

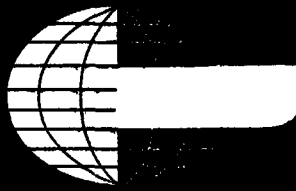
The criteria for speed determination of negative motion-picture films, (in Russian), L. I. Arkhipov, L. V. Kosmatov and L. P. Krýlov, *Tekh. Kino i Televidinya*, 13: 32-34, Sept. 1969.

Two criteria are in use for speed determination according to the different national standards: $D = 0.10 + D_0$ and $D = 0.85 + D_0$, the latter being used in GOST standard in the Soviet Union. Either of these would be suitable for motion picture work if the films used had the same characteristic curve. Significant differences are found in speeds determined by this criteria. The author would prefer to see the 0.1 criterion in the Soviet Union.—S.C.G.

A rational methodology for the study and evaluation of the physical and mechanical properties of photographic films (in Russian), L. V. Rozental'. *Konf. teorii technol. procesu fotogr. Zakopane, 1968. Cz. 3. S.1., s.a., 59/1-59/8. Ref. Zh., Fotokinotekhnika*, Abstract. No. 8.46.158, 1969.

The aims and requirements that should be met by a rational system for the quantitative determination of the physical and mechanical properties of photographic films, and also of the base and emulsion layer separately, are discussed. It was found that the most sensitive method was the thermomechanical, i.e. the determination of the degree of lengthening (mobility of the structural elements) of a polymer as a function of temperature over a range

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
- Film and Its Properties
- Instrumentation and High-Speed Photography

- Optics
- Photographic Theory and Materials
- Sound Recording and Reproduction
- Special Applications
- Television

AERIAL PHOTOGRAPHY

A light source for sensitometry of aerial films, P. D. Carman, *Photographic Science and Engineering*, 13: pp. 376-381, Nov.-Dec. 1969.

To establish a light source suitable for the sensitometry of film for aerial survey photography, published and unpublished radiometric data on daylight were collected and appropriately combined. Allowance was made for the transmission of typical lenses. The effect of the atmosphere between the scene and the camera was examined. A typical spectral energy distribution was established from 350 to 920 nm. Practical laboratory sources approximating this distribution were sought and a satisfactory one was found using a 2854 K tungsten lamp with three glass filters (Corning 5900, Schott FG10, and Schott KG04) in appropriate thicknesses.

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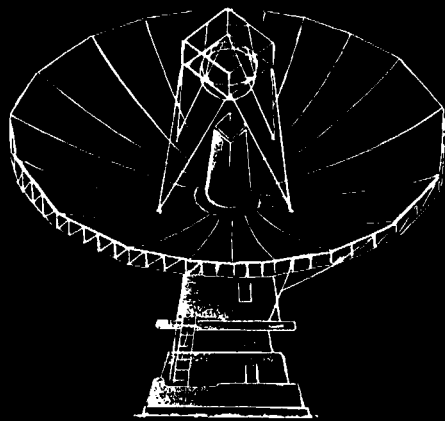
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embracing the different physical states of the polymer. Some ideas on the choice of the temperature range for such a method are discussed for different cases. Thermo-mechanical curves are given of triacetate base without emulsion, the emulsion layer (with and without plasticizer) free from base, photographic films with emulsion layers of different thicknesses, and also with processed layers. — S.C.G. (Translated from *Ref. Zh., Fotokinetekhnika*).

The influence of the structure of dyes on the resolving power of prints and the adhesion of a dyed relief and a blank film. (in Russian), M. P. Arbutova, N. S. Spasokukotskii, and O. A. Golubeva, *Zh. Nauch. i Prikl. Fot. i Kinemat.*, 14: 323-326, Sept.-Oct. 1969.

When monoazo dyes with one sulpho-group, and also with two sulpho-groups in one ring, are used in the imbibition process, the resolving power of the prints is very low, and adhesion between the matrix and blank film is high. This is because the dyes with one sulpho-group show a large adsorbing power and the first portions taken up from the dyed relief are so firmly adsorbed in the surface layers of the blank film that the probability of lateral diffusion of the remaining mass of dye in the thin lamina of water between the layers is increased. Since adsorption proceeds by the interaction of the sulpho-groups of the dye with the amino-groups of the gelatin or of the mordants, then on the surfaces of both the matrix and the blank film such dyes appear to be orien-

tated with the sulpho-group towards the layer, and the hydrophobic residue outwards. The increase in adhesion is the result of the association of these residues. Dyes with two or more sulpho-groups situated in different nuclei have a lower affinity and are not so firmly adsorbed onto the surface of the blank film. Hence, when they are used, the resolving power is increased and the adhesion is reduced. — S.C.G.

The neutralization of static charges on light-sensitive photographic materials (in Russian), L. G. Gross, Yu. A. Petrov, and G. A. Fadeeva, *Tech. Kino i Televidinya*, 13: 35-39, Sept. 1969.

The characteristics and construction of a shielded low-frequency corona neutralizer and a radioactive neutralizer, for use with moving photographic film, are discussed. A description is given of an experimental tritium neutralizer with automatic blocking of the radiation when the film is not in motion.

A method of calculating the general sensitometric variables of motion-picture films on a computer by comparison with a standard characteristic curve. V. I. Ionov, *Konf. teorii technol. procesu fotogr. Zako-pane*, 1968, Cz3, S.1., s.a., 60/1-60/6; *Ref. Zh., Fotokinetekhnika*, Abstract No. 8.46.164, 1969.

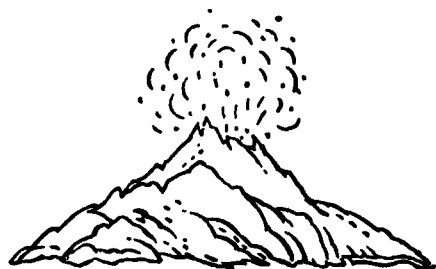
The following suggestion is made: if some standard characteristic curve is chosen and described by the functional re-

lation $D = f(\log E)$, then any experimental characteristic curve may be obtained from the standard by shifting the latter along the axis of abscissae by an amount e multiplied by the factor S , and raising it along the axis of ordinates by an amount D_0 ; in this way any characteristic curve will be described by the relation $D = D_0 + Sf(\log E + e)$. In this equation, of the infinite multiplicity of combinations of D_0 , S and e , only one completely (or, perhaps, to a maximum degree) brings together the standard and the experimental characteristic curves. In order to test the different combinations and choose the best by the method of least squares, the authors used the Minsk-1 computer and programs available for it. The value of D obtained in this way immediately gives the fog density, and S and e are used for calculating contrast (gamma, mean gradient) and the speed value at the criterion point of the characteristic curve. — S.C.G. (Translated from *Ref. Zh., Fotokinetekhnika*)

INSTRUMENTATION AND HIGH-SPEED PHOTOGRAPHY

Photographic study of two-phase flows (in German), K. Lehmann, *Wiss. Z. Tech. Univ. Dresden*, 17: 1313-1317, No. 5, 1968; *Ref. Zh., Fotokinetekhnika*, Abstract No. 9.46.222, 1969.

