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*), published monthly by the Engineering Index, Inc., 33 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:

Acoustics
Color
Film
General
Instrumentation and High-Speed Photography
Laboratory Practice
Lasers
Light Sources
Medical Photography
Miscellaneous Apparatus
Photographic Theory and Materials
Projection
Sound Recording and Reproduction
Television

ACOUSTICS

Acoustic irradiation in cinemas, Gerhard Zimmermann, *Bild und Ton, 18:* No. 9, 258–260, No. 10, 293–297, 1965.

The conditions required for first-class sound reproduction in confined rooms, especially in cinemas, are described with emphasis on noise levels, reverberation time, echolessness and other major influences.—M.C.

COLOR

Color photographic latitude of natural objects (in Russian), A. M. Kuritzŷn, *Tekh. Kino i Televideniya, 9:* 12–19, Aug. 1965.

A brief review is given of the literature on the results of investigations of the latitude (brightness interval) of natural subjects. Data are given from measurements of color photographic latitude of certain natural subjects, obtained with the aid of of the TsYa-1 color brightness meter, together with results from the comparison of the color photographic latitude of the measured subjects with the latitude of color motion-picture negatives.—S.C.G. (Translation of author's abstract.)

Measurement of color appearance, R. W. G. Hunt, *J. Opt. Soc. Am., 55:* 1540–1551, Nov. 1965.

An instrument has been constructed in which colors seen under various conditions of direct viewing by the left eye can be matched for color appearance by adjusting the proportions of a red, green and blue mixture seen by the right eye in the center of an adapting field of 1000 ft-L at a color temperature of 4000 K. The instrument has been used for measuring the appearance of the colors of a chart under various viewing conditions ranging from bright sunlight out of doors to ordinary tungsten room lighting. It was found that adaptation only partially corrected for changes in the color and intensity of adapting illuminations and, in addition, colors lost saturation markedly as the adapting intensity was lowered. It was also found that, if viewed by tungsten light in a dark room, a color reproduction having the same spectral reflectance curves as the original would appear to be appreciably more orange, darker, and less saturated than the original when viewed in sunlight.

Cathode-ray-tube color reproduction in relation to Gaussian spectral parameters, Ojars J. Sovers and Lewis J. Bodi, *J. Optical Soc. Am., 55:* 1643–1650, Dec. 1965.

Experimental spectral distributions are approximated by curves which are Gaussian in frequency. Color coordinates and luminosities are calculated as functions of the Gaussian parameters. This approach is extended to make possible a detailed analysis of the problem of color reproduction in tricolor cathode-ray tubes. Variations in luminosity, color triangle area, and radiance ratios are related to the two parameters defining the Gaussian distributions.

FILM

The most important tasks in the development of narrow-gage cinematography (in Russian), V.G. Komar and N.D. Bernshteĭn, *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 gage films is foreseen for mobile cinemas and small cinemas in country regions. 8mm films are particularly suitable for schools and other teaching purposes.

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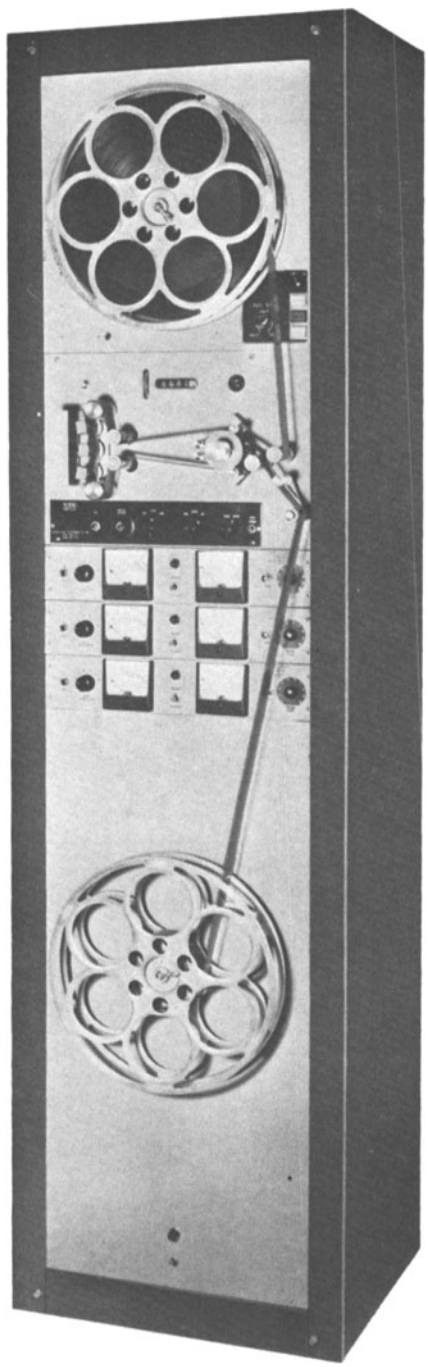

