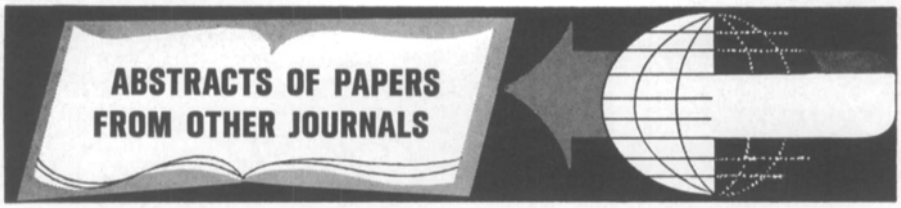

Abstracts of papers appearing in other journals chosen for their importance and possible value to researchers as well as those of timely interest, are published in the *Journal* from time to time. Many translations of abstracts from foreign journals, chiefly those of the USSR, are made available to the *Journal* by the Research Laboratories of the Eastman Kodak Company. As a rule, translations are made of the abstracts and not of the papers. The journals in which the papers appear can be consulted at some libraries. Current issues of *Tekhnika Kino i Televidinya* can be consulted at, or borrowed from the Society's Headquarters Office.

Those requiring definitive and thorough searches of current literature and patents are referred to *Abstracts of Photographic Science & Engineering Literature* (*APSE*), produced by the Engineering Index, Inc., 345 E. 47 St., New York, N.Y. 10017, with the editorial cooperation of the Society of Photographic Scientists & Engineers.
The subject areas are grouped below:

Aerial Photography
Data Recording and Processing
Film and Its Properties
General
Instrumentation and High-Speed Photography
Laboratory Practice
Optics
Projection
Photographic Theory and Materials
Projection
Sound Recording and Reproduction
Special Applications
Television

AERIAL PHOTOGRAPHY

Practical experiences with aerial color photography, Manfred Duddek, *Photogrammetric Eng., 33:* 1117–1127, Oct. 1967.

Theoretical investigations and practical tests must be made prior to any productive employment of aerial color films. Such investigations and tests are, however, costly and time-consuming. Wild Heerbrugg Ltd., together with the Swiss Federal Survey Department, therefore undertook to conduct these investigations and practical tests in order to give guidance to the users of Wild cameras who are interested in aerial color photography. The results of the flight tests carried out during the period 1962–1965 have proved that the 6-in. Aviogon and 6-in. Universal Aviogon lenses are well suited for color photography. However, there are influences from the lens and from the filter which must be taken into consideration. The procedure which finally brought consistently good results with different types of Kodak color films is outlined.

A small four-camera system for multi-emulsion studies, Thomas L. Marlar and Jack N. Rinker, *Photogrammetric Eng., 33:* 1252–1257, Nov. 1967.

Aerial photography, with simultaneous exposure of different film/filter combinations, has proved to be very useful in photo-interpretation. However, such photography is often expensive and beyond the facilities and budgets of many laboratories. For some of our work in environmental analysis, it was necessary to assemble a relatively inexpensive, small, four-camera airphoto system. The set has been successfully used on projects in arctic and temperate regions. It is light-weight, motor-driven, and has a self-contained power supply. It has a wide range of readily available accessories and features rapid interchangeability of film magazines, lenses, filters, and viewfinders. The set is not only suitable for aerial photography (vertical and oblique) but is also easy to disassemble to provide handheld cameras for ground control photography.

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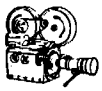

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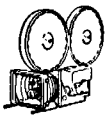

