ABSTRACTS OF PAPERS FROM OTHER JOURNALS

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
Cameras
Cinematography
Color
Film and Its Properties
General
High-Speed Photography
Laboratory Practice
Lasers
Lens Systems
Light Sources
Medical Photography
Photographic Theory and Materials
Sound Recording and Reproduction
Special Applications
Television

AERIAL PHOTOGRAPHY

Airborne mapping equipment quality development, Robert C. Livingston, *Photogrammetric Eng., 32:* 390–407, No. 3, May 1966.

The steady progress of quality in USAF development of the various elements of airborne map acquisition subsystems for the military mapping program during the period 1950–1965 is described. A large portion of this progress involved actions incident to the improvement of the basic imaging sensor—the aerial mapping camera. In this category are lens distortions, magazine platen flatness, photographic resolution, shutter and diaphragm, image motion compensation, automatic exposure control, other geometric factors such as platen reseaus, data recording capability, camera calibration, camera window glass and aerial camera stabilization. Improvements through the years include other elements of the airborne mapping subsystem, such as aerographic films, the distance measuring equipments, navigation-positioning equipment, airborne digital computers, the terrain profile recorder and mapping radars. The AN/USQ-28 Mapping and Surveying Subsystem incorporates practically all the progress in airborne mapping during the past sixteen years. A chart graphically contrasts the State of the Art in 1950 and that in 1965.

CAMERAS

The use of narrow-gage cameras with control devices in the "Multimoment" method of work study (in German), J. Susanszky, *9th Internat. Kolloqu Tech. Hochschule Ilmenau, 1964, Produktionsorganisation,* S.l., s.a., i-3; *Referativny Zhur., Fotokinotekhnika,* Abstract No. 3.46.233, 1966.

A description is given of experiments carried out under production conditions with the aim of clarifying the possibility of using narrow-gage motion-picture cameras with periodic release for the study of the organization of work and production. An automatic camera release device is used which allows the duration of the individual impulses to be altered from 10 sec to 18 min. The results of the experiments confirm the possibility of using such cameras for ends in view. A short description is given of the method, called "synchronous concentrated periodic cinematography" and consisting in the simultaneous filming of several operations with several cameras. The types of production process for the study of which periodically released cameras may be used are listed (the utilization of working time, loading of machines, etc).—S.C.G. (Translation of the Russian abstract.)

CINEMATOGRAPHY

Synthetic cinematography, F. W. Sinden, *Perspective, 7:* 279–290, No. 4, 1965.

Traditionally, the image sequence of a motion picture simulates the movement of real objects. Today the computer is sufficiently versatile to simulate both objects and movements before they exist. Moving-picture films have been made of weather maps in motion, the tumbling of an earth satellite, the progress of shock waves in a solid, the appearance of an aircraft carrier to an approaching pilot and many other subjects.

Pictures are traced out on the face of a cathode-ray tube and photographed using a microfilm camera. Pictures are composed of dots and straight-line segments displayed on a raster which may contain up to 1024 by 1024 points, and photographed at a speed of several frames/sec. The most convenient subjects for animation are those in which the drawings and motion are easily specified by mathematical formulas. E. E. Zajac (Bell Telephone Laboratories) has made films in which projections of three-dimensional objects are calculated by the computer and depth can be simulated.

Images can also be created in the form

of a mosaic of tiny squares of different shades of gray. Greater storage capacity is needed for this but higher resolution is possible than for the raster system.

The cost of computer animation is less than for hand animation even at the development stage.—N.M.W.

The problem of the classification of the forms of scientific kinematography and the nomenclature of scientific motion-picture cameras (in Russian), I. I. Krȳzhanovskiĭ. *Izvest. Vȳssh. Ucheb. Zavedenit, Priborostroenie, 8:* 158–160, No. 5, 1965; *Referativnyl Zhur., Fotokinotekhnika,* Abstract No. 2.46.10, 1966.

