

consulting. His major works in high-speed photography date back to 1929, when he was working with his inspiring teacher, Carl Cranz, an earlier pioneer in ballistics high-speed photography, to whom he gave considerable credit for his early success. This work led to his doctorate in physics in 1934, for which his thesis, "The Quantitative Application of the Schlieren Method," was based on his work in high-speed schlieren methods for ballistic events.

Throughout his career, high-speed photography was the common thread that was outstanding in his contributions to science and education, utilizing his own technology of high-speed photographic instrumentation in his major areas of scientific investigation — missile water impact and entry, explosive shock wave phenomena, and brittle fracture. His contributions to education have been directly to individuals on an international basis as well as through universities in Germany. He was always available for assistance in whatever capacity he could be helpful in disseminating his knowledge in the field, including adult education of a nontechnical nature in his home town.

In 1959, Prof. Schardin became the first Scientific Director of a joint French-German research institute at Saint Louis, France, which position he held until 1964. He then became Director of the Technique Department of the German Ministry of Defense, a position comparable to that of a Director of Research and Development in the U.S. Department of Defense.

Concurrently with his work in the Ministry of Defense, Prof. Schardin retained his positions as Professor at the Universities of Freiburg and Cologne, and as Director of

the Ernst-Mach Institute at Freiburg and Weil am Rhein. He faithfully served the Ministry of Defense while also giving his best efforts toward support of physics research in Germany, his own optical institutes, and acting as a consultant for the Saint Louis Laboratories. In spite of this tremendous workload, Prof. Schardin made himself available to be most useful and communicative at the 7th Congress in Zurich.

The impact and impression made by Professor Schardin on the field of high-speed photography can in no way be completely summarized. His visits to activities such as the Naval Ordnance Laboratory, White Oak, Maryland, where, as a consultant, he helped establish the present uses of schlieren and ballistics photography, his personal efforts, and his publications con-

tributed considerably to the Laboratory's existing technology in aeroballistics and aerodynamics. Such use of his knowledge in other activities in the United States, Europe and elsewhere can similarly be credited.

His efforts as an advocate of high-speed photography over the years may best be summarized by a quotation from his acceptance speech for the Du Pont Gold Medal: "I consider this Gold Medal not only as a recognition of my own work but also as a visible sign that high-speed photography has become an important tool of research in opening the world of high-speed phenomena." Professor Schardin worked endlessly to accomplish his own goal of proficiency, and was equally generous in helping others in their endeavors to reach the same goal.—Max Beard.



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; also of possible interest to some readers may be three papers which have been translated from the

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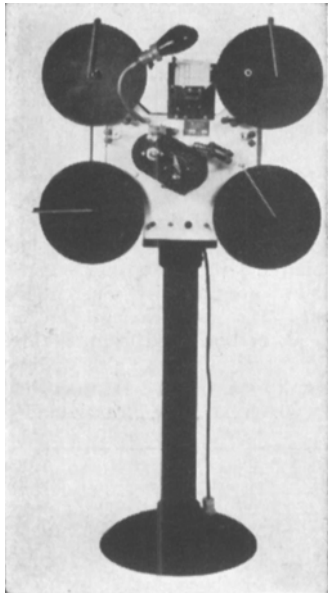


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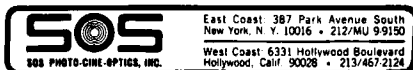
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Russian and are available as manuscripts on loan from Society Headquarters:

(1) L. G. Golshtein, I. Ya. Levin and T. I. Maksimov, "Optical printer," *Tekh. Kino i Telev.*, 3: No. 10, 58-62 (1959).

(2) M. M. Lisogor, "The 'Rossiya' Universal Cine Theater," *Tekh. Kino i Telev.*, 6: No. 5, 1-8 (1962).

(3) I. B. Gordichuk, "The present state of the manufacture of cine apparatus in the USSR," *Tekh. Kino i Telev.*, 6: No. 5, 3-19 (1962).

Those requiring definitive and thorough searches of current literature and patents are referred to *Abstracts of Photographic Science & Engineering Literature (APSE)*, published monthly by the Engineering Index, Inc., 345 East 47 St., New York, N.Y. 10017, with the editorial cooperation of the Society of Photographic Scientists & Engineers.

The subject areas are group below:

- Aerial Photography
- Cameras
- Cinematography
- Data Recording
- Film
- Film and Its Properties
- General
- Instrumentation and High-Speed Photography
- Laboratory Practice
- Lasers
- Lens Systems
- Medical Photography
- Miscellaneous Apparatus
- Photographic Theory and Materials
- Sound Recording and Reproduction

## AERIAL PHOTOGRAPHY

An interference method for the control of the size of aerial films and aerial photographs (in Russian), I. S. Nenashev, *Geod. i Kartografiya*, 46-54, No. 8, 1964; *Referativnyi Zhur.*, *Fotokinetekhnika*, Abstract No. 3.46.86, 1965.

