

A Survey of Photographic Instruction, 2d ed., 1960, a résumé of instruction in American colleges, universities, technical institutions and schools of photography, is an Eastman Kodak publication (Pamphlet No. T-17). The pamphlet contains a list of colleges and universities offering courses in photography together with a brief description of the courses offered and also a list of Schools of Photography. This information is based on a survey completed in 1960. Only 1250 replies were received in response to 2100 questionnaires. Of the 1250 schools replying, 400 reported one or more courses in photography; 250 reported catalog courses in other subjects that include instruction in photography; 175 reported catalog courses in audio-visual materials; 30 offer minor credit in photography; 50 offer major credit in photography; 100 offer photography instruction in summer sessions; and 150 reported the employment of one or more full-time photography instructors.

A brief analysis of the survey presented in the pamphlet includes a discussion of certain interesting trends brought out by a comparison of the answers to questionnaires in this survey with the answers received in the survey made a few years ago. Trends noted in analysis include a marked and predictably continuing increase in instruction in audio-visual materials and methods, and also an increasing emphasis on photography in nonphotographic courses, such as the various sciences, medicine, art, etc.

Abstracts

Abstracts from other Journals, chosen for importance and timeliness, are published in the *Journal* from time to time. The greater numbers of these abstracts are translations, chiefly from the U.S.S.R., and made available by the *Kodak Monthly Abstract Bulletin*

The subject areas are grouped below

Cameras and Equipment (except High-Speed)
Cinematography
Color Photography and Color Development
Film and Its Properties
Film Processing (Apparatus and Chemicals)
General
High-Speed Photography and Instrumentation
Printing and Optics
Projection
Sound Recording and Reproduction
Television

CAMERAS AND EQUIPMENT (Except High-Speed)

The Preparation of a Beam-Splitting Block for a Special-Effects Camera (in Russian), L. M. Glotova, *Tekh. Kino i Televideniya*, 5: 53-56, Mar. 1961.

In 1958 the NIKFI Laboratories introduced a traveling-matte technique into the Soviet film studios and produced the TKS-3

camera for special effects, including the traveling matte. The construction of the beam-splitting block used in that camera is described. It is made up of four right-angled prisms, two with an angle of 60°, and two with an angle of 45°, assembled so that a space is left between the two exit (45°) prisms for the passage of the film pack.—S.C.G.

Cameras for Amateur Cinematography (in Russian), N. Panfilov, *Kinomekhanik*, 24-28, Mar. 1961.

Brief descriptions, with tabulated data, are given for a range of amateur 16mm and 8mm cameras available in the U.S.S.R.—S.C.G.

Apparatus for the [Soviet] Cinema Network in 1961 (in Russian), G. Gnevyshev, *Kinomekhanik*, 2-5, Feb. 1961.

A range of equipment for Soviet cinemas at present available and to come into production during 1961 is reviewed.—S.C.G.

At the "Mos'film" Motion-Picture Studios (in Russian), G. Kh, *Tekh. Kino i Televideniya*, 5: 66-67, Mar. 1961.

A bayonet-type mounting for an anamorphic optical system for a motion-picture camera and an anamorphic attachment for projection in use in the Mos'film studios are briefly described.—S.C.G.

Motion-Picture Camera Objectives and the Criterion of Sharpness, A. L. Yarinovskaya, *Tekh. Kino i Televideniya*, 5: 29, Apr. 1961.

A method of defining the quality of an optical image by the criterion of sharpness with the help of edge gradient curves is considered. A quantitative evaluation by this criterion is proposed. The influence of stopping down the objective on the optical and photographic resolving power and on the image sharpness is explained.

The agreement of the results of objective quality determined with the help of optical image assessment by the criterion of sharpness, with the general evaluation of a photographic image is considered.

A Device for Testing the Setting of Objectives and the Position of the Ground-Glass Screen in the "Konvas-Automat" Motion-Picture Camera (in Russian), B. A. Shardin, *Tekh. Kino i Televideniya*, 5: 63, Jan. 1961.

Frame-by-Frame Filming with the Kiev-16C-2 Camera (in Russian), P. A. Degtyarev, *Tekh. Kino i Televideniya*, 5: 65-68, Jan. 1961.

A description is given of the mechanical alterations and electrical circuit used in converting a Soviet Kiev-16C-2 camera for time-lapse cinematography.

Investigation of the Noise of Motion-Picture Cameras and Developing Methods for its Reduction (in Russian), L. I. Zaets, *Trudy NIKFI*, No. 34, 101-109, 1960.