A report is given on photographic



Special Effects in Motion Pictures

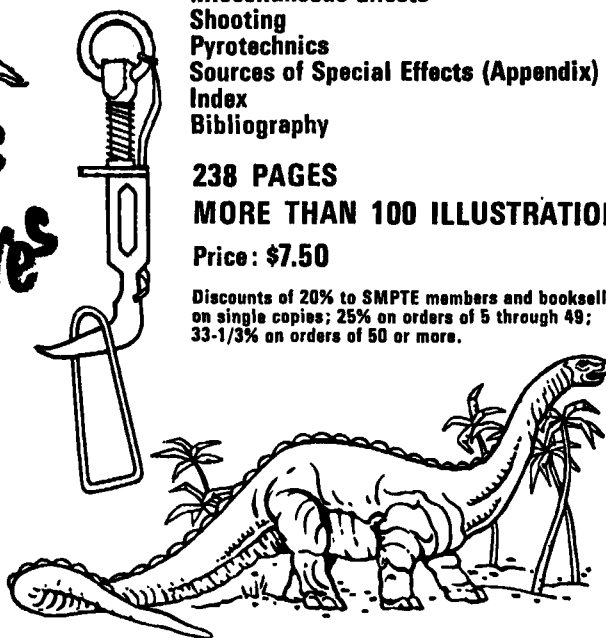
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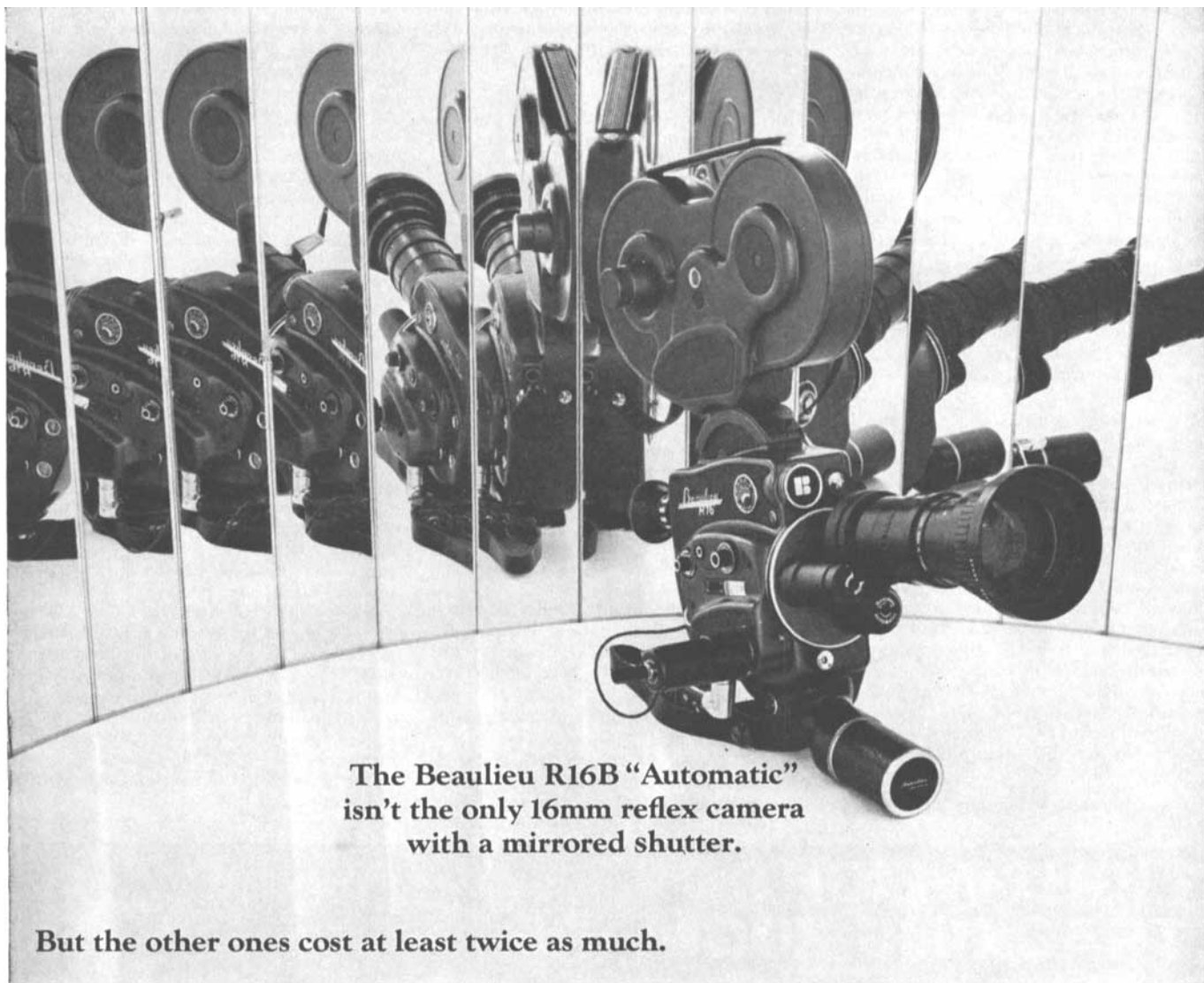
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studies of two-phase flows, carried out in the Institute of Applied Aerodynamics at Dresden University. Water and air were fed into a glass tube of diameter 22.5 mm and length 2 m, and at the end of the tube the two-phase flow which formed was photographed with speeds of 0.3 to 10 m/s. The following types of flow were photographed: bubbles, drops, mixed and wave. Photography was carried out with a strobe lamp and Exakta Varex camera. — S.C.G. (Abridged from *Ref. Zh., Fotokinotekhnika*)

Chronolite 8, a versatile multiple high-speed spark camera (in English), W. Thorwart, F. Suarez, and H. G. Patzke, *Explosivstoffe*, 17: 49–57, No. 3, 1969; *Ref. Zh., Fotokinotekhnika*, Abstract No. 9.46.51, 1969.

A description is given of a high-speed camera, made as an improvement of the Cranz-Schardin design and intended for obtaining a sequence of six to eight photographs at a frequency of 10⁶ frames/s. The unit consists of an electronic circuit with control desk, a spark source, an optical section and the receiving part. The electronic circuit allows the interval between sparks to be varied from 1 μs to 1s. The optical unit consists of a disk shutter with a controllable slit, and 8 optical channels for separate recording of the frames and objectives. Photographs are taken on a conventional negative film or a Polaroid-type film in 9×12 cm cassettes. — S.C.G. (Abridged from *Ref. Zh., Fotokinotekhnika*)

High-speed photomicrography of the at-

omization of fuel (in Russian), S. G. Mukhametzhanov and B. N. Semenov. *Zh. Nauch. i Prikl. Fot. i Kinemat.*, 14: 365–368, 1 pl., No. 5, Sept.–Oct. 1969.

Apparatus has been designed, constructed and tested for photomicrographic studies of mixture formation in internal-combustion engines with atomization of the fuel by means of a spray mechanism. A high-speed photomicrographic study has been made of the dispersity of the jet of fuel, the structure of the fuel layer, and its evaporation. — S.C.G.

The type FK-1 instant-access, high-speed camera with high light-gathering power (in Russian), A. S. Dubovick, P. V. Kevlishvili, G. I. Belinskaya, G. P. Ilyushin, M. S. Gus'kova, and Yu. A. Gus'kov, *Zh. Nauch. i Prikl. Fot. i Kinemat.*, 14: 378–380, No. 5, Sept.–Oct. 1969.

The FK-1 is an all-purpose, high-speed camera, which can be used as a framing camera with speeds from 1250 to 20,000 frames/s, or as a photocronograph with slit scanning, reaching speeds of 76m/s. It can be used with wide lens apertures. — S.C.G.

High-speed photographic studies of ultrasonically induced cavitation, Hilding G. Olson and Frederick G. Hammitt, *Jour. Acoustical Soc. Am.*, 46: 1272–1283, (Part 2), Nov. 1969.