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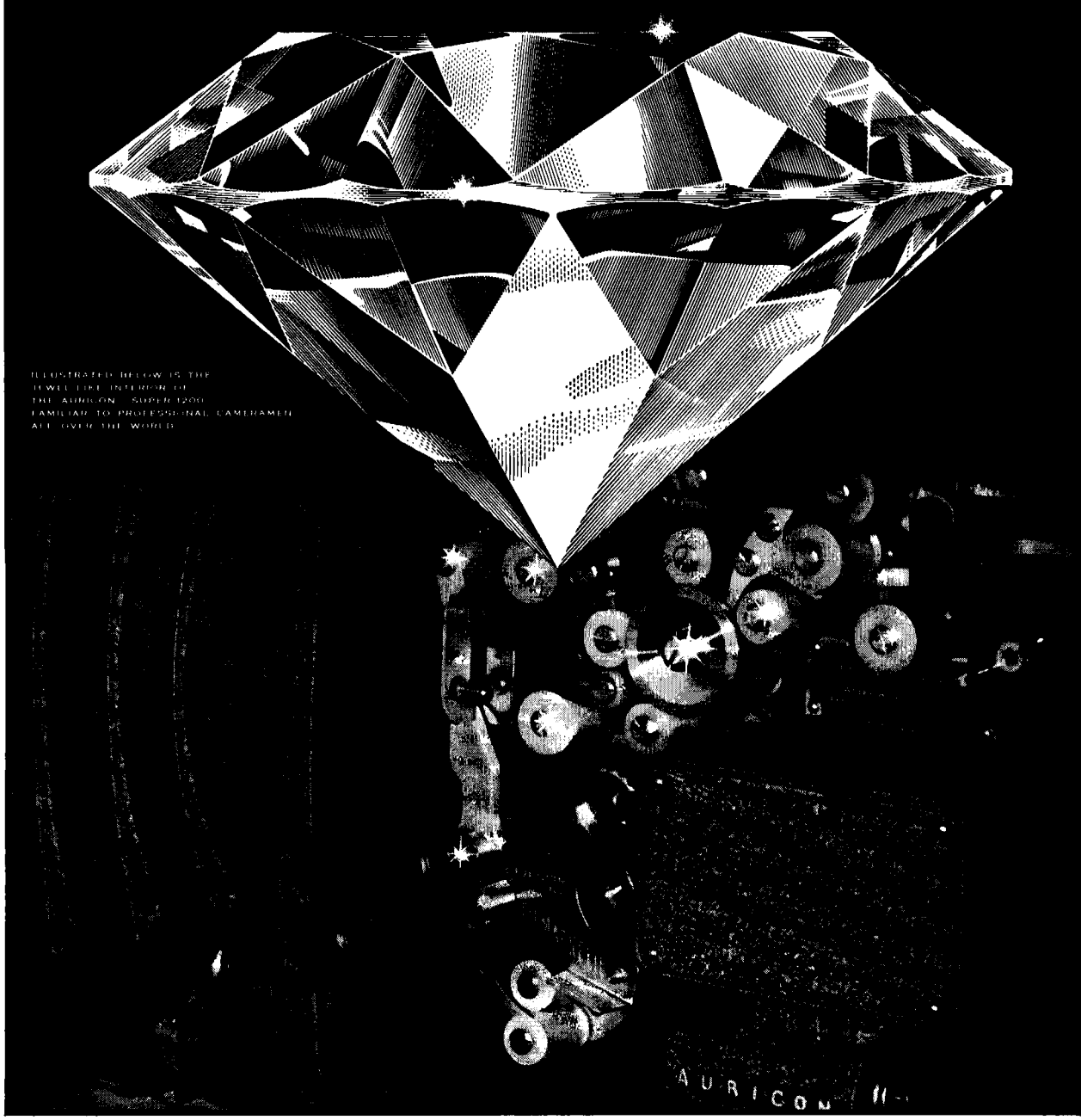

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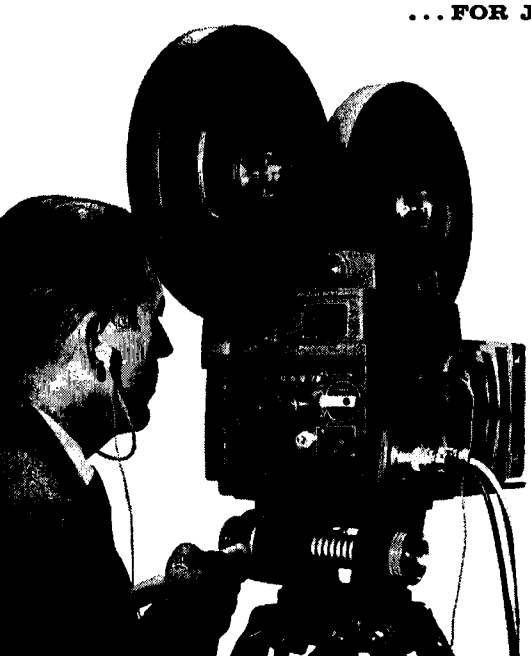

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DATA RECORDING AND PROCESSING

A multi-parameter data recording and processing system using magnetic tape, J. Sears, *IEEE, 34:* 225–235, Oct. 1967.

This paper describes a flexible digital data recording and recovery system which will accept information of up to 76 bits per event at a rate variable from some 375 to some 48 × 10^3 bits per second (b/s), and replay at a rate of from 3 × 10^3 to 48 × 10^3 b/s. The total tape storage capacity is some 55 × 10^7 bits. The number of parameters recorded is limited only by the accuracy required and by the total event size (in relation to the maximum number of bits per event), provision is made within the equipment for correlation determination between selected parameters and for the selective examination of recorded data. The tape transport control system permits remote control which facilities its integration into a computer complex.