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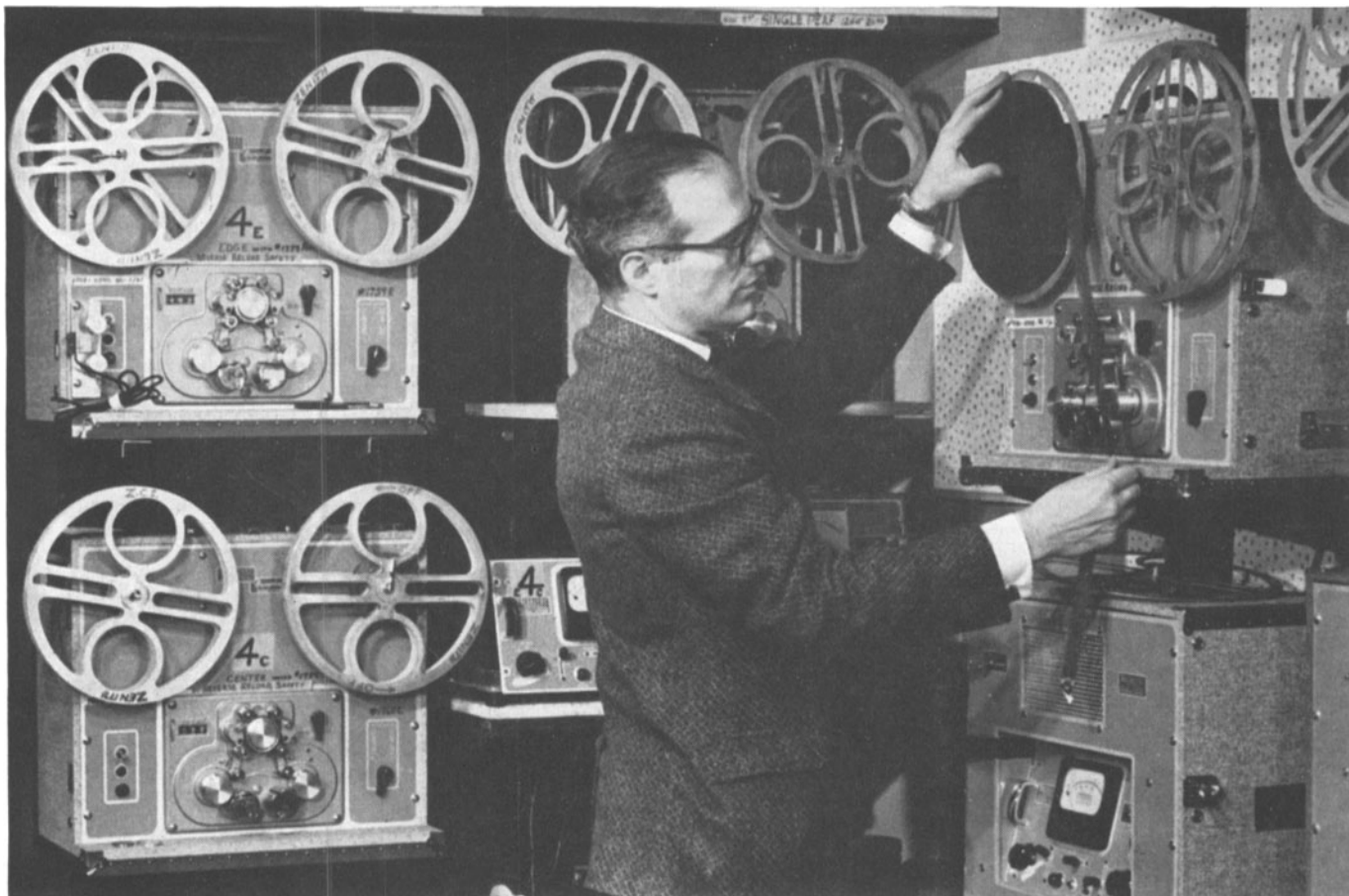
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mounting of the 2KSS motion-picture camera reduced the operation noise from 62 to 27 db. A change in lens design and minimizing the effect of mechanical vibration on the lens will be necessary for a greater reduction of noise.

COLOR PHOTOGRAPHY AND COLOR DEVELOPMENT

The Processing of Color Negative Films (in Russian), Ts. S. Arnol'd and L. P. Krylov, *Tekh. Kino i Televideniya*, 5: 13-19, Mar. 1961.

The new Russian negative color films DS-5 and LN-5, containing masking couplers, required a somewhat different processing from the earlier films which they supersede. The new processing technique worked out for them may also be used with the older films. The new process is very stable, gives more reproducible results and is designed to interfere as little as possible with masking properties of the couplers, to give maximum film speed and to give minimum fog. Sensitometric data are given to show how the processing behaves in practice.—S.C.G.

A New Set of Color Motion-Picture Films (in Russian), A. N. Iordanskiĭ, I. M. Kilinskiĭ and Yu. B. Vilenskiĭ, *Tekh. Kino i Televideniya*, 5: 4-13, Mar. 1961.

New Russian color motion-picture films with improved color separation and re-

solving power are described. The DS-5 negative stock, balanced for daylight and arc light, has masking couplers in the middle, green-sensitive and bottom, red-sensitive layers. There is no colloidal-silver layer, but the top, blue-sensitive layer is dyed with a yellow dye which is removed during processing. The overall thickness of the emulsion layers has been reduced from 27 μ (in the DS-2 film which the DS-5 replaces) to 19 μ . The silver-halide/gelatin ratio has also been altered so as to increase the resolving power. Speed has been sacrificed and the DS-5 is about half as fast as the DS-2.

The corresponding positive film, TsP-7, has a green-sensitive (magenta) layer at the top, followed by the red-sensitive (cyan) and blue-sensitive (yellow) layers. The magenta coupler has been improved. The emulsion layers are dyed to reduce light scatter, the dye being removed during processing. Resolving power has been increased to 200-250 lines/mm.

Other films in the series are the LN-5, a color negative film for tungsten lighting, and the KP-4 duplicating film for use with either negative stock. The films are all made by the Shostinskiĭ factory.—S.C.G.