Points out the necessity of classifying the forms of kinematography with regard to the frame frequency and the intended fields of application. On the basis of an analysis of a wide complex of processes underlying research by the kinematographic method, it is proposed that the whole range of frequencies used in scientific kinematography be divided into six types, each of which would have its own field of application and specific apparatus, namely: (1) retarded (zamedlennaya), with frequencies of 1 frame in 24 hr to 10 frames/sec.; (2) normal, from 8 to 60 frames/sec.; (3) accelerated (uskorennaya), from 50 to 500 frames/sec.; (4) high-speed (skorost'naya), from 500 to 15,000 frames/sec.; (5) ultra-high-speed (vȳsokoskorost' naya), from 10,000 to some tens of millions of frames/sec.; (6) lenticular-plate ultra-high-speed (rastvor'aya vȳsokoskorost' naya) from 50 million to several thousands of millions frames/sec. The fields of application of each type of kinematography are listed. Corresponding to the forms listed are motion-picture cameras also designated retarded, normal, accelerated, high-speed, ultra-high-speed, and lenticular-plate ultra-high-speed.—S.C.G. (Translated from the Russian abstract.)

Problems in the development of professional narrow-gage cinematography and its techniques (in Russian), A. A. Anashkin, *Tekhnika Kino i Telev., 9:* 13–20, Nov. 1965.

The discussion of the place of narrow-gage professional films in Soviet plans for the development of the cinema network is continued from *ibid.*, May 1965.—S.C.G.

Geometrical distortions in cinematography (in Russian), V. G. Komar, *Tekhnika Kino i Telev., 9:* 1–11, Dec. 1965.

A discussion is given of the geometrical distortions arising in different systems of cinematography: conventional, wide-screen, panoramic and stereoscopic. Criteria are proposed for the evaluation of geometric distortions, taking into account filming conditions, projection and viewing the image on the screen.—S.C.G. (Translation of author's abstract.)

Innovations in the technology of special effects cinematography (in Russian), G. D. Aizenberg, *Tekhnika Kino i Telev., 10:* 27–31, Jan. 1966.

Some new methods of making combined frames, developed in the Mosfilm studios for use in normal, wide-screen, and wide-gage cinematography in black-and-white and color, are described.—S.C.G. (Translation of author's abstract.)

Determination of the conditions for image recording from a kinescope screen (in Russian), A. K. Fel'st, Yu. A. Zhigin and V. M. Vyshinskiĭ, *Tekhnika Kino i. Telev., 10:* 39–45, Jan. 1966.

The various factors affecting the quality of a cinematographic recording from a kinescope are discussed, and an electronic device is described for facilitating the control of selected factors.—S.C.G.

A traveling-matte method for black-and-white cinematography with the use of color film (in Russian), I. A. Felitsyn, *Tekhnika Kino i Telev., 10:* 17–20, Feb. 1966.

A description is given of the author's method of special-effects cinematography by the traveling-matte process. It is applicable only to black-and-white cinematography, but is relatively simple and has other advantages. The first exposure is made on color negative stock, the actor and the background being illuminated with light in different spectral bands, so that the images are formed in different layers of the film. A positive print is prepared and is passed through the camera in contact, emulsion to emulsion, with unexposed black-and-white stock. The new background is recorded in blue light, with no interference from the blue image on the color film, while the orange image acts as a traveling matte. Subsequently the orange image is printed in red light. The process can be carried out with a variety of normal motion-picture cameras and any type of objective. The use of the process in the Mosfilm studios is described.—S.C.G.

The reproduction of wide-film images by means of kinescopes (in Russian), V. S. Babenko and R. A. Shevchenko, *Tekhnika Kino i Telev., 10:* 27–36, Mar. 1966.

An analysis has been carried out to show that kinescopes which are available from industry and which are calculated for a format of 4:3, may also be used for reproduction of wide-film images (at least with formats up to 3:1). The most suitable for wide-film systems are kinescopes with a rectangular screen, of plane smoke-gray glass, and magnetic focusing, since they allow a wide-format image of high quality to be obtained.

In order to improve the quality of image reproduction on going over to the wide format, a number of alterations must be made in the electric circuits of the reproducing equipment so as to widen the transmission band of the video amplifier, to improve the linearity of the line scanning and to adapt the dynamic focusing circuit, etc.—S.C.G. (Translation of author's abstract.)

COLOR

Color film for color television, C. B. B. Wood and F. A. Griffiths, *Brit. Kinematog. Sound & Television, 48:* 74, No. 3, Mar. 1966.