The system is illustrated by examples of its application to the acquisition of data from nuclear experiments.

The digital computer as a creative medium, A. Michael Noll, *IEEE Spectrum, 4:* 89–95, Oct. 1967.

In the computer, man has created not just an inanimate tool but an intellectual and active creative partner that, when fully exploited, could be used to produce wholly new art forms and possibly new aesthetic experiences. Digital computers are now being used to produce musical sounds and to generate artistic visual images. The artist or composer interacts directly with the computer through a console. This article explores the possibilities of the computer as an artistic medium and makes some predictions about the art of the future.

Data communication requirements of computer systems, John C. McPherson, *IEEE Spectrum, 4:* 42–62, Dec. 1967.

Teleprocessing systems are mushrooming throughout public and private industry: computer-to-computer links form an integral part of our national defense system and air traffic control; manned terminal-to-computer systems establish reservations on airlines and at motels; hybrid systems keep our tax returns honest. But these computer centers, remote terminals, and displays are often far apart, and require lines of direct communication. A large number of inexpensive, switchable data channels are needed, with a speed resolution of 10 to 20 characters per second, for connecting human-operated terminals to a multiplex of special-purpose computers. Machine-to-machine communication requires channels with high-speed data resolution that are several orders of magnitude faster, with virtually error-free performance.

Redundancy reduction applied to coarse-fine encoded video, Gerald P. Richards and William T. Bisignani, *Proc. of the IEEE, 55:* 1707–1717, Oct. 1967.

A new video digital data compression technique, time-buffered coarse-fine (TB-CF), is presented along with experimental results. This technique has the ability to produce high-quality video pictures with compression ratios, referenced to a 6-bit pulse code modulation (PCM), from 2-to-1 to greater than 20-to-1 depending on the subject complexity and the element accuracy required, with a 6-to-1 compression typical. This system uses a modified version of the coarse-fine compressor invented and implemented by the authors with additional processing of the data by noise recognition and removal circuitry and run-length coding. The coarse-fine system is briefly discussed followed by a detailed description of the time-buffered coarse-fine system operation. Time-buffered coarse-fine compressed pictures are then presented and analyzed.

FILM AND ITS PROPERTIES

Optimum methods for using infrared-sensitive color films, Norman L. Fritz, *Photogrammetric Eng., 33:* 1128–1138, October 1967.

Considerable interest has currently been expressed in the potential of Kodak Ektachrome Infrared Aero Film, Type 8443,