Points in the Kinetics of Color Development (in Russian), V. I. Usepenskiĭ and N. I. Rodionova, *Zhur. Nauch. i Priklad. Fotografii i Kinematografii*, 6: No. 2, 125-129, Mar.-Apr. 1961.

In color development of gelatin silver-bromide layers containing nondiffusing

color couplers for which the formation of the dye passes through a stage in which a leuco-base is formed, the relations between the density or gamma of the dye image and the duration of development for all concentrations of the couplers, including relatively small concentrations, are expressed by straight lines, while the kinetics of the growth of silver density is expressed, as usual, by a curve with a gradually decreasing gradient.

This type of kinetics of the development of a color image is explained thus: on color development for a dye image, no lowering of the covering power of the dyes occurs on prolonged development, while for the silver image, the photometric equivalent of the silver alters in the appropriate manner.

For couplers which do not give rise to leuco-bases during the formation of the dye, the kinetics of development of the image from the dyes shows for most cases a slowing-down with prolongation of development, and in this respect is similar to the kinetics of black-and-white development.

FILM AND ITS PROPERTIES

Overcoming Being Behind in the Film Quality in a Short Time, E. M. Geller, *Tekh. Kino i Televideniya*, 5: 1-4, Apr. 1961.

A meeting of the Technical Council of the Ministry of Culture of the U.S.S.R., enlarged by the inclusion of representatives of the film factories and other interested bodies, was held on Feb. 6-7, 1961, for the discussion of shortcomings in current Soviet motion-picture film stock. Color films are particularly open to criticism and their improvement has been slow. Black-and-white films are good individually, but insufficient attention has been paid to matching the characteristics of negative, positive and duplicating stocks. Complaints are made of large batch-to-batch variations in properties and the occurrence of mechanical and other defects. Processing is inadequate, as regards both general quality and uniformity.

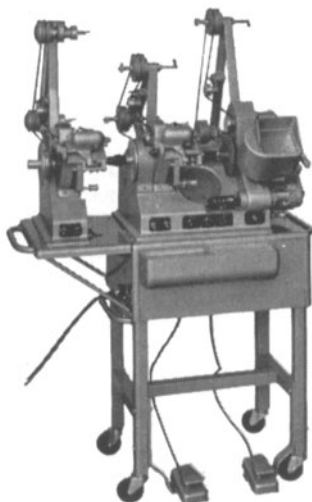
It is considered that insufficient research has been put into the subject by the research institute, NIKFI, and the factories, and that NIKFI has failed to coordinate the activities adequately. The supply of raw materials and semifinished products also comes in for criticism.

A number of measures were adopted and targets set for the rapid improvement of Soviet film stocks.

Immediate Prospects for the Development of the Material and Technological Resources of Kinematography (in Russian), *Tekh. Kino i Televideniya*, 5: 1-6, Jan. 1961.

Plans for the development of the motion-picture industry in the U.S.S.R. are discussed. During 1961 several studios are to be constructed or reconstructed. The production of film of all types is to be raised by 125 million meters over that of 1960; and an improved black-and-white positive stock and new color films, including a color negative with integral masking, are to be introduced. Materials for the imbi-

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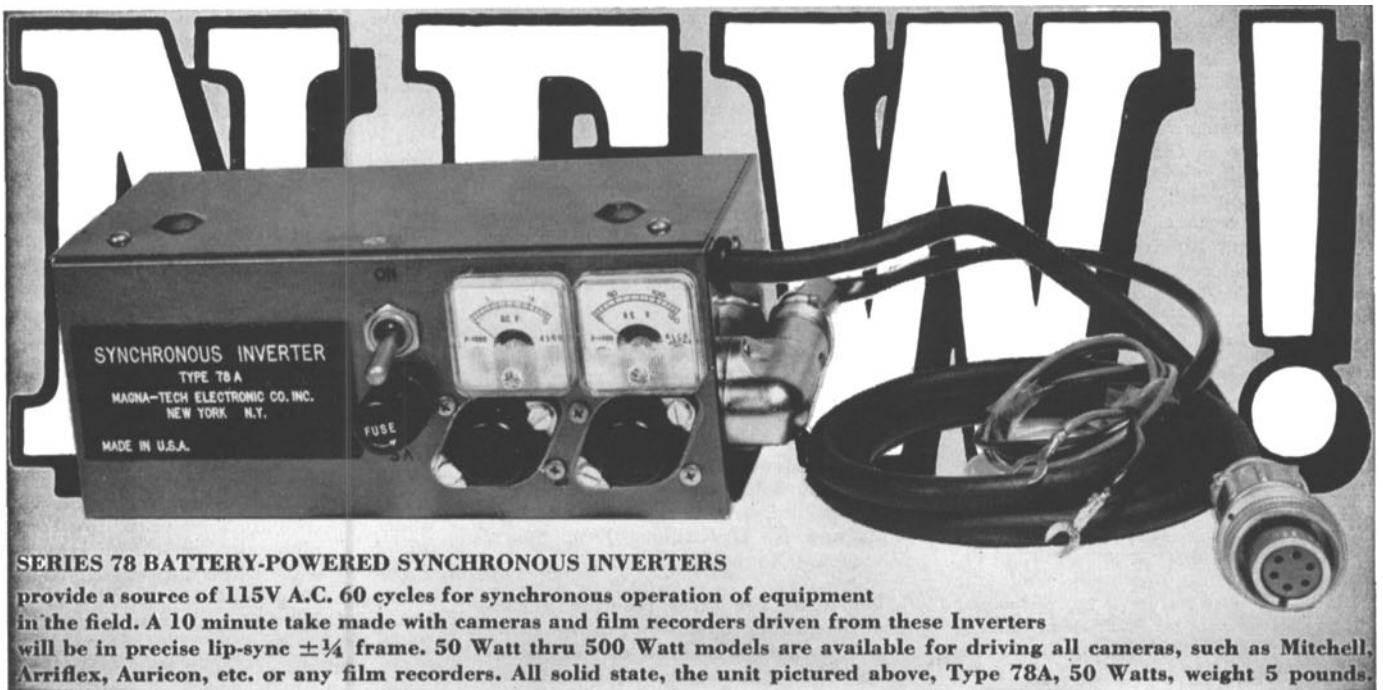
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tion process are being successfully developed. A new matrix and blank film are to be introduced during the year, but the situation is not completely satisfactory and manufacturing methods need to be improved. Printing and processing laboratories are to increase output by the continued introduction of mechanization and new equipment is being produced. More cinemas, of different sizes, are to be built, the larger being fitted out for wide-screen and panoramic projection.