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In the Soviet Union television and the cinema are being developed together and this close connection also has bearings on the use of narrow-gage film.—S.C.G.

The image on reversal motion-picture film (in Russian), E.A. Iofis. *Tekh. Kino i Televideniya, 10:* 59–71, Oct. 1965.

An account is given of the principles of a reversal film, and simple processing instructions are given for reversal motion-picture film.—S.C.G.

Two new black-and-white camera negative films, D.J. Kimbley, *Brit. Kinemat. 47:* 42–44, No. 2, Aug. 1965.

Eastman 4-X Panchromatic Negative Film, Types 5224 (35mm) and 7224 (16mm), is a high-speed material with double the sensitivity of Tri-X but no increase in granularity.

Eastman XT Panchromatic Negative Film, Types 5220 and 7220, is a slow material of very fine grain and high sharpness. Full technical details are given.—G.I.P.L.

GENERAL

Symposium on cinematography under difficult conditions (in Russian), A.Ya., *Tekh. Kino i Televideniya, 9:* 92, Sept. 1965.

A brief account of a symposium held in Moscow, July 1965, in connection with the International Film Festival and UNESCO, is given. The contributions from authors from many countries are listed.—S.C.G.

The principle of velocity modulation dodging, Paul Pargas, *Phot. Sci. and Eng., 9:* 219–227, 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 faceplate of the cathode-ray tube reduces the dodging in areas of high densities. The effects of boundary enhancement (a characteristic inherent in scanning printers) and, briefly, the spot size, persistence, and vignetting, are discussed.

INSTRUMENTATION AND HIGH-SPEED-PHOTOGRAPHY

High-speed cinematograph with Q-switch laser flashes (in English), D. Ebeling, *Z. Angew. Math. und Phys., 16:* 121–122, No. 1, 1965; *Ref. Zh., Fotokinotekh.,* Abstract No. 8.46.233, 1965.

The use of the coherent monochromatic radiation from a ruby laser as a light source is accompanied by two main difficulties: (1) The character of the laser radiation under normal conditions does not allow time resolution to be carried out in the filming of rapid phenomena, and (2) Diffraction and interference patterns formed when the beam falls on uneven surfaces are very complicated. The results of experiments are described which were carried out with the use of a Kerr cell. Fifty intense flashes were obtained equal in duration and amplitude. For photography the use of a drum type camera is suggested with normal film and with monochromatic filters for eliminating illumination by the white light from the subject itself. The advantages of this method are shown in high-speed schlieren photography.—S.C.G. (Translated from *Ref. Zh., Fotokinotekh.*)

The use of a high-speed motion-picture camera for the study of the plastic deformation of metals on explosive loading (in Slovak), A. Schweighofer, *Jemná Mech. a Opt. 10:* 75–76, No. 3, 1965; *Ref. Zh., Fotokinotekh.,* Abstract No. 9.46.257, 1965.