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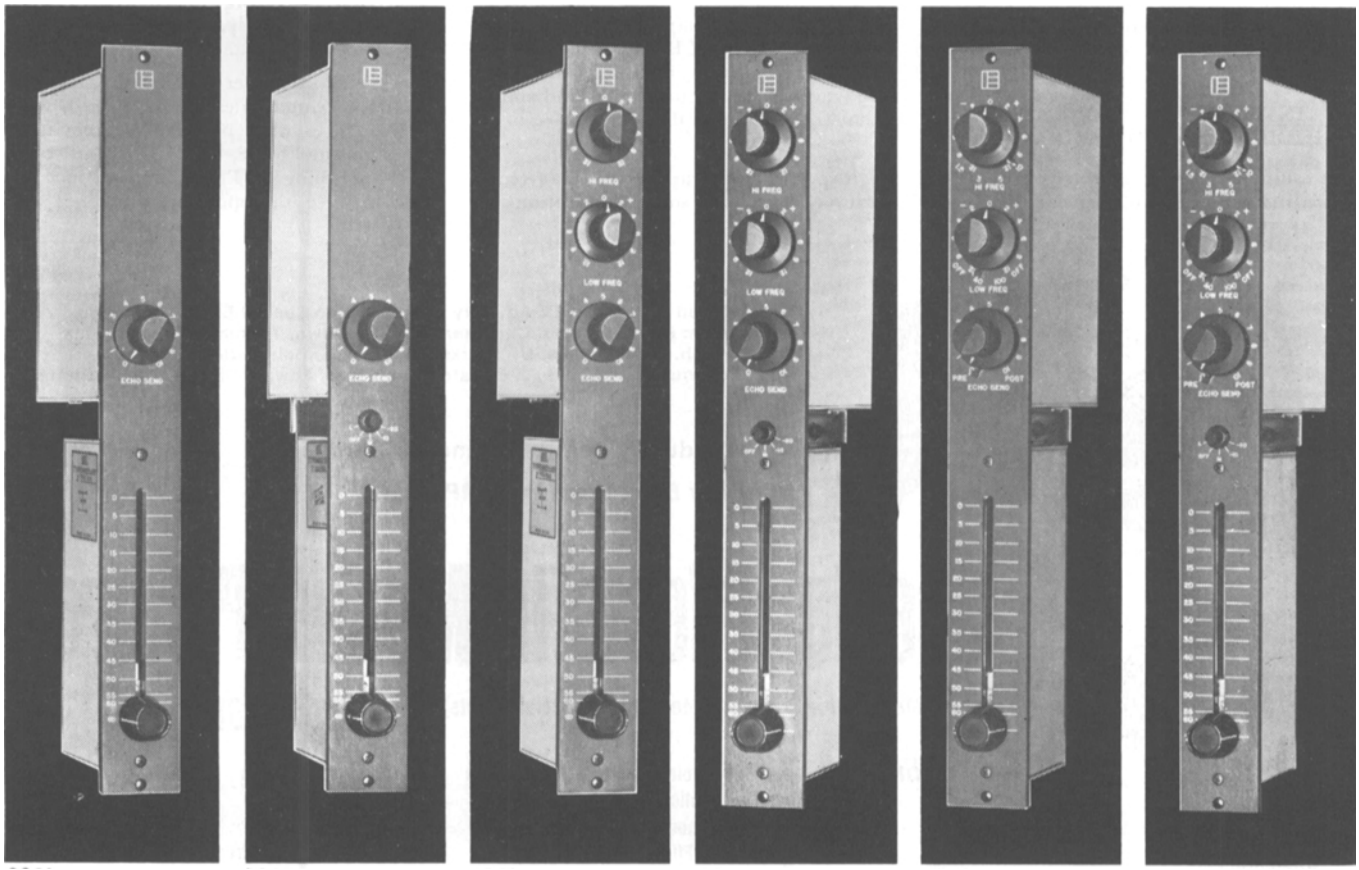

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309L
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409L
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509L
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as a remote sensor for applications as diverse as aerial reconnaissance and the detection of diseases and pests in agricultural crops. The results obtained with this film can be optimized through a knowledge of some of its special characteristics, and by using photographic techniques which take advantage of its unique properties. Consideration of the typical scene characteristics indicates that the principal applications at the present time involve the photography of foliage. By observing appropriate methods for storing, exposing, and processing, one is assured of obtaining photographs having the highest information content.

GENERAL

Herbert Ponting and the "unknown engineer." H. J. P. Arnold, *Phot. Jour. 107:* 342–351, Oct. 1967.

Herbert Ponting, the photographer, was a friend and business associate of George W. Ford, an engineer who, although little known invented and improved early kinematographic equipment. Many of his inventions were ahead of their time but were unsuccessful financially. With better backing it is possible his work would have had a great effect on the film industry.—B.A.J.

INSTRUMENTATION AND HIGH-SPEED PHOTOGRAPHY

The establishment of standards in photo-opticalinstrumentation, Francis E. Washer, *SPIE Jour., 6:* 3–5, No. 1, Oct./Nov., 1967.

Standards provide bases for comparison of performance of measuring devices used in any field of instrumentation. To establish tolerances, the performance of many instruments must be measured and analyzed. A method of analysis employed in setting performance requirements covering distortion and resolution of lenses used in photogrammetric cameras is described.

Bubble annihilation in cavitation streamers, Wesley L. Nyborg and David E. Hughes, *Jour. Acoustical Soc. Am., 42:* 891–894, No. 4, Oct. 1967.

Acoustically generated cavitation is studied by motion-picture photography at speeds up to 5000 frames/sec. Bubbles smaller than resonant size move toward pressure maxima and toward each other. Streamers form as mutually attracted translating bubbles tend to travel along a relatively small number of paths, rather than independently. At a certain range of amplitude, bubbles grow rapidly (partly, at least, by coalescence), are projected at high speed, then disappear in a time interval of the order of 1 to 20 sonic periods. It is suggested that high-amplitude surface waves cause fragmentation and consequent annihilation of the bubbles.