Design of the Instrument and the Method of Measurement of Electric Resistance of a Motion-Picture Film Support and Its Antistatic Coatings (in Russian), A. I. Bukin, A. M. Bolotovskaya, L. G. Gross and B. Ya. Shefelko, *Trudy NIKFI*, No. 37, 123-131, 1960.

The first part of the paper describes the instrument and its operation, while the second part gives results of test of lacquer coatings of the support and a description of the method used. The following conclusions can be drawn:

(1) The maximum error of the instrument, as compared with the standard, is 5.0%. The variation between results in parallel tests of samples of the support, without lacquer coating and the subbing, amounts to $\pm 6.0-7.5\%$, while the same for the subbed support amounts to $\pm 7.5-10\%$.

(2) The instrument can be used in the existing form for research and production inspection.

(3) The best reproduction results are obtained when the instrument is kept at constant temperature and relative humidity of the room.

(4) The instrument can be used for determining the specific surface and volume resistance p_s of the support and motion-picture films up to 10^{16} ohms. It has been determined that the volume resistance depends upon the thickness of the support.

FILM PROCESSING (Apparatus and Chemicals)

Calibrated and Uniform Application of Processing Solutions on a Continuously Moving Film, S. M. Levi, N. G. Maskenkova and N. I. Kirillov, *Tekh. Kino i Televideniya*, No. 12, 18-25, 1959.

The chief conditions ensuring a calibrated and even application of processing solutions on a continuously moving photographic film are examined. Equations show the dependence of the volume of the applied solution on various factors for different types of solution-applying apparatus. The action of wetting agents was studied and conditions are indicated for an even distribution of the solutions on the surface of the film. A study was made of the effect of different wetting agents on the evenness of application of developing and fixing solutions. (From *Referat. Zhur. Khim.*, 1960.)

Application of the 40P-1 Developing Machine to the Combined Processing of 16- and 35mm Films (in Russian), V. Malinskii, S. Leshov, I. Vologodskii, I. Ryabovalov and A. Gribov, *Tekh. Kino i Televideniya*, 5: 63-64, Jan. 1961.

CINEMATOGRAPHY

40 Jahre Deutsche Kinotechnische Gesellschaft im Lichte der kinotechnischen Entwicklung, Dr. Albert Narath, *Kinotechnik* 15: 3-7, Jan. 1961.

Guided by the development of cinematography, the author outlines the history of the Deutsche Kinotechnische Gesellschaft which was established 40 years ago. Four periods of nine years each may be distinguished as the characteristic phases in cine film development. These are the silent film era (1920-1929), the sound film era (1929-1938), the color film era (1938-1947), and the era of magnetic-tape and wide-screen methods which lasted from 1947 to 1956. This is followed by a period characterized by the introduction of electronic devices into the cine art, the development of magnetic image recording and the partial adoption of means and methods originally devised for TV. This subdivision is adhered to also in outlining the history of the Deutsche Kinotechnische Gesellschaft.

GENERAL

Piezoelectric Ceramic Transformers and Filters, Alan E. Crawford, *Jour. Brit. IRE*, 27: 353-360, Apr. 1961.

The development of improved piezoelectric ceramics has enabled these materials to be used in the design of electronic components. Two new devices are described embodying piezoelectric principles of operation and relying on electromechanical resonance to obtain efficient energy transformation. The ceramic transformer provides a high voltage source without involving insulation problems or magnetic fields. The Transfilter is used as a miniature filter or an interstage impedance matching transformer suitable for radio receivers. Both are essentially solid-state in character and possess all the advantages of such systems. They present an entirely new approach to component development and can be considered as forerunners of other devices using similar principles.

HIGH-SPEED PHOTOGRAPHY AND INSTRUMENTATION

The Determination of the Accuracy of Quantitative Interpretation of a Motion-Picture Film (in Russian), A. A. Kukibnyi, *Zhur. Nauch. i Priklad. Fotografii i Kinematografii*, 6: No. 2, 102-07, Mar.-Apr. 1961.