A description is given of an interference method for controlling the flattening of an aerial film in an aerial camera with a mechanical method of flattening, when the film is pressed by a special plate onto the flattening glass. The method is based on the phenomenon of interference arising at the boundary of a wedge of air, formed by the surface of the film and the glass, when the flattening system is illuminated. In order to obtain the necessary contrast in the interference picture over the whole field of view with the aid of a simple device consisting of a spherical condensing lens and a diaphragm in front of the light source, use has been made in the experiments of the SMN-2 micro-sodium lamp, while the photographic processing of the film has been carried out in a special developer. Control of the flattening is carried out by counting the number of interference rings under the microscope with a 5 to 10X magnification, and calculating a coefficient which is constant for each zone defined by the concentric rings described from the principal point of the photograph. It is shown that for wide-angle aerial cameras the method is applicable by substituting the spherical condensing lens with an elliptical attachment.—S.C.G.

(Translated from *Referativnyi Zhur. Fotokinetekhnika*.)

**Determination of the transfer function of objectives for aerial photography: utilization of spatio-temporal test charts** (in French), J. Plenier, L. Heymann, and C. Durou., *Bull. Soc. Franc. Photogramm.*, 15-23, No. 15-16, 1964; *Referativnyi Zhur.*, *Fotokinetekhnika*, Abstract No. 3.46.133, 1965.

A description is given of a method of measuring modulation transfer functions of a lens by means of a so called spatio-temporal test-object in which a sinusoidally modulated light-flux falls on a variable slit, the image of which is thrown by a rotating mirror into the focal plane of a collimator. Light from the collimator passes through the lens being tested, through a slit of constant width and then to a photomultiplier. The electronic circuit produces the result in a form from which curves showing the relation between contrast factors and frequency can be derived.—S.C.G.

(Abridged from *Referativnyi Zhur. Fotokinetekhnika*.)

## CAMERAS

**New paths in automation: electronics** (in Czech), Anon. *Českosl. fotogr.*, 15: 336-37, No. 10, 1964; *Referativnyi Zhur.*, *Fotokinetekhnika*, Abstract No. 3.46.49, 1965.

Descriptions are given of the automatic devices, involving miniature electronics, which have been used in some recent cameras—S.C.G.

(Abridged from *Referativnyi Zhur. Fotokinetekhnika*.)

**Microtechnique in motion-picture cameras** (in French), J.P. Lavanchy, *Industr. Organ.*, 33: 387-397, No. 9, 1964; *Referativnyi Zhur.*, *Fotokinetekhnika*, Abstract No. 4.46.197, 1965.

A discussion is given of the principles of design of motion-picture cameras and projectors, points in the working of their mechanism and standards of accuracy, together with the problems which must be solved in their construction. An analysis is made of the working of the pulldown and Maltese Cross mechanisms of different designs, their advantages and defects. The main requirements of the sound units in motion-picture projectors are set out and working circuits are discussed.—S.C.G.

(Translated from *Referativnyi Zhur. Fotokinetekhnika*)

**Reproduction of color slides on 8mm color film** (in German), Wiesinger, *Schmal-film*, 16: 425-428, No. 12, 1964; *Referativnyi Zhur.*, *Fotokinetekhnika*, Abstract No. 6.46.157, 1965.

Experience is discussed in the reproduction of 24 X 36mm slides on 8mm film with the aid of the Niso Heliomatik Reflex camera. The Rodenstok Euron f/2, 8/-37.5mm tele-objective is used with supplementary lenses. With the camera it is possible to carry out photography a frame at a time, or at a frequency of 8 frames/sec.—S.C.G.

(Abridged from *Referativnyi Zhur. Fotokinetekhnika*)

**The 'Mir' motion-picture camera** (in Russian), A. G. Kashekhlebov (Moscow Design Office for Motion-Picture Appara-

tus), *Tekh. Kino i Televideniya*, 9: 13-18, March 1965.

A new model (3KSS) of the Soviet 'Mir' professional motion-picture camera is described. It is lighter and easier to handle than the earlier model, and improvements in the suppression of noise allow a microphone to be used in close proximity. The mechanical, optical and electrical design of the camera is discussed.—S.C.G.

#### CINEMATOGRAPHY

**The image sharpness criterion and its evaluation in different systems of cinematography** (in Russian), V. G. Komar, *Usp. Nauch. Foto.*, 10: 79-89, 1964.

The frequency-contrast characteristic of both the single elements, and the whole cinematographic process, as well as of the human visual apparatus, can be expressed with sufficient accuracy by the empirical exponential function  $y = e^{-(p/p_0)^n}$ . The width of the zone of gradually increasing brightness over a contour of the image, which determines its sharpness, is inversely proportional to the critical value of the spatial frequency of the cinematographic process  $p_0$ , i.e. to that value of the spatial frequency at which the frequency-contrast function  $y$  is reduced by a factor  $e$ . In this connection the quantity  $p_0$  is suggested as a criterion of image sharpness; it can quantitatively characterize the given cinematographic system (the whole of its technical processes) in relation to the possibility of obtaining a determined degree of image sharpness.