The reasons why color films, which are satisfactory for viewing by normal pro-

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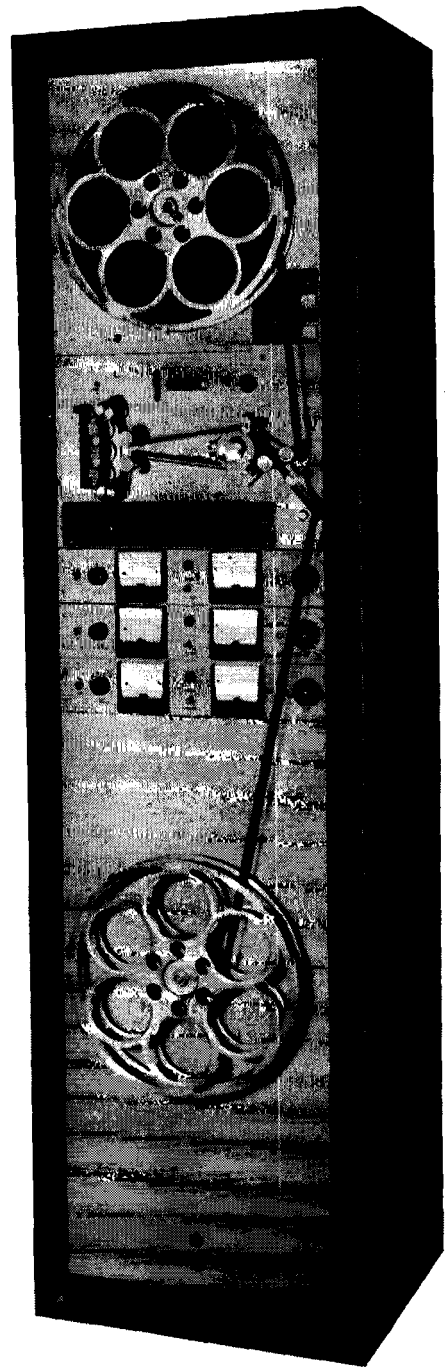

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jection, may give unsatisfactory quality when displayed through television systems, are reviewed. A system is described in which color television pictures derived from color film are improved in quality by a form of electronic masking: signals proportional to the logarithms of red, green and blue transmittances of the film are added and subtracted from one another in such proportions as to correct for the unwanted absorptions of the cyan, magenta and yellow dyes in the film and for other errors. The final signal-to-noise ratios are still satisfactory.—R.W. G. H.

FILM AND ITS PROPERTIES

Das Single-8-System (in German), Wilhelm Roth, *Kino-Technik, 20:* 87–90, Apr. 1966.

This contribution provides a survey of the "Single-8" narrow-film system which was developed in Japan. The system is compatible with the Super-8-System as far as projectors are concerned but uses different film cassettes in the camera. With the Single-8-System the film pressure plate is part of the camera and not of the film cassette. The color and black-and-white films using polyester as a base for the sensitive layer and the first camera and projector models, including a sound film projector now appearing on the German market, are described in brief and the basic technical data are given.

GENERAL

Patent information in the fields of cinematography and television (in Russian), Yu. D. Sergeev, *Tekhnika Kino i Telev., 10:* 58–61, Mar. 1966.

The systems of classification of patents used in the important industrial countries are mentioned, and the sections of the "German" classification used in the USSR which are of particular interest to inventors in the fields of cinematography and television are reviewed.—S.C.G.

HIGH-SPEED PHOTOGRAPHY

A fast camera for spark-chamber photography, R. F. Wilkins, *J. Phot. Sci., 14:* 65–71, No. 2, Mar./Apr. 1966.

The paper describes a novel method of securing extremely rapid advance of the film in a camera designed for single-shot "on command" operation. The film is drawn through the film gate by means of compressed air which forms a loop of predetermined size on the far side of the gate. The inertia of the moving parts of the system is very low and the overall resetting time for the mechanism is only 35 ms.

The rapid-advance mechanism has been installed in a camera for spark-chamber photography at an accelerator. Initial tests have been made (taking more than 500,000 pictures) which show the performance to be satisfactory.

LABORATORY PRACTICE

Progress in viscous processing of motion-picture film, B. J. Davies, *Brit. Kinematog., Sound & Television, 48:* 55–61, Feb. 1966.

In a lecture delivered before the Society in January 1964 and published in the Society's *Journal* in February 1964* an account was given of the technique of viscous processing of motion-picture film.

In the present paper the aims and objects of viscous processing will be explained; consideration of equipment design, based on further experience, will be discussed; and finally a brief account will be given of the results so far obtained.