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Errors due to smoothing-out in space are reduced in the case in which the sighting plane is a plane of symmetry of the motions of the bodies, and the planes of their motions are not significantly inclined to the sighting plane of the objective of the motion-picture camera.—S.C.G. (Translation of Author's Abstract.)

PRINTING AND OPTICS

The Transmission of an Image by a Multichannel Light Conductor (Fiber Optics) (in Russian), V. B. Veinberg, V. V. Bogatyreva and L. N. Evanova, *Optiko-Mekh. Prom.*, No. 7, 23-30, 1960; *Tekh. Kino i Televideniya*, 5: 90, Feb. 1961.

A description is given of the principles of multichannel light-conducting elements, some of the results obtained with them are shown and possible schemes for the application of fiber elements are discussed.

The following points are considered: the light transmission of a glass rod and fiber; the transmission of an image through a bundle of fibers; the preparation of light-conducting fibers; flexible fiber bundles; special interlacing and packing of the fibers. A bibliography of 73 references is given. (Translated from *Tekh. Kino i Televideniya*)

PROJECTION

Objective Distortions of Cinematograph Images with Vertical and Horizontal Projection Angles II. The Cylindrical Screen (in Russian), E. M. Goldovskii and S. S. Ryshkov, *Zhur. Nauch. i Priklad. Fotografii i Kinematografii*, 6: No. 1, 53-60, Jan.-Feb. 1961.

The mathematical analysis of distortions introduced into the projected picture by the angle of projection, carried out for a flat screen in Part I (*Zhur. Nauch. i Priklad. Fotografii i Kinematografii*, 5: No. 6, 439-445, Nov.-Dec. 1960), is here extended to the case of the cylindrical screen.

An All-Purpose Motion-Picture Projector for Large-Capacity Cinemas (in Russian), A. N. Karal'nik, *Tekh. Kino i Televideniya*, 5: 31-43, Jan. 1961.

A detailed description is given of the Soviet TKPU-1 motion-picture projector

which is intended for the screening of 35mm films with optical soundtrack and aspect ratio 1.38:1; wide-screen 35mm films with 4-channel magnetic soundtracks and aspect ratio 2.55:1; wide-screen 35mm films with a single optical soundtrack; and 70mm films with stereophonic sound on six magnetic soundtracks.

Czechoslovak Motion-Picture Projectors (in Russian), J. Stanek, *Tekh. Kino i Televideniya*, 5: 74-79, Jan. 1961.

Two Czechoslovak 35mm projectors for cinema use are described. The Meopton-IV is intended for small to medium halls, while the FTP-1 is a more powerful projector for large halls.

Curved Film Gates (in Russian), A. Karal'nik, *Kinomekhanik*, 33-35, Mar. 1961.

A number of reasons are given for preferring a curved gate to a straight one in a motion-picture projector, including the tendency of the film to curve and the curvature of the focal plane of the projector objective. The construction of curved gates is discussed, and Soviet-made projectors which have them are mentioned.—S.C.G.

The Problem of Screen Shape in Large-Capacity Cinemas (in Russian), E. M. Goldovskii, *Tekh. Kino i Televideniya*, 5: 40-44, Mar. 1961.

The design of screens for the exhibition of panoramic and wide-screen films in theaters with seating capacities of 1000-6000 places is discussed.—S.C.G.

SOUND RECORDING AND REPRODUCTION

When the Wide Screen Bursts Forth with Sound, L. Trakhtenberg, *Isk. Kino*, 98-101, No. 3, Mar. 1961