Visual perception of a motion-picture image as sharp can be quantitatively determined by a sharpness criterion  $K_E$ , equal to the ratio of the critical spatial frequencies of the whole cinematographic process and of the visual analyzer, carried out according to the optical enlargement from the positive of the film,  $K_E = P_E/P_{E(\text{eye})}$ . The image sharpness criterion  $K_E$  is inversely proportional to the angular enlargement on projection of the films,  $M_\theta$ , i.e., the angle at which the observer sees an image on the screen corresponding to a portion on the positive film equal to 1 mm. The angular dimension of the screen in cinematography can be increased while preserving the necessary image sharpness, by an increase in the dimensions of the frame of the positive film and by an increase in the critical spatial frequency of the cinematographic process. The use of anamorphic optics, other conditions remaining the same, allows screen dimensions to be increased only along the horizontal at the expense of a corresponding decrease in the dimensions along the vertical or vice versa, to increase the vertical dimension of the screen at the expense of reducing the horizontal dimension.—S.C.G. (Translation of author's abstract).

**A new system for universal impulse cinematography** (in German), J. H. Lucas, *Med. Markt.*, 12: 471-473, No. 11, 1964; *Referativnyi Zhur.*, *Fotokinetekhnika*, Abstract No. 6.46.268, 1965.

An impulse cineradiographic system is described in which the motion-picture camera is controlled by the x-radiation. The duration of the x-ray pulse lies in the range 1-10  $\mu$ sec and is controlled by the electronic circuit. The system allows the automatic control of the action of each x-

ray pulse on the film, so as to obtain a uniform density over the whole extent of the film.—S.C.G. (Translated from *Referativnyi Zhur. Fotokinetekhnika*)

**Wide-screen cinematography by the masked-frame method** (in Russian), V. Petrov., *Kinomekhanik*, 30-35, March 1965.

Masked-frame and anamorphic systems of wide-screen cinematography are compared, with the following conclusions. The main form of 35mm wide-screen films should be the anamorphic, but specially prepared 35mm films can be projected by the masked-frame method with aspect ratios of 1.65:1 to 1.85:1. When films of this type are projected, good anastigmatic objectives must be used in order to obtain the necessary picture quality.—S.C.G.

**A study of the quality of the cinematographic image** (in Russian), I. B. Blyumberg and T. M. Zyazina. *Usp. Nauch. Foto.*, 10: 50-57, 1964.

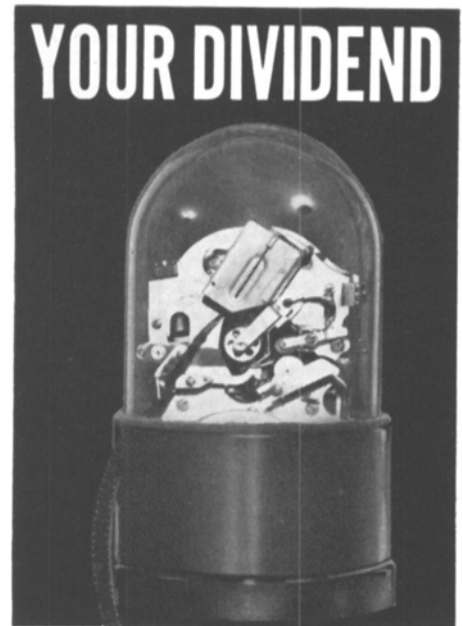
The quality of a motion-picture image can be evaluated by the sharpness, graininess, tone reproduction, and resolution of small detail. Tone reproduction, evaluated by the brightness-contrast characteristics, is closer to correctness the smaller the brightness intervals in the subject; in cinematography it is never correct nor proportional. Equations are suggested for tone reproduction and the conditions necessary for obtaining motion-picture images with satisfactory tone reproduction. The resolution of small detail and sharpness were lower in every later image of a printing series than in the earlier ones. A study was made of the relation between the degree of deterioration of resolution and sharpness and different factors, and the necessary values for these quantities were found for screen properties. The magnitude of the graininess factor in later images can be increased or decreased in comparison with its value in the earlier ones, depending on the sharpness, resolution, contrast and brightness. Tolerances for graininess values in screen positives have been found.—S.C.G. (Translation of authors' abstract).

**Cinematography with light amplification** (in Russian), I. N. Goufman and E. V. Ksandrov. *Tekh. Kino i Televideniya*, 9: 51-56, June 1965.

The types of electronic image intensifier now available are described and their application to cinematography under poor lighting conditions is discussed.—S.C.G.