On the basis of photographic studies, it is indicated that the normal collapse mode for a bubble in an ultrasonically induced cavitation field is asymmetrical. In most cases, the bubble surface is due to pressure

gradients, etc. A vortex ring is formed producing a central microjet, the impact of which upon a solid surface is believed to be the predominant damaging mechanism. Three collapse models are hypothesized to explain the existence of the various types and sizes of cavitation bubbles that were observed and also to suggest the mode of a possible damaging collapse. An attempt is made to correlate the known pit damage on an individual specimen surface, and it is found that the order of magnitude is correct. Visible evidence of the effect of the shock waves that apparently accompany rebounding bubbles is presented.

OPTICS

Servo zoom lenses for the film industry, J. H. Askew and C. B. Flindt, *Brit. Kinemat. Sound and TV*, 51: 356–358, Oct. 1969.

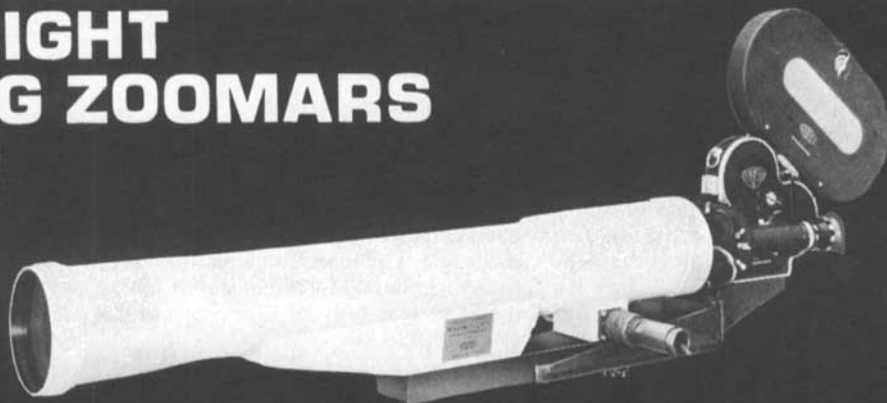
Although the use of servo-controlled zoom lenses is almost universal in European television, their application to the film industry has so far been limited to systems having an auxiliary television viewing facility. The Evershed Power Optics system described can be either a permanent fitting to a lens or a detachable auxiliary. The positions of zoom, focus and iris can all be remotely controlled and pre-selected. In the case of the zoom function, velocity control, for accurate control of long slow zooms is provided.

Such systems would enable the techniques already in use in the television industry to be applied to filmmaking and could be extended to control pan and tilt function as well.

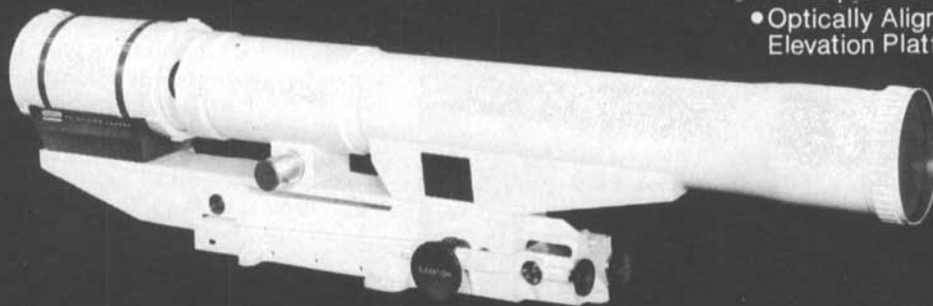
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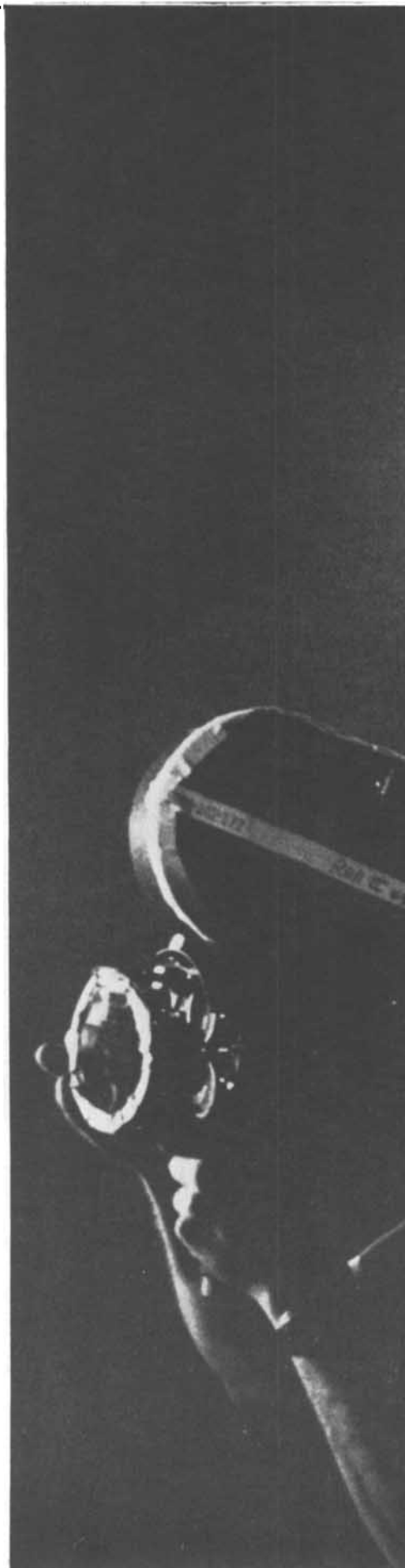
Minimal sets and costumes, improvised action, free wheeling camera techniques, symbolism, metaphores both visual and literary—"Recess" might once have been pigeonholed as 'Underground'. But its thematic outlook has emerged into the mainstream, in this case backed by a crew of impeccable professionalism. Producer, William E. Barnes spent seven years as story editor for Otto Preminger; DP George Silano has such TV features as "Hunger in America" and "N.Y.P.D." behind him; and Director, Rule Royce Johnson zeroes in on his film's techniques during years of directing for the stage, including the original production of "Recess" at the esteemed Off-Broadway theatre, Cafe La Mama.