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* Viscous processing of motion picture film, by B. J. Davies, *Brit. Kinemat*, *44*: 36–49, Feb. 1964.

A motion-picture printer for optical printing onto 35mm film from 70mm originals, (in Russian), G. I. Tumanov, I. S. Golod, O. I. Ioshin, L. G. Tsifrinovich, N. D. Bernshteĭn, B. V. Valuishiĭ and A. P. Ivanov, *Tekhnika Kino i Telev.*, *10:* 18–26, Jan. 1966.

The Soviet-made K23PTO-1 optical printer is designed for the printing of 70mm originals onto 35mm film. The printing area can be selected, and an editing and monitoring desk is provided for the control of the required degree of alteration of frame size, necessary in printing different scenes, and for setting up the light change band. Technical specifications and descriptions of the units making up the printer are given.—S.C.G.

Modernization of drying units of developing machines for motion-picture color positive films (in Russian), F. A. Rozental', N. A. Vinogradova and Yu. A. Boltunov, *Tekhnika Kino i Telev.*, *10:* 27–36, Feb. 1966.

In an earlier paper the authors described a method of accelerated drying of motion-picture film (see *ibid*, No. 12, Dec. 1963). They now give the results of production trials on an experimental drying unit based on their principles, and used for the drying of color positive motion-picture film.—S.C.G.

LASERS

Regenerative ruby laser amplifiers, J. Jacobs, F. A. Brand, C. LoCascio, S. Weitz and G. Novick, *J. Opt. Soc. Am.*, *56:* 149–156, Feb. 1966.

An ideal laser amplifier was previously treated as a three-medium transmission system. It was predicted that for a given length, the gain would rise with negative attenuation (population inversion), reach a maximum, decrease rapidly at first and then gradually approach zero asymptotically. The theory has been tested experimentally, using ruby at liquid-nitrogen temperatures. By controlling the relative times of firing of two rods—one acting as oscillator, the other as amplifier—the transmitted power gain was studied. When both the oscillator and amplifier rubies were uncoated, they could be made to oscillate for about 100 μs, giving a well-defined pulse of quasi-continuous-wave operation. The gain of the amplifier increased when the input signal from the oscillator approached the time at which the amplifier went into oscillation. If the oscillator was delayed so that its signal occurred at increasing time after the amplifier oscillations had ceased, the power gain decreased, even though the amplifier crystal was still being pumped. Finally, with still further delay of signal relative to the amplifier oscillation period, attenuation in transmission was observed.

LENS SYSTEMS

Diffraction of a plane wavefront in an afocal system, Daniel Malacara, *J. Opt. Soc. Am., 56:* 14–15, Jan. 1966.

It is generally assumed that when a plane wave enters an afocal system, the wave comes out plane from the system. For instruments, such as high-precision interferometers using afocal combinations, the wavefront after the second lens has opposite curvature to that which would be produced by Fresnel diffraction, if only a stop is placed at the appropriate place near the first lens.

LIGHT SOURCES

Powerful ultra-high-pressure xenon motion-picture projection lamps of the dismountable type (in Russian), V. P. Sasorov, *Tekhnika Kino i Telev., 9:* 20–24, Dec. 1965.

Constructional and technological difficulties in the design of powerful ultra-high-pressure gas-discharge xenon lamps are discussed and ways of overcoming them are indicated. Brief information is given on Soviet xenon power lamps of 3 and 5 kW with water cooling of the electrodes.—S.C.G. (Translation of author's abstract.)

The selection of lighting equipment for cinematography and television transmissions (in Russian), V. G. Pell', *Tekhnika Kino i Telev., 10:* 8–16, Feb. 1966.

Discusses problems in the choice of lighting equipment for the different forms of cinematography and for television transmissions, taking into account the sensitivity of the receiving surface, the relative aperture of the objective and the relation of the lighting equipment to the total illumination.—S.C.G.

MEDICAL PHOTOGRAPHY

Medical applications in Europe, John N. Schernhorst, *Photogrammetric Eng., 32:* 416–421, No. 3, May 1966.