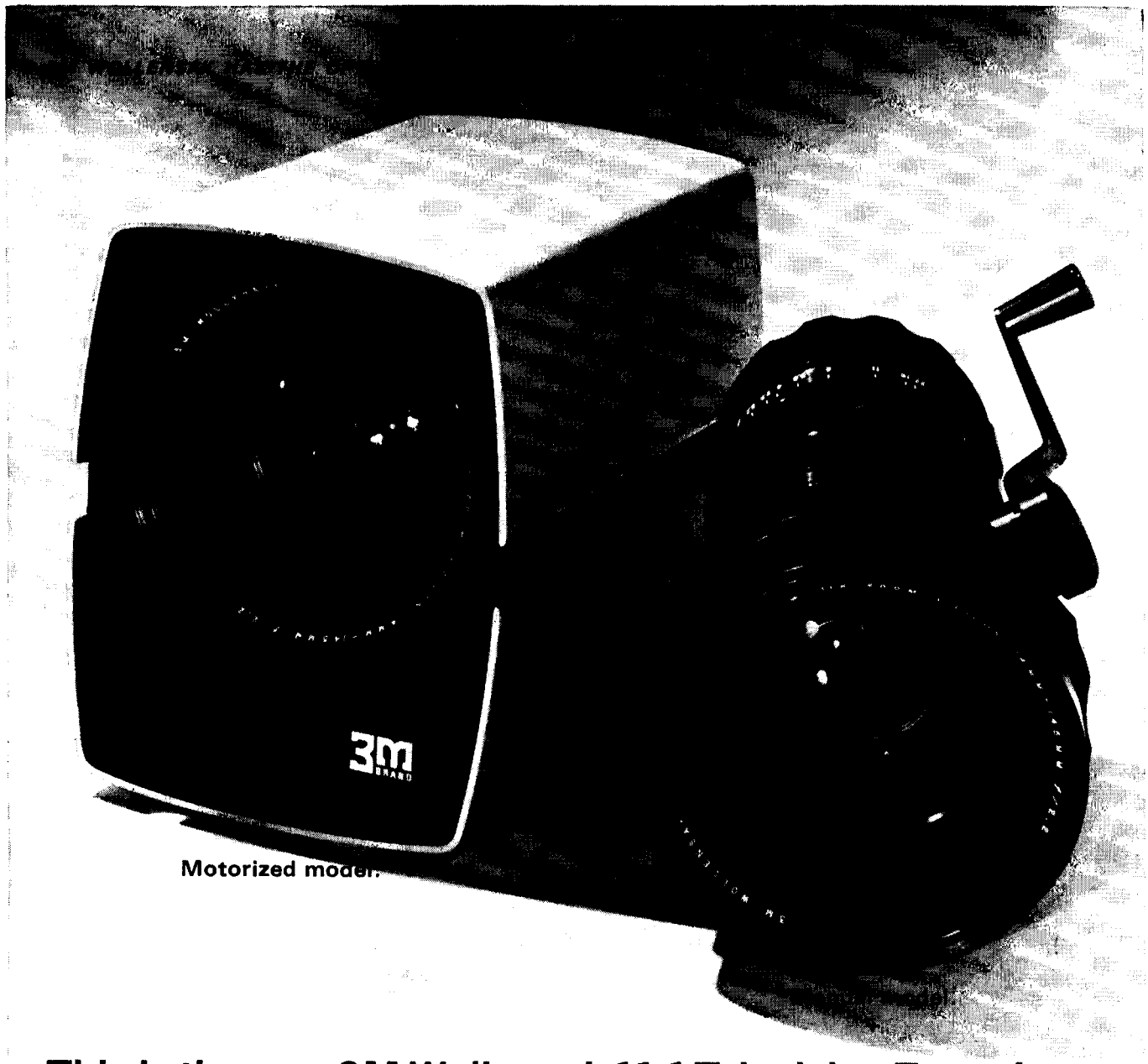
High speed photography: the image converter camera and some applications to research, J. M. Webster, *Phot. J., 107:* 335–342, Oct. 1967.

A brief survey of the development of the high-speed camera introduces the ultra-high-speed image converter, capable of recording submicrosecond phenomena with framing rates as high as 2×10^7 pictures/s and exposures as brief as 5 ns (5×10^{-9} s). The principle of operation is explained, and the use of the camera in frame or streak mode discussed. Optical efficiency of these devices is considered and a case is made for the use of mirror objectives of the Schmidt type. Image intensification by the use of a second stage tube is also considered. Applications of this system at the Marchwood Engineering Laboratories include research into the formation and development of electric arcs in rectifying valves, and switches. Some operational problems are outlined and the necessary development of a rapidly opening shutter of the collapsing-foil type explained. Examples of some recorded picture sequences are presented. (Authors' Abstract.)

LABORATORY PRACTICE

Electronic printing of color materials, Earle M. Knibiehly, *Photogrammetric Eng., 33:* 1139–1142, Oct. 1967.