**Underwater photography** (in English), H. E. Edgerton and J. W. Harford. *Verhandl. Internat. Verein Theoret. und Angew. Limnol.*, 15: 1034-37, No. 2, 1964; *Referativnyi Zhur.*, *Fotokinetekhnika*, Abstract No. 3.46.88, 1965.

A description is given of a new automatic deep-water camera which may have wide use in oceanology and hydrography. The camera is provided with two objectives with shutters controlled by a solenoid. The shutter has a built-in contact with a stroboscopic electronic flashlamp. One objective is intended for photographing the subject, while the second is for photographing dials of the depth indicator and other auxiliary devices. Photography is carried out on



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standard 35mm film in a spool with a capacity of 30 m, taking 500 photographs. The camera is provided with a 76-V battery. The box containing the camera is capable of withstanding a pressure of 1400 kg/cm<sup>2</sup>.—S.C.G.  
(Translated from *Referativnyi Zhur., Fotonotehnika.*)

#### DATA RECORDING

**Direct digital computing of acoustical data**, G. Marup Jensen, L. Linden and R. Lundin. *B & K Technical Rev.*, 3-14, No. 2, 1965.

A modern spectrograph makes it possible to gain detailed knowledge of noise within a very short time. However, the need for averaging the results of several measuring points, as well as the work involved with

corrections for background noise and room effect, make more detailed analysis expensive when it has to be performed by manual methods. In order to reduce these costs and also to accelerate the data processing, a new system for direct computing of acoustical data has been developed. This system comprises a potentiometer connected to the level recorder, a set of potentiometers for correcting the position of the spectrometer amplifiers, a unit composed of an integrator and a digital voltmeter and, finally, a calculating machine with a tape puncher. The data computing is programmed for making background noise and room-effect corrections, as well as for calculating average pressure and power levels in third-octave as well as octave bands. The calculation time for a series of eight measuring points with a Facit EDB computer is two

minutes, but this can be reduced with more rapid machines, such as the GE 625, to below one second. It is believed that the reduction of costs resulting from the application of this new method can allow a more thorough investigation of acoustical problems with the important object of reducing the noise exposure for human beings.

**Information storage density**, Marvin Camras, *IEEE Spectrum*. 98-105, July 1965.

Old and new methods of storing information are compared with theoretical limits based on compactness, speed and total bit capacity. Biological methods still surpass man-made systems.

#### FILM

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(in Russian), V. G. Komar and N. D. Bernshteyn. *Tekh. Kino i Televideniya*, 9: 9-17, May 1965.

Problems arising in the use of 16mm and 8mm in the Soviet national cinema network are discussed. The use of these films forms part of the wider picture of the correct apportionment of all the forms of cinematography now available to their appropriate places in the unified system. Extensive use of 16mm copies of standard-gauge films is foreseen for mobile cinemas and small cinemas in country regions. 8mm films are particularly suitable for schools and other teaching purposes. In the Soviet Union television and the cinema are being developed together and this close connection also has bearings on the use of narrow-gauge film.—S.C.G.

#### FILM AND ITS PROPERTIES

**Motion picture film 65mm and 70mm**, *BSI News*, (Pt. 4) Aug. 1965.

Specifies the dimensions for cut and perforated film. An appendix explains the choice of the appropriate longitudinal perforation pitch for negative film.

**The control of the characteristics of reversal films and some problems of their use in television** (in Russian), E. Shalk. *Trudy V Kongressa Mezhdunarod. Soyuz Tech. Kinematogr. Assotsiatsii*, 1962, Moscow, 'Iskusstvo', 1964, 84-86; *Referativnyi Zhur.*, *Fotokinetekhnika*, Abstract No. 4.46.174, 1965.

Results are given of a study of the properties of reversal films and copies made from them by reversal printing and by the negative/positive method of duplicating. Quality control of the image included determination of the resolving power, granularity, and edge sharpness by the lattice method. Both subjective and objective methods of evaluating the image showed that not only the reversal original but also the reversal copies had better resolving power than a positive copy from a negative. Copies from a reversal film obtained by negative-positive duplicating, give the worst results.—S.C.G.

(Abridged from *Referativnyi Zhur. Fotokinetekhnika*)

#### GENERAL

**Optics or ignorance?** A. M. Hughes, *Discovery*, 26: 42-46, June 1965.

Normal, time-lapse and high-speed photography have many applications in industry and research. Some of these are described. However, in Britain the knowledge and utilization of scientific photography are too much confined to government research establishments, a few university departments and leading industrial firms. There is a need to spread this knowledge more widely, particularly in industry. The organization of scientific photography in other countries is described.—N.W.

**A speed stabilizing block with a symmetrical rigid rocking shaft** (in Russian), A. V. Solomonik, *Trudy Leningrad. Inst. Kinozhenerov*, 13-23, No. 11, 1964; *Referativnyi Zhur.*, *Fotokinetekhnika*, Abstract No. 4.46.209, 1965.