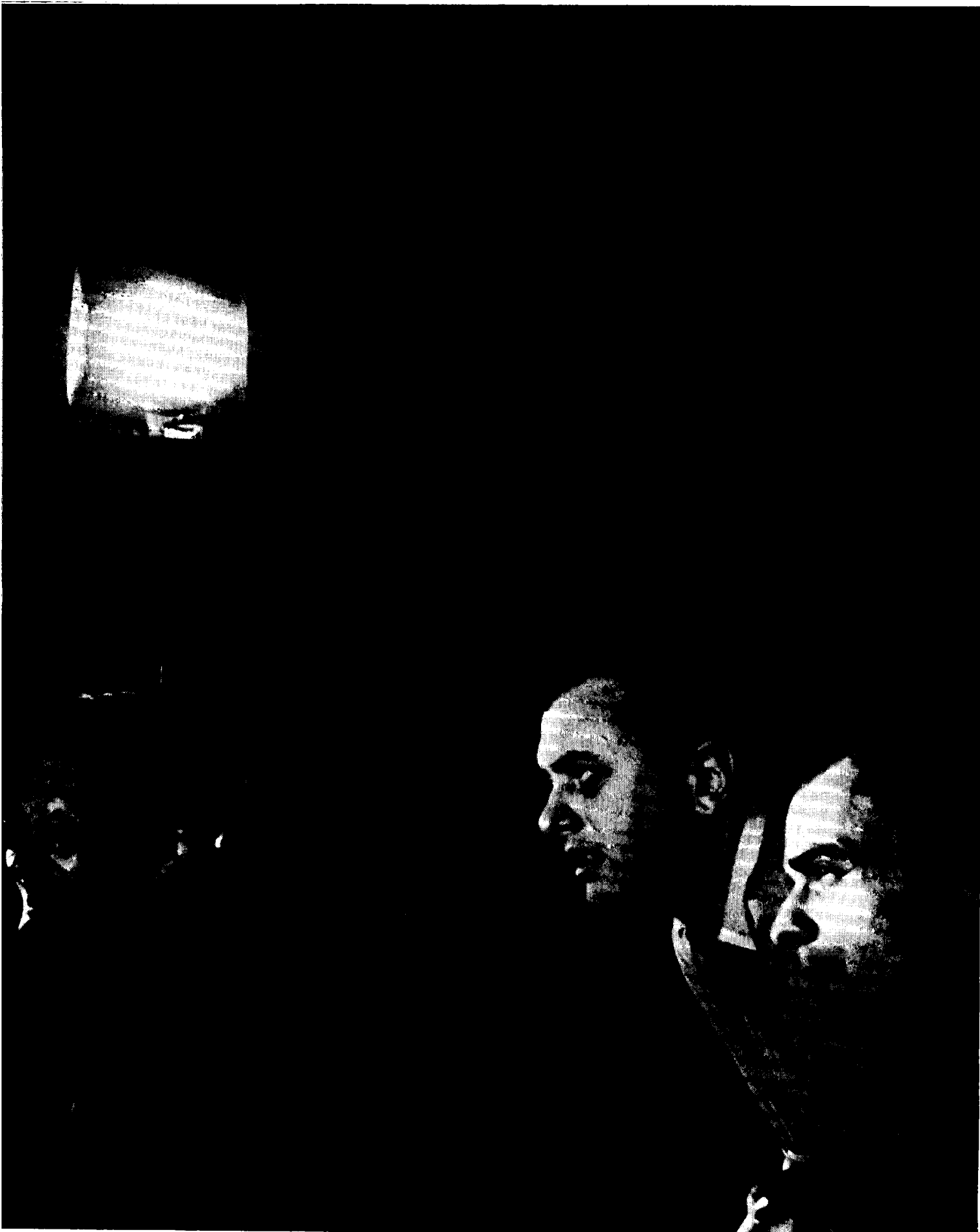
The difficulty with the improvisational shooting technique used in "Recess" is the relative chaos it requires—when spontaneity is the spicing you want, overpreparation will likely dull the flavor. "The actors would get deeply into their parts", said Mr. Silano, "improvising some of the most intense performances I'd ever seen. So you look at the footage counter and—you're running out of film. Spend more than a few seconds reloading and the actor looks like a deflated automobile tire. You've got to be shooting again almost instantly, while that pressure's still in him. If he takes it from the top again, he'll improvise a whole new movie. And that, more than anything else, is how the Arri 'made' this film. No other 35 would have let me work fast enough. It was the magazines, the viewfinder, its hand-holdability—the whole thing's just geared for speed, for the unexpected."

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PHOTOGRAPHIC THEORY AND MATERIALS

Critical design factors affecting the performance of a microdensitometer, Daniel Galburt, Robert A. Jones and John W. Bossung, *Phot. Sci. and Eng.*, 13: 205-209, July-Aug. 1969.

Existing microdensitometers were found to be incapable of recording with the accuracy required by computerized data analysis programs. A new microdensitometer was designed and constructed to satisfy these accuracy requirements. Care was taken to minimize any inaccuracy due to flare, coherency, film granularity, angular misalignment, and focal misadjustment.

Applications of image transformations in motion-picture filming (in Russian), B. F. Pluzhnikov, *Tekh. Kino i Televidinya*, 13: 40-45, Sept. 1969.

Systems of modifying photographic images, including solarization, bas-relief and isohelic, are discussed from the point of view of their applications in motion-picture work. — S.C.G.

A graphical method of calculating the distribution of effective illumination in linear elements of a raster image (in Russian), O. F. Grebennikov, *Zh. Nauch i Prikl. Fot. i Kinemat.*, 14: 313-319, No. 5, Sept.-Oct. 1969.

A method is proposed for calculating the distribution of illumination in optical and photographic images of luminous bands of constant brightness. A graphical method has been used for the calculation, making

use of the curve of the light-distribution function in the image of an edge in a luminous field. Tables are given, suitable for calculating the light distribution in an optical image formed by aberration-free objectives with circular and rectangular pupils, and also cylindrical optics. By using the convolute of the light-distribution function in the optical image and the scatter function in the emulsion of the light-sensitive material, curves have been constructed of the distribution of effective illumination in the image of an edge in a luminous field, formed by a photographic system with aberration-free optics. The curves are suitable for calculating the light distribution in the image of bands of constant brightness formed by photographic systems. — S.C.G.

Methods of evaluating the quality of motion-picture taking objectives (in Russian), F. S. Novik, *Tekh. Kino i Televidinya*, 13: 8-14, Oct. 1969.

A number of methods of evaluating the quality of motion-picture objectives have been compared in practice by applying them to lenses of different make. The methods used were based on the photographic resolving power, threshold curves, modulation transfer functions, and the photography of special models. The advantages and disadvantages of the methods are discussed. — S.C.G.

Coefficients of friction of materials used in motion-picture apparatus (in Russian), I. S. Golod, V. B. Liberson, and V. F. Piyavskii, *Tekh. Kino i Televidinya*, 13: 15-18, Oct. 1969.

Experimental values have been obtained for the coefficients of static and sliding friction of different pairs of materials used in motion-picture apparatus, and in particular, in printers. Coefficients of sliding friction were obtained for different sliding velocities, normal forces, and areas in contact. — S.C.G.

The relation between the quality of a motion-picture image and the degree of development of the negative and positive (in Russian), L. P. Krylov, I. G. Abidina, and L. I. Arkhipov, *Tekh. Kino i Televidinya*, 13: 26-28, Oct. 1969.

A discussion is given of the problem of the change of quality of the resultant positive image when the negative and positive are developed to different levels of contrast, the conditions of development being kept constant. When the quality of the image is assessed, the tone-reproduction, sharpness, and graininess of the resulting positive image do not noticeably change at different levels of development. — S.C.G.

The dimensions of the step of a sensitometric step-wedge (in Russian), G. S. Baranov, Z. A. Belorusets, and N. S. Ovechkis, *Tekh. Kino i Televidinya*, 13: 28-30, Oct. 1969.

Below a certain size, the dimensions of the step of a sensitometric step-wedge have an influence on processing, and so influence the measurements of speed and speed balance of tested materials. It is recommended that the dimensions of the step of a sensitometric wedge should not be less than 15×8 mm. — S.C.G.



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The contrast function and its application to the estimation of the sharpness of motion-picture films (in Russian), G. A. Is-tomin, *Konf. teorii technol. procesu fotogr., Zakopane, 1968*, Cz. 3, S.1, s.a., 61/1-61/12; *Ref. Zh., Fotokinotekhnika*, Abstract No. 8.46.169, 1969.

A short review is made of work on the use of the contrast function and the dif-fusimetric coefficient derived from it for the quantitative evaluation of the sharp-ness of a photographic image. The rela-tion of the contrast function to the line-spread function of the image; the influence of the conditions of development and the Eberhard effect on the contrast function; the linear approximation for the case of negligibly small reflection halation; the general form of the contrast function for layers with one- and two-variable Frieser functions; and different methods of cal-culating reflection and scatter halation, etc., are discussed. — S.C.G. (Translated from *Ref. Zh., Fotokinotekhnika*)

The vibrating camera: a photographic method for the measurement of velocity (in German), K. Affeld and G. Clauss, *VDI-Zeitschrift*, 111: 496-500, IV, No. 8, 1969; *Ref. Zh., Fotokinotekhnika*, Abstract No. 9.46.224, 1969.