Very shortly after the first LogEtronics Contact Printers, designated CP/10, were delivered to their owners, the inevitable questions had to be, "But can I print color on this thing?" These first pioneering efforts were disappointing, but not dis-



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couraging. It took almost ten years, incredible as it may seem, to bring together at one conference table the designers of the necessary components for a successful system: (1) the light source; (2) the electronics; (3) the color emulsions. This paper describes the major problem areas of electronic exposure control and electronic unsharp masking, using a light source having an interrupted spectrum.

LASERS

Laser action in liquids, Adam Heller, *Physics Today, 20:* 35–42, Nov. 1967.

Reduction of radiationless relaxation has led to new liquid lasers that are at least equivalent in performance to pulsed crystal and glass lasers.

LIGHT SOURCES

The compact source iodide lamp, a new high efficiency projector lamp, T. S. Ainsworth and E. J. G. Beeson, *The Photographic Journal, 107:* 324–332, Oct. 1967.

The application of the iodide technique has enabled light of good color and color rendering properties to be obtained at an efficiency of 80 lm/w from a compact source discharge lamp. Improvements in illumination levels by factors between 3 and 10 can be readily achieved by substituting the new lamp in existing equipment. Considerable importance was attached to designing a lamp which was both convenient and easy to use and simple to manufacture. Following brief sections on the general characteristics of arc discharges and on the iodide technique to give essential background information, the design features to achieve this are discussed at some length. Later the course of the actual development is outlined and the characteristics and applications of the new light source are considered.

OPTICS

Superresolution in microscopy and the Abbe resolution limit, Charles W. McCutchen, *Jour. Opt. Soc. Am., 57:* 1190–1192, Oct. 1967.

It is now well established in principle that supperresolving optical systems can be made. Such systems, when viewing objects of finite extent, can resolve detail finer than the normal diffraction limit. This has obvious attractions for microscopy, but we may wonder whether the ultimate diffraction limit for a lens of large numerical aperture, the limit which counts in microscopy, can be beaten. Can detail smaller than one half of the wavelength of light really be made visible? It can be, but only in specialized and probably limited applications.

Fiber optics applications and fabrication techniques, James D. Cope and Herman E. Brown, *SPIE, Jour., 6:* 6–8, No. 1, October/November 1967.

There are many applications for optical fiber assemblies. This paper describes some optical fiber assemblies that have been constructed and presents some details on methods of fabrication.

PHOTOGRAPHIC THEORY AND MATERIALS

Methods for testing image stability of color photographic products, David C. Hubbell, Robert G. McKinney and Lloyd E. West, *Phot. Sci. and Eng., 11:* 295–305, Sept./Oct. 1967.

The equipment and test procedures are described for the accelerated image stability testing of color photographic products. Results from these tests have shown good correlation with results from actual long term usage of a large number of color photographic products. The accelerated image stability tests consist of tungsten, fluorescent, and xenon irradiation and of heat and humidity storage. The basis for the selection of which of nine test conditions for each of six types of color products is described. The method of preparing special test chart exposures for processing and obtaining quantitative data by making appropriate integral density measurements before and after image stability testing is also described. Methods of reporting data are discussed.

Three-dimensional hologram reconstruction and image speckle, John B. DeVelis and George O. Reynolds, *SPIE Jour., 5:* 188–190, No. 5, June/July, 1967.

It is known that three-dimensional objects form three-dimensional images by

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using the hologram technique and it has recently been shown that when the photographic record (hologram) is bleached to make a phase hologram, three dimensional images also result. The purpose of this paper is to demonstrate theoretically these experimental observations. In particular a three-dimensional boundary value problem is considered and the resulting three-dimensional image is derived both for amplitude and phase holograms and for reflecting and transmitting objects. The speckling that appears superimposed upon the image is also derived from the same model by assuming that rough surfaces in the optical system are random noise generators.

PROJECTION

A continuous magazine (in Russian), A. Ya. Kuperman and L. G. Tarasenko, *Tekh. Kino i Televideniya, 11:* 6–15, May, 1967.

The different types of continuous magazine for use with endless bands of motion-picture film are discussed, and a new type, designed in the NIKFI laboratories is described. In this the film is doubled back on itself in the form of a double spiral on each of two spools, and is therefore referred to as the "bifilar" system. In a complete cycle, one branch of the film on the feed spool passes through the projector, while the other is rewound as one branch on the second spool. The take-up from the projector forms the second branch on the rewind spool. When the first spool becomes empty, the two spools change places and functions. The magazine will take 600 m of 16mm film.—S.C.G.