Formulas have been derived, on the basis of which an estimation is made of the

relation between the main operating factors and the elements of a speed stabilizing block with two tension rollers.—S.C.G.

(Translated from *Referativnyi Zhur. Fotokinetekhnika*)

**Material presented at the VIth Congress of UNIATEC** (in Russian), E. M. Goldovskii, A. G. Kashekhlebov, and B. N. Konoplev, *Tekh. Kino i Televideniya*, 9: 57-64, May 1965.

A general report is given on the proceedings of the VIth Congress of UNIATEC (Universal Association of Television and Motion Picture Engineers) held in Milan Oct. 14-17, 1964, with a summary of the papers.—S.C.G.

#### INSTRUMENTATION AND HIGH-SPEED PHOTOGRAPHY

**Measurement of light traces with a ballistic photogrammetric camera with moving film** (in German), H. Lukanow, *Wehrtechn. Monatsh.*, 61: 249-253, No. 7, 1964; (*Referativnyi Zhur.*, *Fotokinetekhnika*, Abstract No. 3.46.307, 1965.

A description is given of the construction of a ballistic photogrammetric camera intended for photogrammetric measurement in a series of rocket launches following rapidly one after the other. Its method of use is described.—S.C.G.

(Abridged from *Referativnyi Zhur. Fotokinetekhnika*)

**A photographic attachment for measuring devices** (in German), Anon. *Arch. techn. Messen*, R123, No. 345, 1964; (*Referativnyi Zhur.*, *Fotokinetekhnika*, Abstract No. 3.46.90, 1965.

A report is given of a new photographic attachment, type 230, from Frazar and Hausen Ltd., which is intended for recording images from electronic indicators, digital voltmeter scales and other measuring devices. It allows the photography of a 17-in. (430 mm) oscillograph screen on 35mm film, the frame dimension being 22.2 x 31.7-mm. The images may be observed during photography and the electronic shutter can be worked by hand, according to a given program, or by given signals derived from the process being investigated. Focal length of the objective is 19mm, the dimensions of the attachment are 380 x 609 x 457mm, and its weight is 11.35 kg.—S.C.G.

(Translated from *Referativnyi Zhur. Fotokinetekhnika*)

#### LABORATORY PRACTICE

**Some causes of instability in the processing of color-positive motion-picture films** (in Russian), S. E. Tikhonovich and L. S. Sevast'yanova (Moscow Motion-Picture Printing Factory), *Tekh. Kino i Televideniya*, 9: 51-5, April 1965.

Substances not normally taken note of in the analysis of the working solutions in color processing in particular iodides and emulsion stabilizers, can accumulate during processing sufficiently to influence the characteristics of the processed colour materials. The effects vary with the type of film being processed. Results are given of experiments with a Soviet color-positive film. It is recommended that films with different structures and types of emulsion should not be processed at one time in the same machine.—S.C.G.

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**Rapid access methods in the United States**, John H. Jacobs, *Phot. Jour.*, 271-292, Oct. 1965.

The current status of rapid access photography in the United States is reviewed, with emphasis on available equipment for rapid processing and image recording and display with minimum delay. Such equipment includes machines using deep tanks, roller applicators, other special applicators, jet sprays, viscous layers and webs. A brief account is given of recent laboratory work reported in U.S. technical journals and other developments in the chemistry of rapid processing. In a review of electro-photography reference is made to some recent developments which could lead to a wider use of this technique in rapid-access applications.

**An electromechanical solution dispenser**, (in Russian), I. L. Dýshel' and A. M. Voronchikhin ('Gruziya-fil'm' Film Studios), *Tekh. Kino i Televideniya*, 9: 60-61, April 1965.

A brief description is given of an automatic device for the measured delivery of solutions in the processing of ciné film.—S.C.G.

#### LASERS

**Progress in semiconductor lasers**, B. Lax, *IEEE Spectrum*, 62-75, July 1965.

The semiconductor laser field has progressed at a tremendous pace during the past few years. This paper attempts to bridge the gap between the now familiar injection laser and more recent work on optical photon and electron pumped lasers.

#### LENS SYSTEMS

**Apparatus for the determination of transfer functions of image-forming systems** (in Russian), O. A. Gerasimova and A. A. Nilov, *Tekh. Kino i Televideniya*, 9: 30-39, June 1965.

Methods and apparatus for the measurement of contrast-frequency and phase-frequency characteristics of optical systems are discussed.

The value of the phase-frequency characteristic is as great as the value of the contrast-frequency characteristic. It is true that complex lenses, well-corrected and with small relative apertures have phase-frequency characteristics which differ little from zero; therefore, for these it is sufficient to determine one contrast-frequency characteristic. However, simpler objectives and also objectives with large relative apertures and large fields of view need the determination of phase-frequency characteristics on a par with the contrast-frequency characteristics. In particular this applies to objectives intended for aerial photography and to wide-angle motion-picture objectives.