The development of roentgen-screen cameras has not only simplified radiological working procedures but also heralded a new era of more universal clinical application of photogrammetry based on the stereometric evaluation of photofluorographs. The Odelca 100 cameras make 100-by-100mm microphotographs of the fluorescent x-ray screen. The Kohnle Rontgen-Stereokomparator is a complementary plotting instrument for photofluorographs made with the Odelca 100 camera. The Rohr Rontgenpeiler is a stereotactical operating apparatus which measures points and distances within the unopened body of a patient and provides uninterrupted visual control during the full course of certain surgical operations.

PHOTOGRAPHIC THEORY AND MATERIALS

The role of Phenidone in the motion-picture laboratory, C. T. Davies, *J. Phot. Sci., 14:* 33–34, No. 1, Jan./Feb. 1966.

Some indication of the use of Phenidone in PQ developer systems in large-scale motion-picture laboratory practice is given. Various characteristics, which were examined on a plant scale before MQ systems were abandoned in favor of PQ systems, are discussed; the stabilities and economics of the two systems are compared.

Variations of SMT acutance with system elements, M. C. Goddard and R. G. Gendron, *Phot. Sci. Eng., 10:* 77–82, Mar./Apr. 1966.

Crane (1964) gave an empirical formula for system modulation transfer acutance (SMT acutance), a correlate of subjective sharpness:

$$S = 111 - 21 \log \Sigma_i \left(200 \times \text{magnification}/\text{MTC area}_i\right)^2$$

The constants in this formula have been changed from the values given by Crane to reflect a recalibration of the film MTF (modulation transfer function) measuring system. In this formula the subscript i refers to the elements of a photographic system from the camera lens to the observer's eye. The rate at which changes in the modulation transfer curve (MTC) areas and magnification contribute to changes in SMT acutance are examined. These rates of change provide a measure of the relative sensitivity of SMT acutance to changes in the system elements. Examples are drawn from an 8mm color system and a color-print system.

Behavior of some photographic materials exposed to radiation in the 8-Angstrom region, Zsolt Szlagyi and Elliot Blackman, *Phot. Sci. Eng., 10:* 111–113, Mar./Apr. 1966.

Several high-speed panchromatic emulsions, as well as various films specifically sensitive to x-ray and far ultraviolet radiation, were exposed in the spectral region of 8 to 10 Å to determine their relative merit for use at lower exposure levels. In addition, reciprocity failure for three of these films was investigated and found not to be measurably significant for exposure times ranging between 3 and 300 sec.

PROJECTORS

Some modern trends in the development of foreign motion-picture projectors (in Russian), V. I. Artishevskiĭ and S. M. Provornov, *Tekhnika Kino i Telev., 10:* 70–81, Mar. 1966.

Modern non-Soviet static cinema projectors are reviewed, and also the introduction of automation of the projection room.—S.C.G.

SOUND RECORDING AND REPRODUCTION

"Reportocord 16 M/R"—Magnettonaufnahme-und-wiedergabergerat für 16-mm-Magnetfilm (in German), A. Lohmann, *Kino-Technik, 20:* 91–94, Apr. 1966.

The "Reportocord" is a sound recording and playback unit for perforated 16mm narrow film. It is specially suited for on-the-spot reporting in connection with film cameras driven by synchronous motors. The author describes design details and some novel start-marking techniques.

Tragbares tonbandgerat für synchrone stereo-aufnahmen (in German), R. R. Epstein, L. O'Donnell and L. Green, *Kino-Technik, 20:* 97–101, Apr. 1966.

For an exhibition it is planned to use simultaneous projection onto several screens in connection with stereophonic sound presentation. For this purpose a standard tape recorder was modified to permit dual-channel sound recording. Synchronous recordings are made possible by means of precision oscillators and a frequency-modulated pilot soundtrack. The system also permits synchronous playback with the integral dry cell battery of the tape deck feeding all necessary accessories. Studio facilities permitting duplication of original recordings are also provided.

Where are we going with 8mm sound? H. S. Hind, *Brit. Kinematog., Sound & Television, 48:* 54–55, Feb. 1966.

It is urged that the track width allowed on Super 8 be widened at the expense of picture width to permit the use of an optical track.—G.I.P.L.

The quality of photographic soundtracks in release prints (in Russian), V. A. Burgov and Z. V. Tsirulina, *Tekhnika Kino i Telev., 10:* 32–38, Jan. 1966.

The characteristics of photographic soundtracks on release prints [in the Soviet Union] are discussed and some observations are made on ways of improving their quality.—S.C.G. (Translation of author's abstract.)