In the study of the mechanism of plastic deformation of a metal under shock tension it was necessary to record the extension of an experimental rod with time and the maximum speed of plastic movement at the position of the greatest constriction of the rod. The time interval ranged from 10^{-3} to 10^{-4} s. Details are given of the Meopta high-speed camera used and the experimental method.—S.C.G. (Abridged from *Ref. Zh., Fotokinotekh.*)

Special points of the SFR high-speed motion-picture camera in dynamic photoelasticity studies (in Russian), L. K. Malyshev *Zh. Nauch. i Prikl. Fot. i Kinemat., 10:* 276—278, No. 4, July/Aug., 1965.

Exact calculation of the resolving power of the Soviet SFR high-speed motion-picture camera in different modes of operation is complicated. Approximate methods of deriving the working characteristics of the camera, and of the electronic flash lamp used with it, are suggested.—S.C.G.

LABORATORY PRACTICE

Operating experience of the VA-1-35/22 and VA-1-32/22 developing machines (in Russian), B. V. Trofimov, L. Sh. Reznikovskaya, and V. V. Sokolov, *Tekh. Kino i Televideniya, 9:* 38–43, Aug. 1965.

The two developing machines referred to are manufactured in Czechoslovakia for the automatic processing of 35mm and 16mm motion-picture film respectively. A number of these machines have been used at Kharkov for the processing of both black-and-white and color film. Their performance is discussed and certain modifications are suggested.—S.C.G.

Rapid access methods in the United States, John H. Jacobs, *Phot. Jour., 105:* 271–292, No. 10, Oct. 1965. (Presented as Paper No. 105 at the Society's Technical Conference in Los Angeles.)

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 electrophotography, reference is made to some recent developments which could lead to a wider use of this technique in rapid-access applications.

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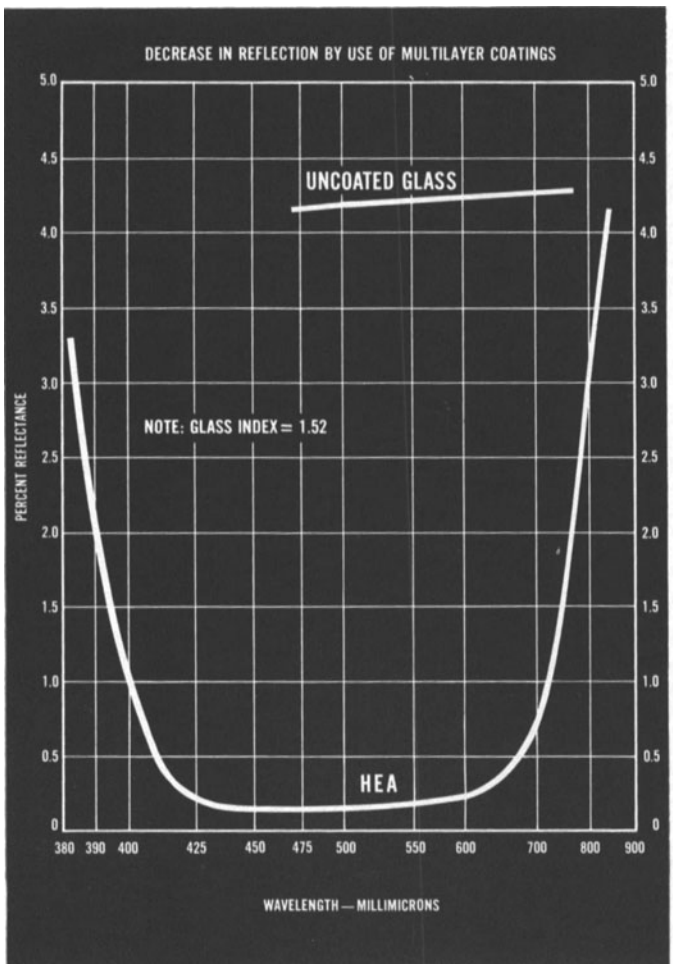