The measurement of the phase-frequency characteristic has only just begun to be studied because of the lack of proper equipment.—S.C.G.

#### MEDICAL PHOTOGRAPHY

**A new method of stereoradiography and viewing apparatus**, S. Dékány, 2. *Optikai Konf. Budapest, 1963*. S. 1., s. a., 101-102 (in Hungarian), 103-105 (in German); *Referativnyi Zhur.*, *Fotokinetekhnika*, Abstract No. 3.46.293, 1965.

An experimental arrangement for x-ray stereography allows a taking frequency of up to 3 frames/sec, the image, as it is recorded, being observed on the fluorescent screen of a viewer even in an undarkened room. The control unit allows for the rapid consecutive switching-on of two tubes separated by a distance equal to the optical base, and at the moment of exposure the aperture of the viewer is closed so as to protect the observer's eye from the sharp increase in intensity of the fluorescence of the screen. The apparatus for viewing the pictures allows the determination of the interesting points of the subject with an accuracy of  $\pm 1$  mm; this accuracy depends in particular on errors introduced by the operator. The determination is carried out by bringing together this point in depth with a measuring mark. The apparatus is intended for the evaluation of pictures made with a given base at a distance of 0.6, 0.9 or 1.2 m.—S.C.G.

(Translated from *Referativnyi Zhur.*, *Fotokinetekhnika*.)

**Magnetische aufzeichnung der Röntgen-Fernsehdurchleuchtung** (in German), H. Birken, *Röntgen Blätter*, 18: 448-452, Sept. 1965.

The latest development in the sector of x-ray television—the magnetic recording—is described. The principle of the magnetic recorder and the technical conditions for medical practice as well as possibilities for other applications are discussed.

**Quantum fluctuations in cineradiography** (in French), R. Desprez, *Rev. Gen. Electron.*, 18: 33-36, No. 215, 1964; *Referativnyi Zhur.*, *Fotokinetekhnika*, Abstract No. 3.46.295, 1965.

A discussion is given of the influence of fluctuations in the number of quanta or photons at small exposures on the quality of the cineradiographic image. By using an image-brightness intensifier of the electronic type it is possible to reduce considerably the intensity of irradiation of the patients, but, because of the fluctuation, the quality of the image becomes significantly worse, the effect being greater as the time of exposure becomes very small. This limits the minimum power level of the source of radiation. To the effect of quantum fluctuations must be added the phenomenon of fluctuations in the intensifier.—S.C.G.

(Translated from *Referativnyi Zhur.*, *Fotokinetekhnika*.)

#### MISCELLANEOUS APPARATUS

**A tape-transport mechanism with high stability of instantaneous tape speed** (in Russian), A. V. Mikhnevich (All-Union Sci.-Res. Inst. for Magnetic Recording and Technology of Radio Communications and Television, U.S.S.R.) *Tekh. Kino i Televideniya*, 9: 40-46, April 1965.

Methods of constructing mechanisms for stabilizing the instantaneous speed of a tape are analyzed, and one such device is described. Test results are reported.—S.C.G.

**A device for printing footage numbers** (in Russian), B. Sherman (Volgograd Televis. Studio), *Tekh. Kino i Televideniya*, 9: 63-64, June 1965.

A brief description is given of a device for



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printing footage numbers on negative film for editorial purposes.—S.C.G.

### PHOTOGRAPHIC THEORY AND MATERIALS

**The use of a diffusimetric method of determining sharpness of a photographic image in the manufacture of thin-layer motion-picture and photographic films** (in Russian), V. L. Zelikman, F. S. Sherman, V. A. Dmitrieva, and E. V. Kondrat'eva, *Usp. Nauch. Foto.*, 10: 221-229, 1964.

An objective method for the qualitative estimation of light scatter in an emulsion layer and reflection from the base, worked out by G. A. Istomin and his collaborators, has been used for the choice of factors in the making of photographic emulsions with low  $\rho^*$  [the gelatin/silver ratio] and the manufacture of thin-layer motion-picture negative film.

A diffusimetric study of laboratory samples of nonammoniacal motion-picture negative films with values of  $\rho^*$  from 0.5-0.75 to 6.0 and with two different average grain dimensions ( $\bar{a}$ ) has shown the following preliminary optimum values of  $\rho^*$  for thin-layer films: for a film of average speed, AM-3 ( $\bar{a} \approx 0.3 \mu^2$ ), about 1.3, and for a high-speed film, B-3 ( $\bar{a} \approx 0.7 \mu^2$ ), about 1.0. [These are the designations of Soviet motion-picture films]. This makes it technically possible to work out a new set of thin-layer motion-picture films based on  $\rho^*$  in the range of 1 to 2 instead of 4 to 5 as in the present set.