A method is described for measuring velocities with a vibrating camera. If the optical axis of the objective undergoes periodic motions, then there is obtained not only an image of the trajectory of the subject being photographed (e.g., a glow-

ing particle) but also a curve of the com-plex motion resulting from the combina-tion of the motions of the particle and the objective. Since the motion of the objec-tive is known the trajectory of the motion of the particle may be obtained. From this curve the instantaneous value of velocity, acceleration, and other characteristics of the motion may be derived. The vibration of the camera may be brought about me-chanically (with the aid of a rotating ec-centric, unequal loading, etc.) or by in-cluding its optical axis with the aid of a rotating mirror or prism. Some practical examples of the application of the method are given. — S.C.G. (Translated from *Ref. Zh., Fotokinotekhnika*.)

Sharpness studies on color-positive mate-rials (in German), Bergt, *Konf. teorii technol. procesu fotogr. Zakopane, 1968*, Cz. 3. s.l., s.a., 65/1-65/6; *Ref. Zh. Foto-kinotekhnika*, Abstract No. 9.46.150, 1969.

Investigations have been made on the sharpness of the image on multilayer posi-tive color photographic materials and on their elementary layers. The Frieser con-stant k was taken as a measure of sharp-ness, and to determine this a contact print was made of an opaque plate with trans-parent narrow (15, 41 and 85 μm) and wide (5 mm) stripes with a continuous grey scale placed lengthwise over them. If it was needed to separate one of the layers of the multilayer material, the appropriate separation filter was used in printing. The results obtained show a lower sharpness (larger k) of an elementary layer in the multi-layer material than in the isolated

state; a decrease in k when a colored antihalation layer is coated; a rapid in-crease in k with thickness of the isolated emulsion layer; a negligible effect of the gelatin protective layer on k (a tendency towards increase); a significant lowering of k for red-sensitive and especially for green-sensitive layers; and a negligible rise in k of the blue-sensitive layer on passing from the classical order of the layers to a different order. — S.C.G. (Translated from *Ref. Zh., Fotokinotekhnika*.)

Automatic apparatus for the measurement of color temperature and light intensity (in German), A. Lennartz, *Funkschau*, 41: 165-167, No. 6, 1969; *Ref. Zh., Fotokino-tekhnikha*, Abstract No. 9.46.94, 1969.

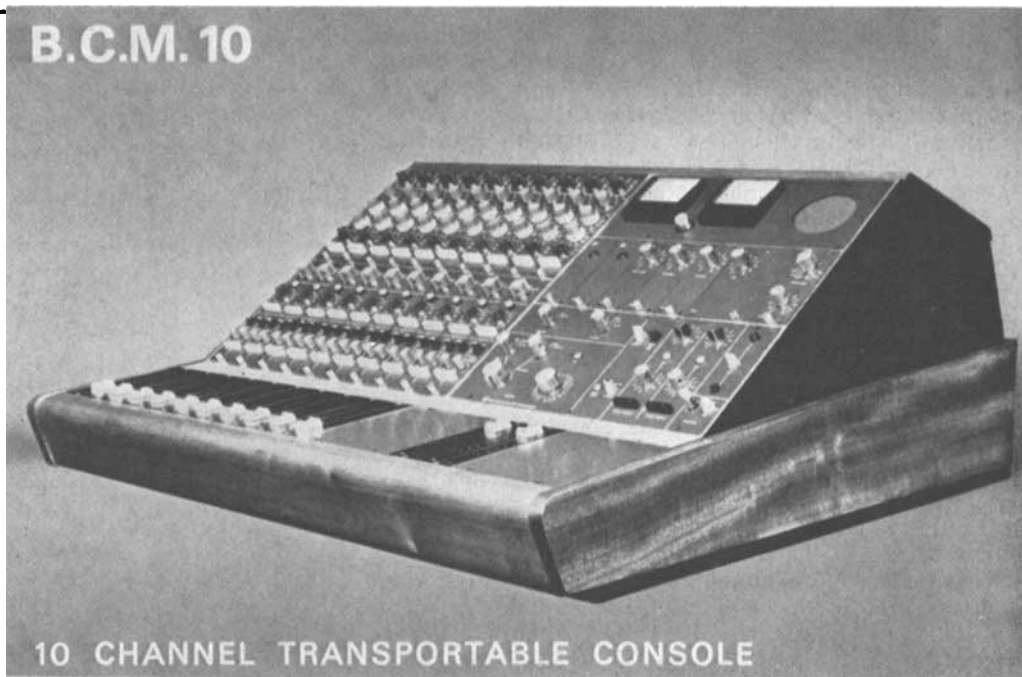
Problems in obtaining high-quality color rendition are discussed in cases where use is made of different types of light source in motion-picture and television studios. The theoretical basis of methods of determining color temperature and of measuring luminous intensity are ex-plaind. On this basis new measuring ap-paratus has been designed. The electrical circuit of the apparatus is described. It consists of two parts, a circuit for measur-ing color temperature and a circuit for the measurement of luminous intensity. For the latter, the apparatus has three ranges: 0-1000, 0-10,000, and 0-100,000 lux. The accuracy of measurement of lu-minous intensity is $< \pm 5\%$. — S.C.G. (Translated from *Ref. Zh., Fotokinotekh-nika*.)

The relation between microphotometric graininess (granularity) and the aperture

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of the microphotometer objective (in Russian), I. I. Breido, K. P. Ermoshina, and V. N. Fomicheva, *Zh. Nauch. i Prikl. Fot. i Kinemat.*, 14: 327-332, No. 5, Sept.-Oct. 1969.

A study has been made of the relation between microphotometric graininess (granularity) of six photographic materials and the aperture of the microphotometer objective. When the aperture is decreased from 0.3 to 0.1, the mean square deviation of the density, σ_D is increased by approximately 30%, the order by granularity of the photographic materials remaining unchanged. The mean square deviation of the coefficient of transmission, σ_T , of some given density changed little as the aperture was reduced—in some cases it increased and in others decreased. The

change of microphotometric graininess with decrease in aperture of the microphotometer objective is connected with the Callier effect.—S.C.G.

New sensitometric apparatus (in Russian), V. N. Anan'ev, G. S. Baranov, A. I. Bepal'chik, V. M. Bondarchuk, M. M. Bubnov, V. N. Glebov, V. V. Elizarov, L. K. Krupenin, N. S. Opechkis, and Yu. B. Rudanovskii, *Konf. teorii technol. procesu fotogr.*, Zakopane, 1968, Cz. 2, S.I, s.a., 52/1-52/8; *Ref. Zh., Fotokinetikhnik*, Abstract No. 8.46.161, 1969.

A description is given of apparatus for the sensitometric testing of photographic materials, including color materials. The apparatus has been designed for and taken up by the Soviet industry. In particular,

descriptions are given of: the TsD FEU color densitometer with photomultiplier (a modification of the TsD-7 with a wider range of measured density in white and filtered light); an analytical densitometer with display of characteristic curves on a cathode-ray tube and numerical read-out; the "Kaskad" programed (punched-card) automatic apparatus for simultaneous processing of up to 16 sensitometric strips with dimensions of 35 × 250 mm or smaller (in the latter case with the use of a special adapter).—S.C.G. (Translated from *Ref. Zh., Fotokinetikh.*)

The VUZORT system of sensitometric measurements for color negatives (in French), E. Bures, *Konf. teorii technol. procesu fotogr.*, Zakopane, 1968, Cz.2, S.I., s.a., 55/1-55/7; *Ref. Zh., Fotokinetikhnik*, Abstract No. 8.46.165, 1969.

A short account is given of the fundamental principles and special points of the system of sensitometry for multi-layer color photographic materials, worked out in the VUZORT institute of Czechoslovakia. Resemblances to and differences from other systems for the same purpose are discussed.—S.C.G. (Translated from *Ref. Zh., Fotokinetikhnik*.)