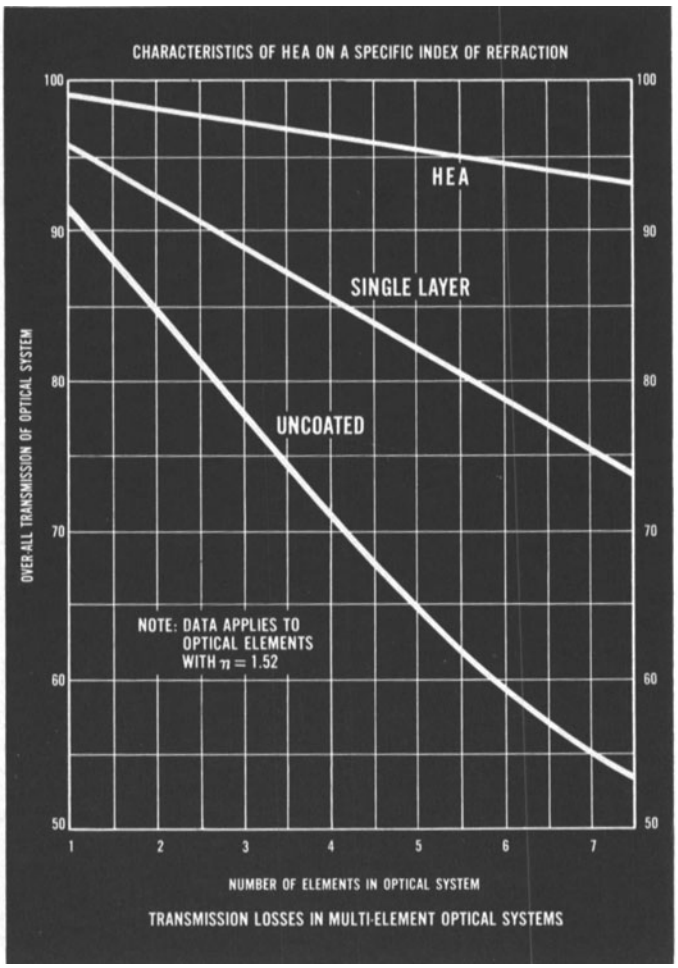

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The improvement of non-actinic lighting in the processing of black-and-white positive film (in Russian), L. Yu. Reshilov, *Tekh. Kino i Televideniya, 9:* 25–34, May 1965.

For safe lighting in the processing of the Soviet MZ-3 motion-picture negative film, the wavelength range 575–595 mμ 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 mμ, 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.

LASERS

Laser-illuminated photooptical instrumentation, George L. Clark, *SPIE Jour., 3:* 214–218, No. 6, Aug./Sept. 1965.

The characteristics of the laser give it a unique potential value in areas of optical instrumentation which require short light pulses of high intensity. A solid-state laser may be operated in pulses 10 to 20 ns in duration with intensities far in excess of that required for most photooptical instrumentation applications. The temporal coherence of the laser eliminates problems due to chromatic aberrations in the optical system and also permits the experimenter to discriminate against light emitted by by the experiment itself.

LIGHT SOURCES

New light sources and associated optical systems for theater and television, T. M. Lemons and R. E. Levin, *Jour. IES,* 637–649, Nov. 1965.

Recent developments in the lighting industry offer the opportunity for a revolution in theater-television equipment. The established workhorses have met the performance parameters, but the inherent limits of their optical systems leave room for much improvement. New lamp developments, especially the quartz-iodine lamp, offer the means of effecting the revolution. The characteristics of these lamps are well suited to theater-television application. Misunderstanding and misuse of the lamps, however, can be detrimental to their acceptance. New concepts in optical systems use the characteristics of the new lamps to the best advantage. The revolution in theater-television equipment will result from these new light sources and optical systems.

Possible indices of the technical and economical efficiency of motion-picture projectors with different light sources (in Russian), T. V. Derbisher. *Tekh. Kino i Televideniya, 10:* 60–63, Oct. 1965.