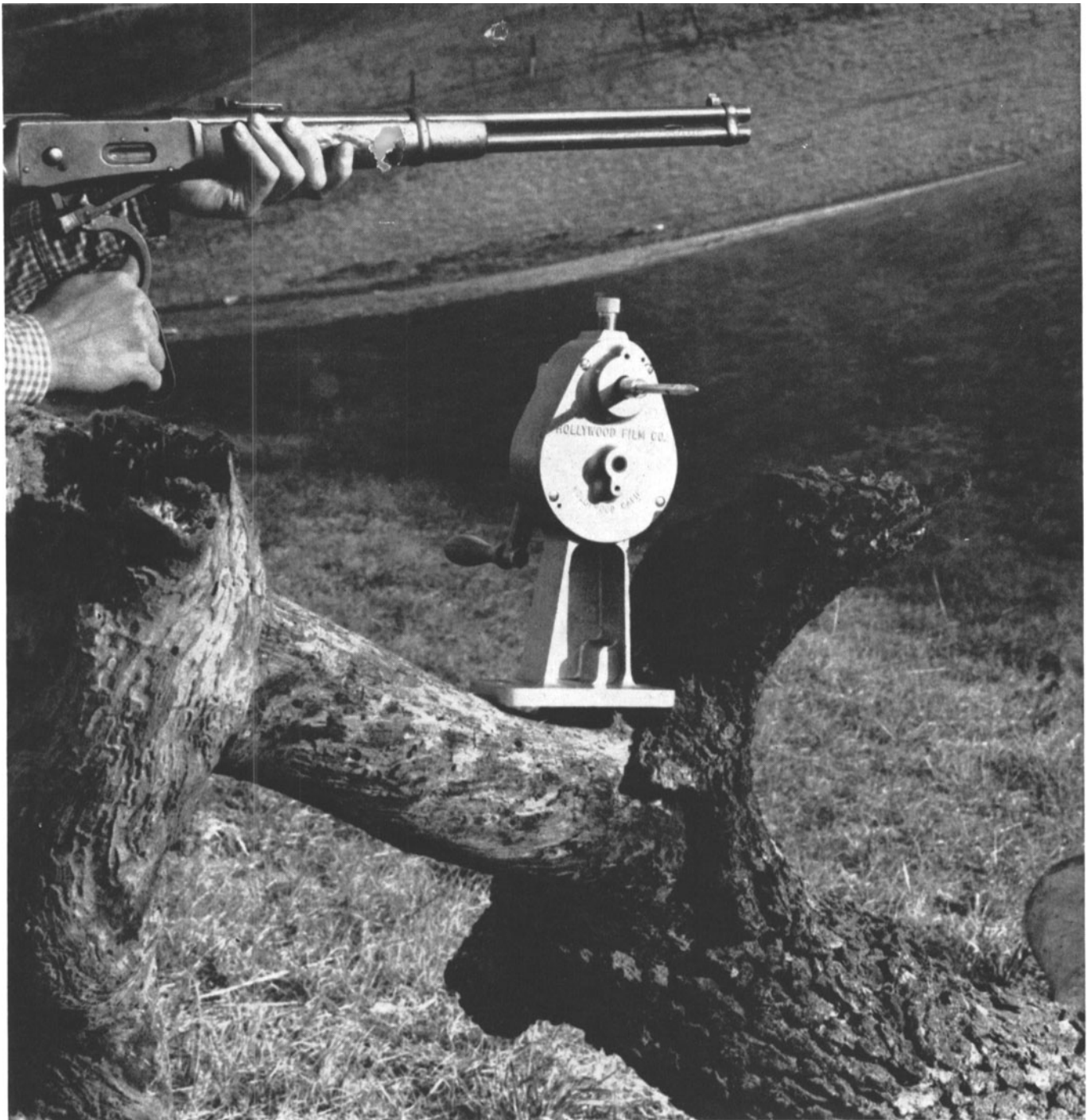
Apparatus for Reproduction of Magnetic Soundtracks from Three Films Synchronized with the Picture (in Russian), M. F. Ottochek and R. I. Glikzon, *Tekh. Kino i Televideniya*, 5: 62, Jan. 1961.

The Kiev motion-picture studios have produced an apparatus for playing three soundtracks simultaneously in synchronism with a picture. It is intended for editing, montage and similar purposes.

Taking of Motion Pictures at Processes of Modification in the Magnetic Structure of Thin Ferromagnetic Films in a Magnetic Field, L. V. Kirenskii, V. A. Buravlkhin and M. K. Savchenko, *Fiz. Metallov i Metalloved.*, 11: 529, 1961.

Optical Reduction of Soundtracks from 35mm Negative onto 16mm Prints (in Russian), S. D. Karipidi, *Tekh. Kino i Televideniya*, 5: 49-53, Mar. 1961.

Soviet motion-picture printers for the optical reduction of 35mm sound originals



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onto 16mm film use a spherical lens instead of the cylindrical lens used elsewhere, and print two of the reduced tracks in parallel. The frequency response and nonlinear distortions of the system are discussed, and recommendations are made for the preparation of soundtracks on 35mm originals intended for reduction to 16mm.—S.C.G.

The Standardization of Magnetic Sound Recording in Amateur Films (in Russian), S. D. Karipidi and L. A. Novgorodtseva, *Tekh. Kino i Televideniya*, 5: 68-70, Jan. 1961.

The NIKFI Laboratories have worked out a standard for 8mm and 16mm films with magnetic soundtrack, specifying the width and position of the tracks and the position of the playback head. It came into effect on Jan. 1, 1961 as GOST 9492-60. The main provisions of the standard are set out and commented upon.

The New Types of Cinematography (in Russian), M. Z. Vyssotski, *Tekh. Kino i Televideniya*, 5: 13-20, Jan. 1961.

The difficulty of installing four-channel stereophonic sound in cinemas has meant that, in the West as well as in the Soviet Union, a large number of cinemas are still without this type of system. Consequently there are two standards for wide-screen film, one with four magnetic soundtracks and a picture 23.16mm wide, and the other with a single photographic soundtrack and

a 21.3mm picture. This causes difficulties, as a film must usually be printed on both kinds of stock. The U.S.S.R. would like to see the adoption of a single, universal film, carrying simultaneously the four magnetic tracks and one photographic track. The smaller perforation at present used with the magnetic tracks is

discussed. Problems of "squeezing" and "squeezing" in anamorphic systems and points arising in 70mm cinematography are discussed.

Finally, the author advocates the use of 70mm film together with an anamorphic system with a coefficient of 1.25-1.3. Such a system is versatile and in addition to being used "straight" can be used with other systems, e.g., three positives for Cinerama-type projection can be made from one "squeezed" 70mm negative.

An Equipment for Automatically Processing Time Multiplexed Telemetry Data, N. Purnell and T. T. Walters, *Jour. Brit. IRE*, 21: 257-274, Mar. 1961.

An equipment is described for processing magnetic tape recordings of frequency-modulated time-multiplexed telemetry data. Details are given of the way in which the input signals are derived and the method by which the recordings are made. The equipment produces two forms of output: analogue graphs on paper film and digital records on punched cards. The performance achieved and the methods of checking this performance are detailed.