Diffusimetric studies on laboratory samples of motion-picture negative film, AM-3, with average speed and with optimum  $\rho^* \approx 1.3$ , on triacetate base with different optical densities of antihalation dye, have shown that the minimum satisfactory density of the antihalation dye is 0.35 instead of the value of approximately 0.25 generally used.

It is shown that the presence of a fine-grain bottom layer, which has considerable advantages from the diffusimetric point of view, in the absence of, or with insufficient optical density of, the antihalation dye, is less effective with the minimum necessary density of dyeing ( $D \approx 0.35$ ).

Advantages from the diffusimetric point of view are shown by a newly suggested dyeing of the base for fine-layer isochromatic motion-picture films, which imitate the curve of their spectral sensitivities.—S.C.G. (Translation of authors' abstract).

**The improvement of nonactinic lighting in the processing of black-and-white positive film** (in Russian), L. Yu. Reshilov, *Tekh. Kino i Televideniya*, 9: 25-34, May 1965.

For safe lighting in the processing of the Soviet MZ-3 motion-picture negative film, the wavelength range 575-595  $m\mu$  is the most favorable for visual work, taking the sensitivity of the film into account. Incandescent lamps with light filters passing light in this range are very wasteful of energy. The sodium vapor lamp radiates mainly at 589  $m\mu$ , lying within the most favorable range. The other lines in the sodium spectrum can be filtered out with only small loss in output.—S.C.G.

**A comparison of two methods of measuring visual equivalent neutral density** (in Russian), L. K. Krupenin, *Tekh. Kino i Televideniya*, 9: 44-50, June 1965.

Two methods of calibrating densitometers for measuring visual equivalent neutral density of color-positive films have been compared experimentally—the method specified for use in the Soviet Union by the standard GOST 9160-59 and the VUZORT method used in Czechoslovakia. The first method specifies one set of filters for all types of color film, while the second specifies a separate set of monochromatic filters for each type of film. The same results were obtained by the two methods.

Visual equivalent neutral densities determined by graphical calculation from spectrophotometric data by the VUZORT method, the wavelengths of the measuring light being those set for the given type of film, agreed satisfactorily with values of the visual equivalent neutral densities obtained from direct measurements with the VUZORT densitometer.—S.C.G.

**Wavefront reconstruction photography**, Emmett Leith and Juris Upatnieks, *Physics Today*, 18: 26-32, Aug. 1965.

New interest has arisen in the wavefront reconstruction process of Gabor. With the aid of the laser, photographic imagery has been produced in which the image is, to all appearances, a three-dimensional reconstruction of the original, complete with parallax and other visual effects.

**Comparison of the rates of development by several agents of latent images formed by exposures at 21C and 196C**, T. H. James, W. J. Miller and I. F. Rosati, *Phot. Sci. and Eng.* 9: 265-272, July/Aug. 1965.

Rate curves and activation energies were obtained for development of latent image formed by high-level exposures of motion-picture-positive film at 21 C and -196 C. Ferro-EDTA, hydroquinone, Phenidone and 4-amino-3-methyl-N-ethyl-N ( $\beta$ -methylsulfonamidoethyl) aniline developers were used. The latter three contained ascorbic acid but no sulfite. The rates of development were lower and the activation energies higher for the low-temperature exposure, but the character of development of the low-temperature image varied considerably for different conditions of development. The important difference between the development of the low-temperature and the room-temperature latent images is the rate-controlling step: the overall kinetics of development of the low-temperature latent image and the rate of fog formation in the ferro-EDTA solutions correlate with the redox potentials, whereas the rate of development of the room-temperature latent image does not. A "latensification" stage may be important in the initiation of development of the low-temperature latent image. The activation energies of development of the low-temperature latent image by several developers tested were nearly the same as the activation energy of solution of the silver halide, suggesting that solution may play a part in the initiation of development.

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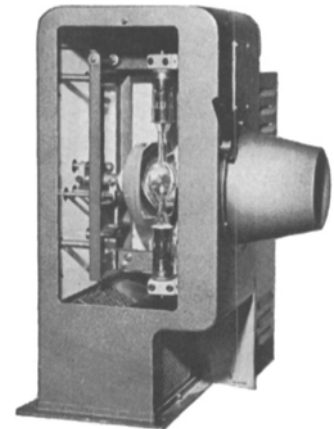
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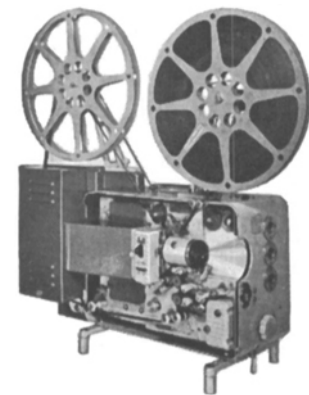
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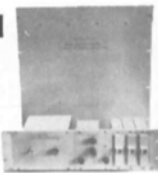


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**Optical problems in motion-picture cameras** (in French), E. Millet, *Industr. Organ.*, 33: 355-360, No. 9, 1964; *Referativnyi Zhur.*, *Fotokinetika*, No. 3.46.127, 1965.