An attempt is made to evaluate the technical and economic efficiencies of lighting systems with different light sources. Projectors with xenon lamps are shown to have advantages in this respect.—S.C.G. (Translation of author's abstract).

Professional aspects of the quartz-iodine lamp, M. Forman, *Brit. Kinemat., 47:* 94–99, No. 4, Oct. 1965.

The construction of the quartz iodine lamp is described and the development of lighting units using the lamp is reviewed. ColorTran Industries Ltd. have developed two new lighting units, both of which have variable beam lamps. The first has an intensity ratio of about 20 to 1, and gives 30% higher intensity at the sides of the lighted area, giving uniform illumination, and is twice as efficient as an ordinary tungsten bulb with Fresnel lens. A new reflector has been designed for the standard 2 kW fitting to give a second unit for floodlight use only. The lamp is placed closer to the lens, and efficiency is increased by 56%. By using such improved equipment to light a film set, four times the intensity of light was obtained while the current consumption was reduced from 900 to 280 A. Three designs for new lamps by ColorTran Industries are also described.—N.W.

MEDICAL PHOTOGRAPHY

Cinematography in endoscopy: simplified technical data (in French), P. Chevet. *Rev. méd. Internat. Photo Cinéma et Télévis. 3:* 142–147, No. 4–5; 1964; *Ref. Zh., Fotokinotekh.,* Abstract No. 9.46.248, 1965.

Problems connected with the use of cinematography in endoscopy and requirements of the apparatus are discussed. Because of their lower price, 8mm cameras are preferred, but for obtaining images of high quality the 16mm camera should be used. The use of 9.5 film is made difficult by the absence of an appropriate international standard. In endoscopy the lens stop is not altered, since the diameter of the exit pupil is constant at 2mm. The exposure depends on the taking frequency which is generally 16 frames/s. With 8mm film an objective of focal length 25mm and a film with a speed of 40 ASA are most suitable. With 16mm film 32mm and 40mm focal-length objectives are used. Basic requirements for cameras are: a mirror viewfinder, a revolving turret for rapid change of objective, an accurate frame-counter, good frame stability, variable film-transport speed, and ease of servicing.—S.C.G. (Translated from *Ref. Zh., Fotokinotekh.*)

MISCELLANEOUS APPARATUS

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

A brief description is given of a device for printing footage numbers on negative film for editorial purposes.—S.C.G.

Broad tooth sprockets for 35mm perforated film, *BSI News,* Dec. 1965.

16-tooth intermittent, and 16-tooth, 24-tooth, and 32-tooth feed, soundhead and hold-back sprockets for use with both cellulose nitrate film and cellulose acetate film. Essential dimensions to achieve accurate engagement with film, minimize film wear, and provide satisfactory visual performance; recommended dimensions for form of teeth.

For motion-picture techniques this type of sprocket is obsolescent and for future practice in cinematograph projectors and equipment, "universal" sprockets conforming to B.S. 3946 are recommended.

A graphical-analytic method for the calculation of pulldown sprockets (in

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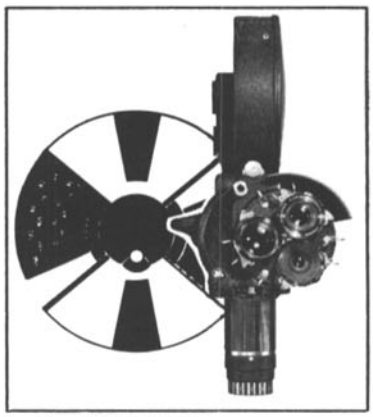

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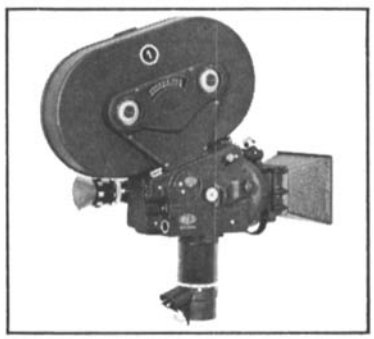

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Russian), G. Yu. Prosvirnin. *Tekh. Kino i Televideniya, 10:* 44–53, Oct. 1965.