TELEVISION

Apparatus for Automatic Examination of Nuclear Photographic Emulsions by the Television Raster Method. Follow-up System, A. E. Voronkov, A. I. Galaktionov, I. D. Murin and L. V. Sukhov, *Pribory i Tekh. Eksp.*, 6: No. 2, 63-86, 1961.

The Aperture Properties of a Motion-Picture Image and Their Influence on the Television Image (in Russian), Z. Novak, *Tekh. Kino i Televideniya*, 5: 20-26, Mar. 1961.

From a selection of 35mm films of suitable subjects, an average curve showing transmission plotted against distance was constructed for the transition across an edge formed by two adjacent densities with a density difference of 1.5. From this an equivalent aperture function was deduced for a motion-picture image. The aperture properties of the motion-picture film in the horizontal direction can be replaced by the characteristics of an equivalent electric circuit, the transition curve with distance being replaced by one with time. It is concluded that the detail rendering of a motion-picture film is poorer than that of a direct television picture. When a film is used as an intermediate stage in a television broadcast, the situation can be improved by aperture correction, the best form of which is discussed.—S.C.G.

The Correction of Color Distortions in a Color Television Image on the Transmission of Motion-Picture Films (in Russian), V. M. Zusmanovich and A. G. Buryakov, *Tekh. Kino i Televideniya*, 5: 33-39, Mar. 1961.

There are two main causes of color distortion when color films are televised: the difference in brightness range of a film compared with a directly televised subject, and, more important, the defective color gradation and separation in the film itself. Electronic masking to compensate for these factors is discussed.—S.C.G.

Concerning the Density of the Recording of Wideband Signals, I. E. Gordon and Iu. P. Drobyshev, *Radiotekhnika*, No. 16: 59-66, 1, Jan. 1961.

Methods of Recording Color Television Programs on Film (in Russian), A. A. Gol'din, *Tekh. Kino i Televideniya*, 5: 21-25, Jan. 1961.

Outlines are given of the Eastman Kodak lenticular-film method of recording color-television programs, and of the system described by Hughes of the Iowa State College. The author's own system (known as LEIS, from the initials of the Leningrad Electromechanical Institute for Communications) is then described. In this a coding unit converts the signals of the three color channels into a brightness signal and two color-difference signals (e.g., R-Y, B-Y), which are recorded on standard black-and-white film by means of ordinary teleciné equipment, and are reproduced, in a similar manner, with ordinary teleciné equipment and a decoding unit which feeds the reconstituted R, G, and B signals to the channels.

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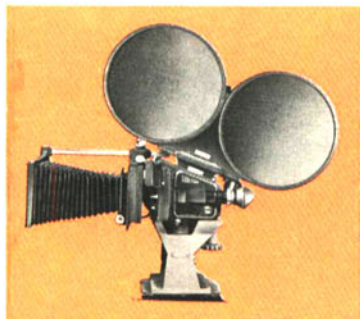
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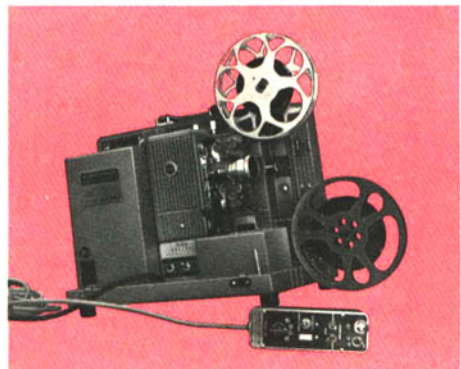
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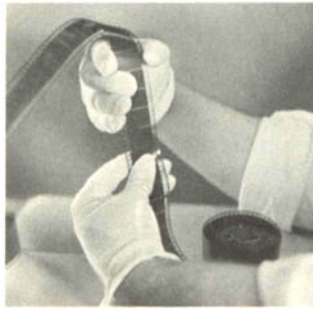
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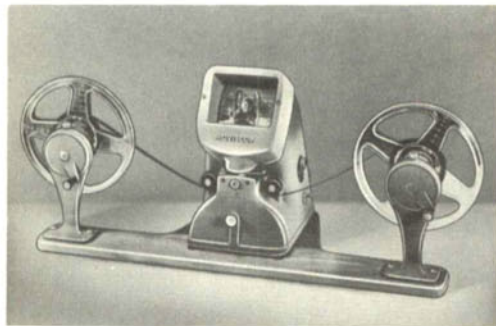
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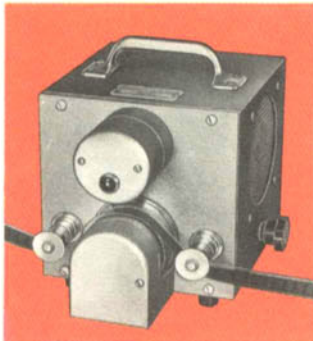
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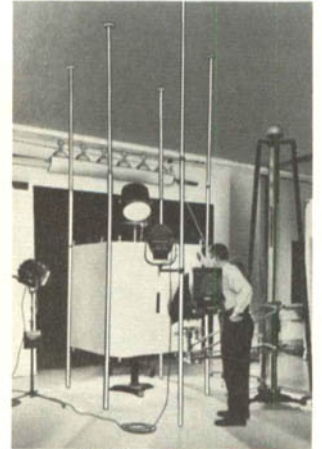
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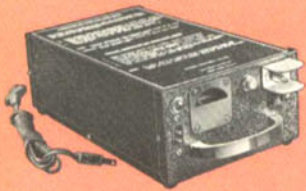
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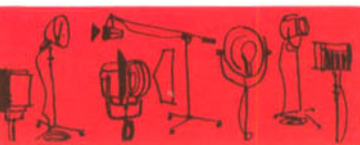
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Transfer Character Between Color Film and Tricolor CRT, H. Genta, S. Kubo, S. Ohe, and T. Sakaguchi, *Chiba Daigaku Kogakuba Kenkyū Hōkoku*, 11: No. 19, 1-19, 1960.

