation to have a tilted dome, the first planetarium to install the Spitz Space Theater system and the first to wed the IMAX projector to the fisheye lens and a spherical projection screen.

#103

Large-Screen High-Fidelity Motion-Picture Projection Systems

WILLIAM SHAW, Multiscreen Corp. Ltd., Cambridge-Galt, Ont.

Four motion-picture projection systems, all based on a 70mm 15-perforation film format are described. Three of these produce screen images of exceptionally high quality, 83 to 90 ft wide (25 to 27 m) and 62 to 68 ft (19 to 21 m) high. Other system elements (including cameras) are described, and observations are made about various subjective factors relating to the system.

#104

35mm Film Damage — Tension and Sliding Problems

GLENN M. BERGGREN, Theater Engineer and Consultant, Atlanta, Ga.

The trend in cinemas toward the use of semiautomatic equipment, with less time being devoted to film inspection and maintenance — combined with an economic need to use a film longer before replacing it — increase the likelihood of serious film damage. The many causes of tension and sliding damage are considered. Previous works on the subject are referred to, along with tests run in 1974. Surveys and tests by film companies on the life cycle of their own film print releases are commented on, and proposals are made for film-use conditions and minimum and maximum limits for tension.

#105

A Format Proposal for a Universal Film/Screen System for 35mm and 16mm Use in Cinemas

GLENN M. BERGGREN, Theater Engineer and Consultant, Atlanta, Ga.

The accepted aspect ratios on the screen for 35mm and 16mm cinema use are reviewed along with practical film ratios in order to arrive at a format for a universal system. With the present strong trend toward automatic projection, there is a need for a more trouble-free format that can give a more stable focus than even the 1.85 : 1 format, without the light-efficiency penalty of half-frame and requiring hopefully only a single optical device converter. Magnification and other factors necessary for an engineered result are considered, and a solution to the problem is proposed.

#106

Electronic Photography "How & Why"

JACK SINCLAIR, Sher & Sinclair, Toronto, Ont.

The Image 655 system for shooting on videotape for widescreen 35mm release has so far been used to shoot three motion pictures: *La Petite Vient Vite, To Kill the King* and *Soap*. How *To Kill the King* was shot is considered in detail. The pre-testing of cameras, image enhancers, lighting contrasts and motion discontinuities, as well as the videotape editing, the transform and the color-print contrast range, are a few of the areas discussed. Selected scenes from *To Kill the King* and *Soap* are shown.

FRIDAY MORNING — November 15

ENGINEERING MANAGEMENT

(Concurrent with Cable Television)

#107

Effective Planning and Control Systems for Television and Movie Production

PAUL J. STONICH, Management Analysis Center, Inc., Northbrook, Ill.

#108

A Discussion of Research and Development Management

HERBERT L. REES, Eastman Kodak Co., Rochester, N.Y.

Some aspects of the management of research and development projects are discussed. Emphasis is on two important characteristics of the development process: the factors to be considered when starting the development of a new or improved product; and the importance of relations among the various company divisions during the development program.

#109

TCR-100 Cartridge Video Recorder: History of a Product Development

ARCH C. LUTHER, RCA Corp., Camden, N.J.

During the mid-1960s there was growing use of videotape for television commercials and other station-break material. It was not difficult to extrapolate that growth to the point that many television stations would need to purchase additional video recorders just to handle the station-break load. This represented a market potential large enough to justify a special-purpose machine optimized for station-break use. Consequently, market research into detail needs was pursued and concept development began on how to fulfill these needs. The concepts which resulted from these studies led to the TCR-100 cartridge video recorder. Some of the significant aspects of management of that new product program are discussed, from early developments through product design, manufacture and field introduction. Factors covered include: establishment of product goals, selection of technological approach, planning and scheduling, cost control, proof of design, reliability achievement, and management of manufacture and field introduction.

#110

Engineering Management in the Canadian Broadcasting Corporation

NORMAN GROVER, Canadian Broadcasting Corp., Ottawa, Ontario

CABLE TELEVISION

(Concurrent with Engineering Management)

#111

The Locally Originated Signal and the Television Broadcast Receiver

DAVID SILLMAN, Hazeltine Research Inc., Chicago, Ill.

#112

Programming Production for Cablevision

WILLIAM O. CRAMPTON, Metro Cable TV Limited, Don Mil's, Ont.

The equipment, staff training and programs presented through one of the largest cable television subscriber operations in Canada are examined. The installation of a system serving 113,000 homes and the operation of the programming department are treated.

#113

Multi-Channel Computer-Controlled Information Displays for Cable TV Application

JAMES DALKE, Metro Data Corp., Seattle, Wash.

Alphanumeric character displays are finding increasing uses in today's modern wideband CATV systems. A system is described, the System 180, a minicomputer-based multiple-character-generator system designed for effective information distribution to the cable television subscriber. The system uses those channels not dedicated to conventional broadcast use. The computer automatically programs these information channels by continuously scanning conventional broadcast teletype services for preselected news, sports, weather and financial information. The system utilizes a proprietary language called NED (News Editing and Display language) which allows lead lines on paragraphs of incoming news data to be scanned for headings and other character strings for routing to the proper channel memory.

#114

A Low-Cost Editing System for Helical-Scan Videotape

R. CEZAR, Television Research International Inc., Mt. View, Calif.
Presented by DENNIS CHRISTENSEN, Television Research International, Mt. View, Calif.

#115

The Serial Analog Memory — Its Application to Television

SATORU C. TANAKA and GENE P. WECKLER, Reticon Corp., Mt. View, Calif.

Integrated circuits which can controllably delay an analog signal have been developed and are finding a wide range of applications within the television and recording industry. Where the commonly used charge-transfer devices transfer a sample of the information through a series of storage cells and lose fidelity with each transfer, the devices here described store a sample of information on a given cell and transfer it only once during readout. The two devices treated are a 64-element serial analog memory (SAM-64) and a 100-element serial analog delay (SAD-100). The delay may be thought of as a special case of the memory where independent I/O is not utilized. Both devices are capable of sampling at rates in excess of 10 MHz with SNR better than 55 dB. Applications discussed include time-base correction, drop-out compensation and remotely controllable simulation of cable length.

FRIDAY AFTERNOON

ENGINEERING MANAGEMENT

#116

The CBC Challenge as Host Broadcasters for the Olympics, 1976

MARCEL DESCHAMPS, ORTO, Montreal, Que.

The CBC has been granted the television broadcast rights for the 1976 Olympic games in Montreal. Under the contract, the CBC must furnish the technical facilities and services to enable world-wide radio and television coverage of the games by more than 60 television and 110 radio organizations. To fulfill its mandate, the CBC has created a special division, The Olympic Radio and Television Organization. The major technical challenges, programs and production planning, including the involvement of film where there is no electronic coverage, will be discussed.

#117

Engineering Management in the Motion-Picture Laboratory

EDWARD H. REICHARD, Consolidated Film Industries, Hollywood, Calif.

The engineering-management procedures in a motion-picture laboratory are described. The functions and responsibilities of the engineering executive personnel, staff, foremen and shift bosses are reviewed. Activities of regularly scheduled committees and their communications effect and interface with each other are considered. Comments are made on CFI's newly installed management plans for achieving motivation and providing incentives.

#118

Technology Transfer and Time Compression — New Hope for Engineering Managers

WALT ROBSON, Hewlett Packard Co., Palo Alto, Calif.

New technology and the need to develop new managerial skills place increasing burdens on the engineering manager who is striving to keep up to date. The modern engineering manager can keep pace with his career-development needs by employing innovative video-based materials available from a wide variety of sources.