A combination of analytical and graphic methods for the calculation of pulldown sprockets with teeth with profiles of evolution is simpler than either method, but is not so accurate as the analytical. It is, however, sufficiently accurate for engineering purposes. A similar method can be used for profiles which are not curves of evolution. Nomograms are given for use with a method worked out by the Leningrad Institute of Motion-Picture Engineers.—S.C.G.

Universal sprockets for 35mm perforated film, *BSI News,* Dec. 1965.

16-tooth intermittent, and 16-tooth, 24-tooth and 32-tooth feed, soundhead and hold-back sprockets. Essential dimensions to achieve accurate engagement with film, minimize film wear, and provide satisfactory visual performance; recommended dimensions for form of teeth. Suitable for Type C.1870 film and film having perforations 0.078 x 0.078 in. or 0.110 x 0.078 in.

PHOTOGRAPHIC THEORY AND MATERIALS

Resolution limitations of lensless photography, George B. Parrent, Jr. and George O. Reynolds, *SPIE Jour., 3:* 219–220, No. 6, Aug./Sept. 1965. .

The resolution requirements for imagery by hologram techniques are given. The case of folding in the reference beam at an angle is treated and the resolution is shown to depend both on the angle of the fold and the film used. In cases where magnification is obtained (i.e., when spherical waves are used) it is shown that magnification is obtained only at the cost of reso lution. The significance of these results on the field of lensless photography is discussed.

A new motion-picture camera viewfinder (in Russian), L. G. Gol'shtein, *Tekh. Kino i Televideniya, 10:* 35–37, Oct. 1965.

Some possible schemes for motion-picture viewfinders using fibre optics are discussed. A short description is given of an experimental form of a flexible viewfinder designed and made at the Lenfilm Studios. —S.C.G. (Translation of author's abstract.)

The use of contemporary materials in cinematograph engineering, W. J. Raymont, *Brit. Kinemat. 47:* 88–93, No. 4, Oct. 1965.

Increased producitivity in cinematography requires improved machinery. Criteria for good performance of machine components are given. The physical properties and possible uses of plastics, stainless steels and heavy metals are reviewed.—N.W.

Nonsynchronous filming from a kinescope screen (in Russian), A. N. Usikov, *Tekh. Kino i Televideniya, 9:* 45–46, Sept. 1965.

Following an analysis of the formation of bands on a motion-picture film taken from a kinescope without synchronization, curves of exposure time against shutter aperture angle are constructed for different taking frequencies, and directions are given for determining whether a given camera can be used for nonsynchronous filming. Alternatively, if the shutter aperture is adjustable the appropriate setting can be found.—S.C.G.

Film animation by computer, E. E. Zajac, *New Scientist, 29:* 346–349, No. 482, Feb. 10, 1966.

By feeding a cathode-ray tube with data from a computer it becomes very easy to make animated motion pictures illustrating a mathematically complex sequence of events. The technique has great potential, in enabling research workers to visualize the results of computation and in preparing educational films (author's abstract).

Holograms: their properties and uses, Emmett N. Leith and Juris Upatnieks, *SPIE Jour., 4:* 3–6, No. 1, Oct./Nov. 1965.

Since the recent demonstrations of high-quality three-dimensional imagery possible uses for this technique have been explored. In addition, many other long-proposed applications cover a wide range, from x-ray microscopy to communication transmission and from interferometry to reconnaissance. Applications are summarized and their attainability commented upon.

Advantages and problems of coherence as applied to photographic situations. Brian J. Thompson, *SPIE Jour., 4:* 7–11, No. 1, Oct./Nov. 1965.

The advantages of narrow spectral width associated with high-energy density make the use of lasers attractive for many conventional photographic situations. The effects of both spatial and time coherence on such photographic operations as contact printing, enlarging, etc., are discussed. The use of coherent light allows a number of unconventional photographic applications to be pursued. The most popular of these at present is the hologram.