Raising the quality of sound on films (in Russian), M. Z. Vŷsotskiĭ, *Tekhnika Kino i Telev., 9:* 21–26, Nov. 1965.

Factors affecting the quality of sound recording and reproduction are discussed and recommendations are made based on experience in the Mosfilm Studios.—S.C.G.

SPECIAL APPLICATIONS

Pictures from space, Irwin M. Krittman, *Electronic Age,* 6–10, Spring 1966.

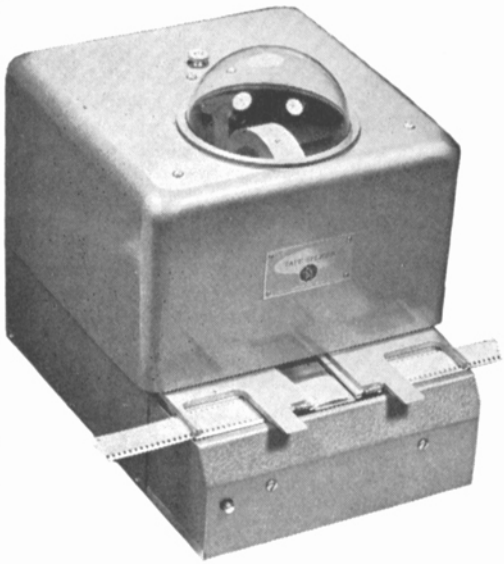
In only six years the art of space photography has proved itself an invaluable tool in space exploration programs.

Photographic recording of spatially modulated coherent light, Adam Kozma, *J. Opt. Soc. Am., 56:* 428–432, Apr. 1966.

Photographic recording of spatially modulated coherent light, such as is encountered in wavefront reconstruction or coherent optical data processing, is described in terms of the amplitude transmittance (T_a) vs. exposure (E) curve of the film. It is proposed that the T_a-E curve is more appropriate for this application than the D-log E curve. The nonlinear effects of recording are analyzed in this context using a nonlinear Fourier-transform technique. A specific nonlinearity, the error-function limiter, is analyzed in detail to illustrate the effects of the film nonlinearity.

High-speed macrophotography used in semiconductor manufacturing, Paul C. Pfeiffer, *J. SPIE, 4:* 55–57, No. 2, Dec. 1965/Jan. 1966.

Discussed are the methods used in photographing contaminate particles of less



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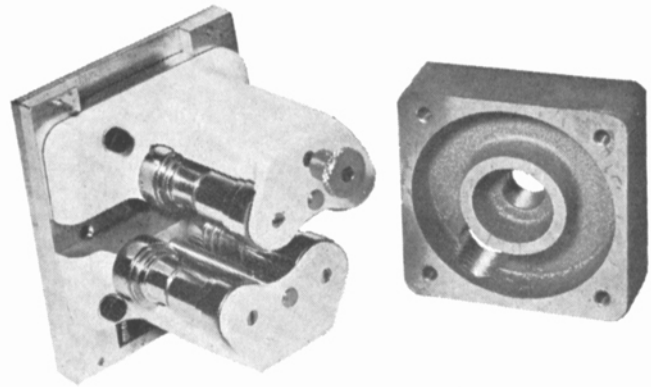

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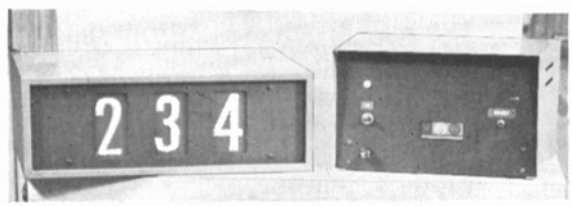

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than 0.006-in. size inside transistors while subjected to various frequencies and vibrations and observation of wire forming dies and electrode welding of header posts in automatic equipment. A method of adapting a microscope into a camera taking-lens is suggested.

A pulse-and-bar generator for testing of color television systems, D. V. Ryle, *Marconi Rev., 26:* No. 161, 2nd Quarter 1966.

Standard sine-squared pulse-and-bar waveforms used for testing monochrome television equipment are not sensitive enough to detect distortion within the chrominance band for color television testing. They have, therefore, been modified in the generator described below and have become especially useful for measuring delay and gain inequalities between the luminance and chrominance channels in the NTSC and PAL color systems.