Characteristic curves of motion-picture materials and the sensitometric variables (in Russian), G. S. Baranov and E. I. Klyuenkova, *Konf. teorii technol. procesu fotogr.*, Zakopane, 1968, Cz.2, S.I, s.a., 53/1-53/8; *Ref. Zh., Fotokinetikhnik*, Abstract No. 8.46.163.

A large amount of data has been obtained to show that, when plotted with co-ordinates $(D - D_0) / \gamma$ and $\log (E/E_i)$, the initial and straight-line portions of the characteristic curves of photographic materials with different emulsions and developed differently coincide well. By putting $D_0 = 0$, $\gamma = 1$ and $E_i = 1$ it is possible to obtain a single "standard" curve from all characteristic curves; and if the speed, S_D , is determined from the characteristic curve from a criterion point D_{cr} , then it can easily be found from S_i of the standard curve by the relation $\log S_D = \log S_i + (D_{cr} - D_0) / g$, where the average gradient is taken for the interval $0 < D < D_{cr}$ on the initial part of the curve, and is taken to be γ on the straight-line portion. The relation between $(D - D_0) \gamma$ and E/E_i is linear over the initial part of the curve, and from the above considerations the coefficient of this relationship is the same for all materials. The relation is also the same for all materials over the straight-line portion in the chosen coordinates (individual differences in D_0 , γ and E_i are previously eliminated in this presentation). The upper non-linear portion of the characteristic curve shows a linear relationship between $\gamma (D - D_0)$ and E_i/E , but here individual differences between materials are large and the coefficient of the relationship differs markedly for different materials.

A device for studying rapid development of sensitometric strips (in Russian), M. M. Ermolaev and Yu. E. Usanov, *Zh. Nauch. i Prikl. Fot. i Kinemat.*, 19: 332-337, No. 5, Sept.-Oct. 1969.

A description is given of a device for

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studying the rapid development of strips from the Soviet-made FSR-41 sensitometer. The measurement of the optical densities of the sensitometric fields during development is carried out in the infrared region of the spectrum. The circuit of the device contains a nonlinear amplifier with small inertia, which serves to measure optical densities of the developed image over the range 0.00 to 2.50. — S.C.G.

Methods of densitometric measurement of the units of the equivalent-gray scale (in Russian), L. K. Krupenin and E. M. Molodtsova, *Konf. teorii technol. procesu fotogr., Zakopane, 1968, Cz.2, S.1, s.a., 56/1-56/5; Ref. Zh., Fotokinotekhnika*, Abstract No. 8.46.168, 1969.

A simplified method is described for the determination of visual equivalent-gray densities for fields close to gray; it is based on narrow-band densitometry in three regions of the spectrum, corresponding to the absorption maxima of the color film. This method is particularly suitable for the experimental determination of printing densities and their subsequent comparison with calculated values in the individual calibration of densitometers. Under conditions of mass measurement of sensitometric strips, especially on automatic densitometers, such calibration must be replaced by choice of a set of light filters for each type of film, while preserving the unit of the equivalent-gray density scale for all types of film. At the same time the conditions for measurement are chosen so that the densities of color negative films are measured in printing density units, and those of color positive films in visual equivalent-gray density units. — S.C.G. (Translated from *Ref. Zh., Kinotekhnika*.)

Sensitometric and resolvometric properties of some photographic materials of a single-stage process (in Russian), B. I. Petrov, P. M. Sobol', and V. A. Veidenbakh, *Zh. Nauch. i Prikl. Fot. i Kinemat., 14: 337-341, No. 5, Sept.-Oct. 1969.*

Sensitometric and resolvometric tests have been carried out on different complementary pairs of photographic materials for diffusion transfer methods of photographic processing of light-sensitive materials. A study has been made of the influence of the factors, which determine the high sensitivity to light of one of the pairs studied, and the considerably greater speed with which a positive image is obtained by means of this pair. — S.C.G. (Translated from *Zh. Nauch. i Fot. i Kinemat.*)

Glycerol and photography, A. A. Newman, *Brit. Jour. Phot., 116: 1106-1107, No. 5705, 1969.*

Glycerol and its derivatives are widely used in photography. An account is given of its uses, past and present. In emulsions it is used to give flexibility, as a hardener, and as a wetting agent. Glycerol can form part of an interlayer, stripping layer or antihalation layer. It is incorporated in processing solutions and is equally useful in non-silver systems, e.g., diazo systems.

A camera for cathode-ray apparatus with translucent viewing screen (in German), H.

Hammerschmidt, *Exp. Tech. Phys., 16: 5-8, No. 1, 1968; Ref. Zh., Fotokinotekhnika*, Abstract No. 8.46.55, 1969.

An account is given of the use of cathode-ray apparatus with a translucent screen, together with a photographic camera. The main difficulty is that, in order to make an observation, the photographic plates must be removed from the path of the beam, and for this the force of gravity cannot generally be used since the screen lies horizontally. In the suggested construction the window with the translucent screen is situated in the upper part of the front wall of the camera, and the magazine with plates is placed during observation in the lower part of the camera, outside the path of the beam. The magazine consists of six cassettes with plates, placed in a mount with an opening at the front. During exposure, the mount, with one cassette pressed against the rear wall by a spring, is raised into the path of the beam. The mount with the exposed plate is lowered, and is raised again with the second plate before the next exposure. A special electromagnetic shutter is used to interrupt the beam. — S.C.G. (Translated from *Ref. Zh., Fotokinotekhnika*.)

The influence of inclined light-rays on the resolving power of light-sensitive materials with low light scatter (in Russian), A. N. Tikhonov and I. A. Chernyi, *Zh. Nauch. i Prikl. Fot. i Kinemat., 14: 373-375, No. 5, Sept.-Dec. 1969.*

In light-sensitive systems with low light scatter, the resulting density lies along the direction of the light rays forming it; this is clearly seen with quasi-parallel rays incident normal to the layer or inclined to it. The decrease in resolving power observed as the aperture of an optical system is enlarged is explained by the increase in the inclination of the peripheral rays of wide-aperture beams. — S.C.G. (Translated from *Zh. Nauch. i Prikl. Fot. i Kinemat.*)

Resolving power and the information capacity of a photographic image (in Russian), G. V. Pankova, P. E. Pesnopevtsev, and I. A. Chernyi, *Zh. Nauch. i Prikl. Fot. i Kinemat., 14: 407-413, No. 6, Nov.-Dec. 1969.*

Several methods of evaluating photographic objectives and cameras by means of the resolving power over the whole of the frame are described. The construction, calculation, and variables of two-dimensional test objects are discussed, as well as a method of integrating the results obtained from tests on objectives intended for cameras giving different sizes of picture (18 × 24, 24 × 36 mm, 6 × 6 cm). Results are given of studies of linear and areal resolving power of 10 objectives of different focal lengths. — S.C.G.

SOUND RECORDING AND REPRODUCTION

The influence of photographic imaging properties on sound reproduction, J. Jespers, *Brit. Kinemat. Sound and TV, 52: 6-11, Jan. 1970.*

Dating back as far as the 1930's, descriptions have been given in various publications of the effect of the properties of

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photographic materials on the quality of optical sound reproduction. In this context various authors have made approaches, either theoretically, accepting some restricting simplifications, or experimentally, dealing with the problem of optimizing the recording conditions in order to attain an image without distortion and with optimum SNR. From then on satisfactory results were obtained in the 35mm and 16mm reproduction systems, especially by the introduction of cross-modulation tests. The introduction of the super 8 size, however, brought some change into this. Following a rather reluctant start, it now becomes obvious that super 8 optical sound recording is beginning to be accepted more and more. It is clear that a super 8 system, even more than a 16mm system, will demand more of the photographic materials as regards the imaging of details. We intend to study these demands for the super 8mm variable area system. For this purpose, use was made of recent concepts such as M.T.F. to define the properties of the photographic materials, the variable area system being analyzed, by means of a computer simulation program in its elements.