Some points in the calculation of a panchromatic objective for an 8mm amateur motion-picture camera are discussed. It is suggested that the objective should consist of a basic objective and a panchromatic afocal attachment. Panchromatic attachments of modern objectives are of two kinds: with optical or mechanical compensation. Optical compensation is brought about by simultaneous displacement along the optical axis of two components, firmly connected to each other. With optical compensation there are no difficultly-made shaped grooves. Mechanical compensation is carried out by the independent displacement of at least two components. The most important stage in the calculation of a panchromatic system is the choice of the optical arrangement and the optical strengths of each component. A method is considered for the preliminary calculation of a 3-component afocal attachment, allowing, even at that stage, the determination of the magnitude and accuracy of the displacement of the movable components. This gives the possibility of satisfying the requirements of mass production of panchromatic objectives. Formulas and graphs are set out to explain the proposed method.—S.C.G. (Translated from *Referativnyi Zhur.*, *Fotonetkhnika*.)

**An experimental study of the edge sharpness given by motion-picture objectives** (in Russian), F. S. Novik and M. M. Shcheglov, *Usp. Nauch. Foto.*, 10: 34-41, 1964.

The edge profile (the microdensitometer trace across the developed image of a knife edge) is used for the evaluation of the quality of an image formed by an objective film system. The method holds some interest in the carrying out of studies of objectives under laboratory conditions. Supplementing a number of other criteria in general use, it allows reliable conclusions to be drawn about image quality under conditions approximating to the practical use of the objectives in cinematography. The choice of any particular feature of the edge profile has not been sufficiently understood and requires further confirmation. In any case the upper and lower curved portions of the edge profile must be taken into account. In the authors' opinion the magnitude of the width of the zone of unsharpness (i.e. the distance between the area of maximum density and the area of minimum density) can be used as a first approximation to a criterion for photographic image quality. It was found that the measured values of the width of the zone of unsharpness and the slope of the straight line portion of the edge profile frequently do not correspond with the values of the photographic resolving power of the objectives under study.—S.C.G. (Based on authors' abstract).

**The measurement of the frequency-contrast characteristics of motion-picture**

**objectives** (in Russian), F. S. Novik and A. P. Aksenchikov, *Usp. Nauch. Foto.*, 10: 44-9, 1 folding pl., 1964.

An experimental photoelectric device has been made for the study of the distribution of illumination in an optical image formed by motion-picture objectives in the center of the field at different relative apertures down to 1:16. A method has been worked out for measuring the frequency-contrast characteristics of the objectives and the processing of the results for compiling curves showing the relation between the relative contrast and the spatial frequency. Several motion-picture objectives have been studied for the dependence of the contrast in the optical image of a radial test object on the relative aperture, for the center of the field.—S.C.G. (Translation of authors' abstract).

**Evaluation of the quality of motion-picture objectives by the criterion of sharpness** (in Russian), A. L. Yarinovskaya, *Usp. Nauch. Foto.*, 10: 42-3, 1964. (Author's summary only).

"Edge-unsharpness" is suggested as a criterion of the quality of motion-picture objectives. It is a criterion which takes into account the light distribution over the developed image of a knife edge, and is obtained by making a microdensitometer trace across the image of the knife edge, and estimating the area between the density against distance curve and the fog level. This area expressed as a percentage of the total area is taken to represent the unsharpness. The method is claimed to give good results with motion-picture camera and projector objectives.—S.C.G.

**The principle of velocity modulation dodging**, Paul Pargas, *Phot. Sci. Eng.* 9: 219-227, No. 4, July/Aug. 1965.

Velocity modulation dodging is a method of controlling the exposure of each local area in a negative by automatically adjusting the velocity of the exposing spot of the cathode-ray tube. The basic equations for this system are derived, and their effects in some optical printers are shown. It is shown that scattered light in the face-plate of the CRT reduces the dodging in areas of high densities. Discussed are the effects of boundary enhancement (a characteristic inherent in scanning printers) and, briefly, the spot size, persistence, and vignetting.

## SOUND RECORDING AND REPRODUCTION

**Improvements in or relating to the synchronizing of a sound recorder and/or reproducer with a cinematograph film** (British Pat. 999,368), K. C. Warner, 1.16.63-7.21.65. 3 p., 1 pl.

A photocell is set up to view the projected light from a cinematograph projector, either directly or via the projection screen, and the alternating signal derived from the photocell is used, with or without an amplifier and/or frequency multiplier to drive a sound-reproducing apparatus, which is thereby synchronized to the projector.—H.J.L.