SOUND RECORDING AND REPRODUCTION

Recent research on sound studio problems—Part I: A subjective investigation into preferred microphone balances, D. K. Jones—**Part II: The design of a low-frequency unit for monitoring loudspeakers,** H. D. Harwood, *BBC Eng. Div. Monograph,* 5–22, No. 68, July 1967.

This monograph presents the results of two recent projects in the Sound Section of the BBC Research Department. Part I describes two series of subjective investigations in which members of the public and BBC staff were invited to assess the relative merits of different microphone balance conditions. It is shown that concert-going members of the public are able to make such assessments with remarkable consistency and that they prefer the sound obtained from a single distant microphone rather than that of a reinforced balance.

Part II begins by reviewing the present state in the design of low-frequency loudspeaker units and indicates the areas where improvement is desired. This is followed by experimental details leading to the design of a 12-in. unit incorporating a vacuum-formed cone of toughened polystyrene with a polyvinyl chloride surround, and it is shown by objective and by listening tests that this design is superior to existing units. An analysis of the price indicates that the new unit should not cost any more than those at present in use.

SPECIAL APPLICATIONS

Introduction to acoustical holography, Alexander F. Metherell, Hussein M. A. El-Sum, John J. Dreher and Lewis Larmore, *Jour. Acoustical Soc. Am., 42:* 733–742, No. 4, Oct. 1967.

The principle of reconstructed wavefronts is extended to the formation of visual pictures of acoustical waves. The important relationships used in conventional optical holography that also apply to acoustics are briefly reviewed. It is shown that image formation using the principles of acoustical holography yields better results than do conventional acoustical lens systems, particularly in the presence of turbulence and turbidity. Experiments are described in which coarsely sampled acoustical holograms, made with sound wavelengths of 0.64 in. and longer, have successfully reconstructed images of acceptable quality. The signal-to-noise ratio in a sampled acoustical hologram is shown to increase with the number of sampled points as well as with the reduction in the size of the sampling probe. Applications of acoustical holography in different fields are discussed.

A review of methods of measuring system parameters in time-variant space communication channels, *Jour. Inst. Electronic and Radio Eng., 34:* T. Kaliszewski, 199–208, Oct. 1967.

The objective and methods of measurement on linear, time-variant communication channels are discussed with a view of assessing their applicability for the diagnostics of certain unconventional channels of interest to space communication. These may include channels formed during the early, powered phase of the space vehicle flight and during its re-entry into the earth's atmosphere. No attempt is made here to elucidate the physical phenomena which are responsible for the formation and properties of such channels and the problem of their measurement is approached from the input-output point of view. It is assumed that the channels in question have been rendered semi-transparent through a suitable choice of carrier frequencies, but that the transmitted waveforms are impressed with identifiable channel characteristics, such as the multipath and Doppler spread. It is concluded that due to the uniqueness and complexity of such channels only the most rudimentary measuring methods, leading to the estimates of gross channel parameters, can be contemplated at this time. The need for further research is indicated.

The scanning electron microscope, R. F. W. Pease, *IEEE Spectrum, 4:* 96–102, Oct. 1967.

Though not a new device, the scanning electron microscope is only beginning to come into its own as a useful and practical scientific instrument, particularly for the direct examination of various kinds of surfaces. The scanning electron microscope combines the techniques of the cathode-ray tube and the conventional electron microscope—both considered indispensable to modern technology. The SEM, which presents a picture having a distinct three-dimensional appearance, is finding ap-

Cameraman Glen Kirkpatrick in close confines of control room.

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It would be difficult to name a more restrictive set for location shooting than a submarine's innards. With a premium on every inch of space, Producer-Director Carl Ragsdale and Cameraman Glen Kirkpatrick chose the Arriflex 16S. As Glen put it: "It's compact, lightweight, and completely reliable. That's what I needed for the job."

Sun Dial's Arriflexes went with them to every major submarine base on the East Coast. They dove with them in "Skipjack", "Shark", "Triton", "Guardfish" and "Tusk". Tripod-mounted where there was room; hand-held where there wasn't, Kirkpatrick's Arri captured graphic, memorable footage of detection, tracking and simulated attacks... and the quieter moments of a submariner's life, as well.

Not every assignment is this difficult or dramatic. But, whether the going is tough or easy, it's good to have Arri's handling ease and optical/mechanical superiority at work for you. And that, in a nutshell, is the Arriflex story.

plication in the examination of wood fibers in connection with paper manufacture, of surfaces undergoing ionic bombardment, and of corrosion. At the present time, one of the most pressing problems is to reduce its total cost.