Transfer character from color film to tricolor CRT in the color television system of National Television system Committee was studied. A large amount of undesirable spectral absorption by the dyes employed for color film may affect the transfer gradient and color reproduction qualities. Both experimental and theoretical results on relations between color film images and tricolor CRT images are described for the color printing type positive film and NTSC color television monitor set.

The Standardization of International Microwave Radio-Relay Systems, W. J. Bray, *Proc. Inst. Electrical Engineers*, 108: Pt B, 180-200, Mar. 1961.

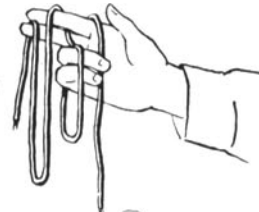
Microwave radio-relay systems using line-of-sight paths now form a substantial part of the international trunk network, both for multichannel telephony and for television. In order that such systems shall provide satisfactory transmission over long distances they must conform with certain minimum performance standards. Furthermore, in order to facilitate the interconnection of radio-relay systems with one another and with line systems, certain common characteristics are necessary. The establishment of links across national frontiers also requires the use of equipment with similar characteristics in each country.

The paper outlines the work of the International Radio Consultative Committee (C.C.I.R.) and the International Telegraph and Telephone Consultative Committee (C.C.I.T.T.) in defining preferred characteristics for microwave radio-relay systems using line-of-sight paths, and discusses the technical and other reasons for the particular values adopted. The need for preferred characteristics for radio-relay systems using tropospheric-scatter propagation is also referred to.

Tables of Horizontal Radiation Patterns of Dipoles Mounted on Cylinders, P. Knight and R. E. Davies, *BBC Engineering Div. Monograph*, No. 35: 5-6, Feb. 1961.

This monograph contains tables of the horizontal radiation pattern (h.r.p.) of a dipole mounted on a cylindrical mast. The tables were calculated on a digital computer and this enabled a comprehensive range of mast sizes and dipole spacings to be covered. The tables of h.r.p.s. should satisfy most requirements arising in the design of vhf. aerial systems for broadcast transmitters. Although applicable to cylindrical masts, they may be used with little error for masts of square or triangular cross-section provided the widths of the mast faces do not exceed 0.5λ and 0.3λ respectively. The tables are intended not merely to give the pattern of a single dipole but also to simplify the calculation of the patterns of arrangements of more than one dipole spaced around a mast; this is achieved by appropriate addition of the contributions of each dipole and an analogue computer has been developed in the BBC Research Department to facilitate this operation.

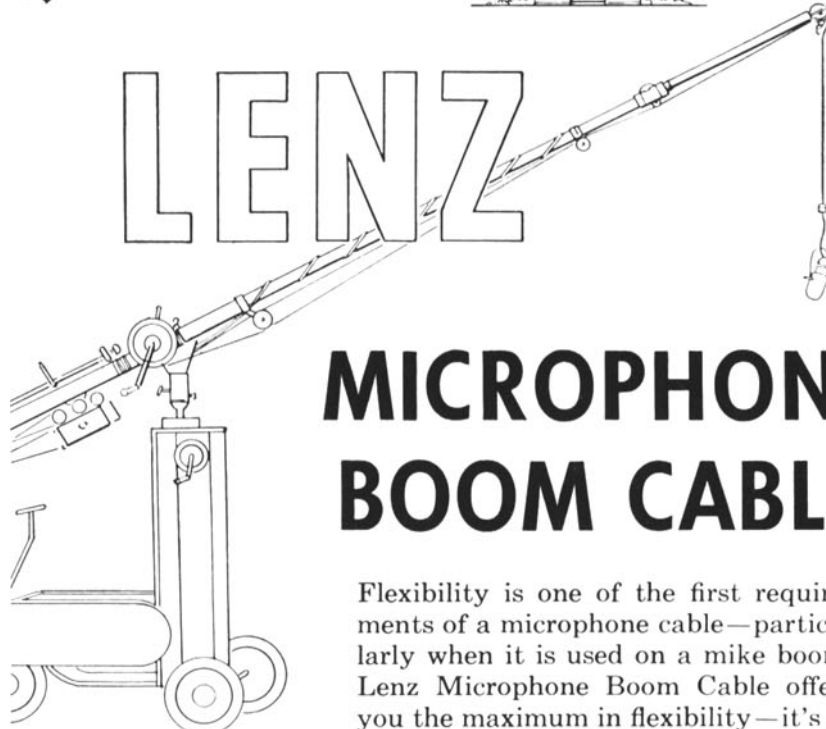
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