The generator provides "Chrominance Only" and "Luminance + Chrominance" color pulse-and-bar waveforms, with a choice of chrominance pulse bandwidth of ±2 MHz or ±1 MHz in each case. In addition, monochrome pulse-and-bar and field frequency square-wave signals are available from the same unit.

Computer simulation of photooptical image-forming systems, Deiter P. Paris, *Phot. Sci. Eng., 10:* 69–76, Mar./Apr. 1966.

A computer program was developed to facilitate the simulation of one-dimensional images in an incoherent photooptical image-forming system. The single or multiple stage image-forming system may consist of a sequence of linear and nonlinear components such as lenses and emulsions, and components that are described by their spread function or optical transfer function. Emphasis in developing the program was on (1) simplicity of the statements in which the user specifies the systems configuration to the program; (2) capability of requesting intermediate output at any point in the sequence of systems components; and (3) capability of providing repeat runs with varied input or component parameters. These three goals were achieved by designing a simple, user-oriented special-purpose programing language called IMSIM/1.

Methods of sampling in motion study using a narrow-gage camera fitted with a control device (in German), J. Susanszky and F. Gyarmati, *Nehezipari müsz. egyet. közl., 25:* 245–250, 1965; *Referativny Zhur., Fotokinotekhnika,* Abstract No. 3.46.-232, 1966.

The basic methods of motion study in production are discussed, including the cyclogram, the chronocyclogram and time-lapse cinematography in the factory or workshop —S.C.G. (Abridged from the Russian abstract.)

Television and photography of thermal states (in French), R. Brocard, *Electron. industr.,* 408–410, No. 87, 1965; *Referat. Zhur., Fotokinotekhnika,* Abstract No. 2.46.59, 1966.

The thermal state of a body may be illustrated by photographing it in infrared radiation. In carrying out this process it is necessary to use electronic apparatus including a thermoelectric image converter of infrared rays. The firm of AGA (Sweden) has marketed a television camera for thermal imaging, the AGA Thermovision. The camera consists of an optical unit which analyzes at high speed the body under study and directs the infrared radiation to the image converter. The latter transforms the heat energy received into an electric signal which forms a television image on an appropriate screen.

Barnes Engineering Co. (USA) has developed apparatus for photographing the thermal condition of objects. The camera can record a thermal image on standard photographic film or give a finished print by the Polaroid process. The apparatus consists of a telescopic unit focusing the elementary field of the infrared detector onto a small area of the object under study. With the aid of an oscillating mirror the detector field analyzes the surface being studied both horizontally and vertically. The amplified signals modulate the radiation of a gas-discharge lamp directed onto a photographic film by another oscillating mirror, the oscillations of which are synchronized with those of the first. In this way the film receives a black-and-white thermogram, illustrating the thermal state of the body being studied. The process is applicable in the temperature range of −170 to +250°.—S.C.G. (Translated from the Russian abstract.)

TELEVISION

The Rank-Cintel twin-claw twin-lens flying-spot, G. H. Askew, *Brit. Kinematog., Sound & Television, 48:* 40–50, Feb. 1966.

Parts 1 and 2, which were published in *British Kinematography, Sound & Television* in January 1966, described the specialized developments associated with the 16mm mechanism. Essential for the operation of the scanner, but not peculiar to 16mm, are the vision chain and ancillary equipment described in this Part 3.

An ultrasonic to electronic image converter tube for operation at 1.20 Hz, R. W. G. Haslett, *Radio and Electronic Eng., 31:* 161–170, Mar. 1966.

From 1949 to 1954 a study was made of the design of a cathode-ray image converter tube for transforming a plane section through a continuous-wave ultrasonic field to a television picture. Eleven different types of high-vacuum sealed-off experimental tubes were investigated. The final tube had a resonant quartz front plate diameter of 5.7 cm and operated at 1.20 Hz with a threshold acoustic sensitivity of 7×10^{-7} watts/cm^2. The overall acuity was 1 mm on the front plate and the resulting picture appeared on a monitor cathode-ray tube at 16⅔ frames/sec with 110 lines/frame. This tube is compared with those reported by other workers since 1954.

Adjustment and investigation of Schmidt objectives (in Russian), R. V. Voronov, *Tekhnika Kino i Telev., 9:* 59–64, Dec. 1965.

Methods of adjusting and testing Schmidt objectives in equipment for projecting television images onto large screens are considered.—S.C.G.