TELEVISION

EVR—A new development in audio-visual aids, Anon, *Brit. Jour. Phot., 114:* 836, Sept. 28, 1967.

The Electronic Video Recording and Reproduction system makes it possible for cartridges of prerecorded programs to be shown on conventional television sets at very low cost. Electronic processes transfer film or video-taped programs to a special unperforated thin film 8.75mm wide. The prepared programs are stored in a cartridge. A special player or "adaptor" is attached to the aerial circuit of the television receiver and the cartridge is inserted into this and "played" on the screen. The system is thought to have great possibilities in the fields of education and home entertainment.—B.A.J.

Television's role in tomorrow's world, George H. Brown, *IEEE Spectrum, 4:* 56–58, Oct. 1967.

Any prediction concerning the future of communications must recognize today's trend toward unification of the various electronic media—which suggests that we should revise our traditional idea of television as a broadcasting service.

The resolving-power functions and quantum processes of television cameras, Otto H. Schade, Sr., *RCA Rev., 28:* 460–535, Sept. 1967.

The resolving power of an imaging system is a significant figure of merit when given as a function of object contrast and exposure. It is shown that the resolving-power functions can be expressed in terms of the quantum densities and transfer functions of the imaging system without recourse to specific electronic or photographic units for which conversion factors or equations are given. The formulation is general, without restriction to specific systems. The quantum densities in the storage surfaces of television camera tubes and the mechanism of signal transfer by the electron reading beam are discussed in detail to determine the constants and parameters for the calculation of resolving-power functions for a variety of operating modes, including continuous and single-image readouts. It is shown that resolving powers exceeding 100 cycles/mm are obtainable with high-quality electron optics.

A line-scan image generator, Frank Scott, *Phot. Sci. and Eng., 11:* 348–351, Sept.-Oct. 1967.

An instrument design especially for research dealing with line-scan (TV type) images is described. The line-scan image generator (LSIG) transforms a photographic transparency into a line-scan image by electronic, photooptical and mechanical means. Its principle of operation is similar to that of facsimile apparatus. The novel features of the instrument make possible the production of line-scan images which exhibit specific and precisely known image structure characteristics. The precise manipulation of the line-scan image characteristics made possible by the LSIG is very commodious in human performance and psychophysical studies, objective line-scan image evaluation and in exhibiting experimental results of graphical information computer processing techniques. Such research will enhance the design optimization of line-scan imaging systems which are becoming increasingly prominent in aerial reconnaissance and photointerpretation, graphical display and high-speed data recording.

current literature

The Editors present for convenient reference a list of articles dealing with subjects cognate to motion-picture engineering published in a number of selected journals. Photostatic or microfilm copies of articles in magazines that are available may be obtained from The Library of Congress, Washington, D.C., or from the New York Public Library, New York, N.Y., at prevailing rates.

American Cinematographer
vol. 48, no. 11, Nov. 1967

The Challenges of Filming Commercials for Color TV (p. 792) *Gerald Hirschfeld*

AV Communication Review
vol. 15, no. 3, Fall 1967

Use of Videotaped Instructional Television for Teaching Study Skills in a University Setting (p. 269) *Charles O. Neidt*

Teaching Machines and Programed Instruction (p. 285) *Gerald Newmark* and *Ray L. Sweigert, Jr.*

vol. 15, no. 4, Winter 1967

Multimedia Systems: A Review and Report of a Pilot Project (p. 345) *M. Daniel Smith, Morton Schagrin* and *L. Eugene Poorman*

British Kinematography Sound and Television
vol. 49, no. 7, July 1967

A New Reversal Colour Print Film With a Silver Sound Track (p. 162) *E. J. Drew*

vol. 49, no. 9, Sept. 1967

The Weakest Points of Modern Gramophone Pick-Ups (p. 198) *J. Walton*

vol. 49, no. 10, Oct. 1967

Colour Video Chains for Flying Spot Telecines (p. 222) *J. D. Milward*

A New Film Viewing and Projection Apparatus (p. 226) *J. Johnson*

Film User Aug. 1967

Two Types of Film For Tomorrow's Teacher (p. 18) *J. Newsome*

I.A.T.S.E. Official Bulletin
no. 456, Autumn 1967

Behind the Success of Expo '67 (p. 4)

IEEE Spectrum vol. 4, no. 8, Aug. 1967

Thyristors and Rectifier Diodes—The Semiconductor Workhorses (p. 102) *F. W. Gutzwiller*