First-order gradient microphone based on the foil-electret principle: discrimination against airborne and solid-borne noises, G. M. Sessler and J. E. West, *Jour. Acoustical Soc. Am.*, 46: 1081-1086, (Part I), Nov. 1969.

Design and performance of a simple first-order pressure-gradient microphone based on the electrostatic principle using

foil electrets are discussed. Such a microphone discriminates against airborne noise as well as against solid-borne vibrations transmitted through the microphone case. For airborne sound originating from a spherical sound source positioned close to the microphone, the frequency response is flat within ± 3 dB in the frequency range 0.1 to 3 kHz with a sensitivity of about -50 dBV/ μ bar in the direction of the microphone axis. In a plane sound field, the microphone exhibits the typical first-order gradient behavior, i.e., its sensitivity rises proportional to frequency over most of the mentioned frequency range. At 0.1 and 1 kHz, the plane-wave sensitivity is 30 and 10 dB, respectively—lower than the sensitivity to sound originating from a nearby source, making this microphone a noise-discriminating device for close-talking applications. Rejection of solid-borne vibrations is due to the lightness of the foil-electret diaphragm. Compared with electrodynamic and electromagnetic transducers, the foil-electret microphone responds 30 to 40 dB less to solid-borne vibrations, referred to equal output for airborne sound.

Feed mechanisms and magazines for endless films and tapes (in Russian), V. R. Epshtein, A. N. Arkhimandritova and T. S. Klemper, *Tekh. Kino i Televideniya* 13: 20-26, Sept. 1969.

Feed mechanisms and cassettes for endless loops, used in motion-picture apparatus and magnetic recorders in the USSR and abroad are discussed. A magazine, designed in the Leningrad Optical and

Mechanical Association, for re-recording sound and dubbing motion-picture films is described and the results of tests are given.—S.C.G.

SPECIAL APPLICATIONS

An automatic picture transmission cloud cover receiving station, W. K. Kennedy and J. K. Bargh, *Radio and Electronic Eng.*, 38: 123-130, Sept. 1969.

The automatic picture transmission (APT) sub-system carried on weather satellites transmits, at facsimile rate, cloud cover photographs of the Earth below. Frequency modulation of a carrier in the 137 MHz band transmitted at a level of 5 W is used to give pictures representing an area approximately 2400 km (1500 mi) square with an average resolution of 3 km (2 mi).

Major factors governing the design of a ground station which has been operational since early 1967 are presented. Signal/noise considerations show that a desirable combination is a tracking antenna having a gain of 10 dB followed by a receiving system having a noise figure not greater than 4 dB. Except for a doubling of line frequency a standard wire facsimile is used for final picture print-out.

Many additions to, and refinements of, the basic station are possible. A few of these are outlined and assessed in terms of operational convenience.

The motion-picture camera under water (in Russian), A. S. Massarskii, *Tekh. Kino i Televideniya*, 13: 31-34, Oct. 1969.

The construction of a housing for the underwater use of a standard Soviet motion-picture camera (the Konvas-Avtomat), is described.—S.C.G.

Methodology and examples of the applications of neon cinematography (in French), M. Odier, *Inform. scient.*, 23: 199-209, No. 5, 1968; *Ref. Zh., Fotokinetekhnika*, Abstract No. 8.46.228, 1969.

The technique of kinematic research is described, based on the use of neon micro-lamps attached to the object whose movement is to be studied, and giving 50 (or 100) flashes/s. A fixed camera with its shutter open for the duration of the motion records the displacement of the object, in the form of a trajectory of dots, on a Polaroid-type film. 10 s after the experiment the print allows the motion to be reconstructed on a plane and in time.—S.C.G. (Translated from *Ref. Zh., Fotokinetekhnika*)

Wide-field astronomical camera for the study of extended luminous sources: its implementation (in French), B. Authier, J. Debilly, and M. Viton, *Sci. et Ind. Spat.*, 4: 23-27, No. 11-12, 1968; *Ref. Zh., Fotokinetekhnika*, Abstract No. 9.46.54, 1969.

The camera described was used for the ultraviolet (2300-3200 Å) photography of sources of radiation in the universe, during the launching of the Veronique-61 rocket. The f/1 objective was a Maksutov-Bauers catadioptric system. The optical design of the camera was executed in two constructional variants. The first is a hyperbolic mirror, a correcting meniscus and a spherical mirror. The focus of the



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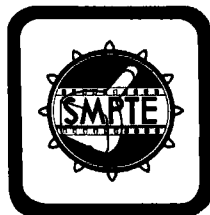
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first mirror coincides with the common center of curvature of the remaining two elements, so allowing for complete correction for astigmatism and distortion. The spectral selectivity of the system is obtained by a coating, transparent to visible light but reflecting the ultra-violet, on the surface of the first mirror. In the second variant a plane mirror or diffraction grating is placed behind the first mirror, so allowing an improved spectral selectivity to be obtained. The light-sensitive material is contained in a special cassette, the construction of which is described in detail.—S.C.G. (Abridged from *Ref. Zhuv., Fotokinetika.*)

Underwater photography, Gomer T. McNeil, *Photogrammetric Eng.*, 35: 1136-1152, Nov. 1969.

Highlights of the report "Optical Fundamentals of Underwater Photography" sponsored by the Naval Photographic Center feature the terms that require definition and standardization in the interest of effective communication for instructional, specification, and operational purposes. The cardinal points of an underwater optical system are presented with particular emphasis on the first and second nodal points that serve as the origins for subtending equal angles in object and image space, respectively. Some photogrammetric considerations are outlined relative to flat and dome windows; panoramic, strip and frame cameras; underwater camera calibrator; and the influence of a variability of the refraction index of an object space of water on the underwater camera and the calibrator.

T/Numbers of endoscopes, J. H. Hett and R. H. Quint, *Phot. Sci. and Eng.*, 13: 210-218, July-Aug. 1969.

Optical constants of a typical cystoscope and a fiber optic gastroscope were measured. Effective T/numbers were calculated and found to be high. Measurements in a projected focal plane confirmed these values. A Bang's nomograph has been modified to represent endoscopic conditions. The responses of an image orthicon, and SEC tube and a vidicon, all corrected for a 10% contrast level in the object field, are plotted on the nomograph.

TELEVISION

Spatiotemporal chromaticity discrimination, Gerard J. C. Van Der Horst and Maarten A. Bournan, *Jour. Opt. Soc. Am.*, 11: 1482-1488, Nov. 1969.

The threshold visibility of uniformly moving colored gratings was investigated. The gratings were equiluminous sine-wave patterns, generated on a color television display. The traveling waves were detected by the subject over a range of three log units of background illuminance, including various spatial- and temporal-frequency combinations. The experiments indicate that no resonance phenomena occur in the spatiotemporal color-discrimination system of the eye. This system probably functions as a low-pass filter. The color coding takes place in much narrower frequency bands than the brightness coding. A regular motion of the pattern never enhances the visibility of the color gratings. The temporal characteris-

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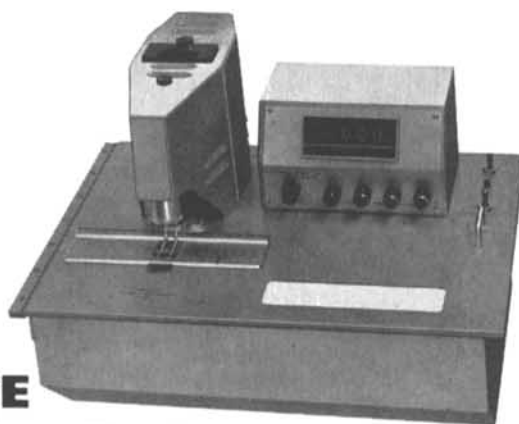
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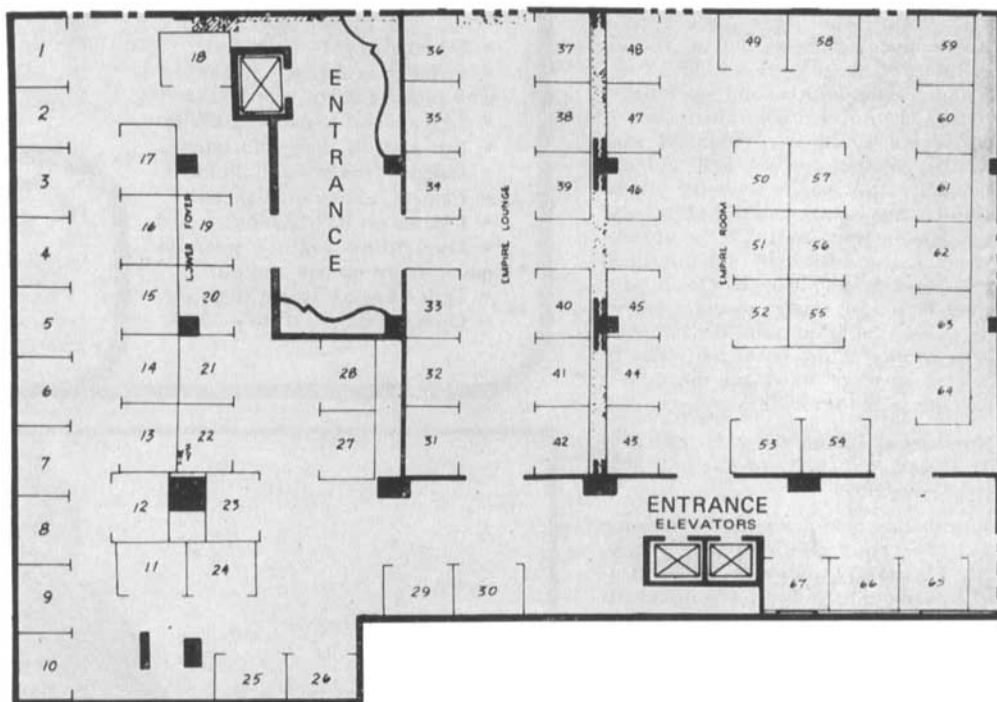
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tion is desirable. Application forms with instructions will be mailed after space orders have been confirmed.

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In recognition of exhibitors' efforts in preparing effective and rewarding displays, the Society will award a plaque to the company selected by the Exhibit Award Committee as having the most imaginative, effective and best-presented exhibit, regardless of size. The presentation will be publicized in the SMPTE Journal.

EXHIBITORS

(Partial List, as of April 15, 1970)

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tographic Instrumentation) Ltd.; Impulsphysik GmbH; L-W Photo, Inc.; Log-Etronics, Inc.; D. B. Milliken; National Camera, Inc.; Optical Coating Laboratory; Photo-Sonics, Inc.; Photosystems Corp.; Quick-Set, Inc.; Red Lake Laboratories, Inc.; Sodern; Thomson-CSF; TRW Instruments; Traid Corp.

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tics of the chromatic-discrimination system show very much resemblance to its spatial qualities. Our experiments show that the threshold chromatic contrast is proportional to the square foot of the illumination. This fundamental relationship can easily be understood from the statistical properties of the photons, absorbed in the differential receptor systems.

Control of gamma in CRT displays using amplifiers with exponential negative feedback, S. L. Cachia, *Radio and Electronic Eng.*, 38: 281-291, Nov. 1969.

It is shown that networks can be produced to correct accurately the effects of the nonlinear transfer characteristics of a cathode-ray tube. The gamma correction required is related to the undesirable non-linearity in mathematical terms and the basic gamma equation evolved. A simple exponential equation can be converted into a gamma equation by the introduction of a linear function and the appropriate constants. A network with the required gamma characteristic is equivalent to an amplifying stage incorporating exponential negative feedback.

Circuits employing semiconductors are presented and discussed and the operational equations and performances are found to compare favourably with the theoretical gamma equation, and to support the theory. Networks employing negative feedback intended for operation at video frequencies call for special design to counteract the effects of gain and phase shift variation at those frequencies and a gamma stage suitable for television applications is presented. Stabilization of the operating point of the gamma stages with respect to temperature and power supply variations is described. Testing a gamma stage involves measurement of phase shift, frequency response and faithfulness of gamma as well as checks for the presence of waveform distortion.

Electronic video recording, F. McLean, *Brit. Kinemat. Sound and TV*, 51: 328-332, Sept. 1969.

Television signals can be recorded with good quality on either film or magnetic tape. The choice is dependent upon many factors, such as the speed with which copies are required, the number of copies, the cost of copies and the degree of complexity permissible in the playback mechanism. Where speed of playback with only a small number of copies is required, video tape has advantages which are very difficult to match with film. Where, however, speed is not so important, the number of copies large and a simple playback equipment is required, film has many advantages. The EVR system has been developed to meet these requirements. The basic ideas originated with Dr. Peter C. Goldmark and his team at the Columbia Broadcasting System Laboratories in the United States. The development of the special films required took place in collaboration with Ilford who also developed the special equipment used in the film printing and processing.

Film recording from the television screen, P. Hansell and R. Morton, *Brit. Jour. Phot.*, 116: 895-897, Sept. 1969.

Equipment and methods for the economical recording of television pictures for educational purposes are described. Methods of synchronization are discussed with particular reference to recording signals derived from helical-scan videotape machines.

Tone reproduction from color telecine systems, S. B. Novick, *Brit. Kinemat. Sound and TV*, 51: 342-347, Oct. 1969.

The factors affecting optimum gamma in color television displays derived from film were investigated.

It was found that the optimum perceived gamma ranged from 1.5, when the picture was displayed with a dark surround, to 1.0 when displayed with a light surround, with intermediate values for dim surrounds. The additional flare-light produced on the face of the display by the ambient lighting, which was used to provide the dim and dark surrounds, provided automatic adjustments of perceived gamma in the right direction but to an insufficient degree.

It is concluded that, since changes of gamma are required when the lightness of the picture surround is changed, it is necessary to standardize the viewing conditions before an optimum system gamma can be set. When an optimum system gamma has been set, for any given telecine and receiver gammas, an optimum film gamma can be evaluated.

Television Comes to Israel, Herbert I. Schiller, *Ed. Broadcasting Rev.*, 3: 45-52, Aug. 1969.

Until recently Israel only had instructional television. The Six-Day War of 1967 demonstrated to Israel's government that a general communications system was needed. Thus in May, 1968 general television was added to the existing instructional television channel. This article contains a description of this new service and its problems.

A new color film television recording process - some aspects of videoprinting, R. J. Venis, *Brit. Kinemat. Sound and TV*, 51: 379-383, Nov. 1969.

Most television pictures seen by the home viewer have been previously recorded. Several recording methods exist, each characterized by its own advantages and disadvantages. Film recording is one method and its main advantages stem from the fact that it is visual images that are stored, rather than electrical signals. Hence, replay is simple and the recording is completely independent of television line, field and color systems. Convenience and easy duplication are other features.

The vidronics film recording system, J. Mulliner, *Brit. Kinemat. Sound and TV*, 51: 393, Nov. 1969.

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