An investigation into the attainable picture sharpness in copying different motion-picture formats (in German), W. Wöhle. *8. Internation. Kolloqu. Tech. Hochschule, 1963, 4, Teile.*, Ilmenau, 495–501; *Ref. Zh., Fotokinotekh.*, Abstract No. 9.46.127, 1965.

The evaluation of image sharpness on contact printing has been carried out by the method of the modulation-frequency function. The resolving power in the center of the frame on contact printing of a test object ($R = 100\text{mm}^{-1}$), obtained on film with a high resolving power, is equal to 59.5mm^{-1}. According to the modulation frequency function the expected resolution is 62.5mm^{-1}. On printing with optics which do not distort the modulation frequency function, $R = 78\text{mm}^{-1}$. On printing on ordinary motion-picture film, comparison of the ideal contact copy and one obtained with non-distorting optics shows that with $R = R_g = 31\text{mm}^{-1}$ (limit of resolving power of the eye), a 24% improvement is observed; with the use of an optical

printer which distorts the modulation frequency function the effect does not exceed 17%. The use of ultrarapid film for shooting gives a gain in contrast of 26% with $R = R_g$ and non-distorting optics; distorting optics lower the effect to 19%. In the case of printing with anamorphotic optics ($\beta_{hor.} = 0.588$ and $\beta_{vert} = 1.176$) decreased sharpness is obtained over a vertical frame, and an improvement over a horizontal frame. On printing from a 70mm negative with anamorphotic optics in the printer, an insignificant decrease of sharpness over the vertical is observed, and a significant improvement over the horizontal.—S.C.G. (Translated from *Ref. Zh., Fotokinotekh.*)

Interferometric vibration analysis by wavefront reconstruction, Robert L. Powell and Karl A. Stetson, *Jour. Optical Soc. of America, 55:* 1593–1598, No. 12, Dec. 1965.

A study of the Leith-Upatnieks hologram for the time average of the coherent wavefronts scattered from a vibrating object is reported. The image reconstructed by the hologram is found to contain a system of interference fringes which map contours of constant vibration amplitude, this providing a method of analysis of the vibration of objects with arbitrary surfaces. Experimental results are presented and interpreted for a simple periodic vibration.

PROJECTION

The permissible angles of inclination of the projection of a stereoscopic motion-picture image (in Russian), A. N. Shatskaya, *Tekh. Kino i Televideniya, 9:* 23–28, July 1965.

A theoretical and experimental analysis is given of the determination of the permissible angles of inclination of the optical axis of motion-picture projectors in different forms of stereo projection. Formulae are obtained for the calculation of the angles of stereo projection which are the maximum permissible both in relation to the physiology of stereo perception, and also in relation to the absence of noticeable

distortions of the subject photographed. Experiments are described, the results of which agree with calculations from the formulae.—S.C.G. (Translation of author's abstract.)

SOUND RECORDING AND REPRODUCTION

Frequency characteristics of the transformation of a stereophonic soundtrack into a monophonic track (in Russian), G. K. Klimenko, *Tekh. Kino i Televideniya, 9:* 6–11, July 1965.

The distortions which arise from the electrical summation of the channels comprising a stereophonic signal are described with the aid of the frequency characteristics of the transformation of a stereophonic soundtrack into a monophonic track. The properties of such characteristics are analyzed.—S.C.G. (Translation of author's abstract.)

The transformation of a multichannel stereophonic soundtrack into a monophonic track (in Russian), M. Z. Vŷsotskiĭ and Yu. M. Orlov, *Tekh. Kino i Televideniya, 9:* 1–5, July 1965.

Some points are discussed in the transformation of a multichannel stereophonic soundtrack into a single-channel (monophonic) track, required for printing wide-screen and ordinary types of wide-gage films and de-anamorphotized wide-screen films released with photographic soundtracks.—S.C.G. (Translation of authors' abstract.)

The preparation of soundtracks for wide-screen and ordinary types of wide-gage films (in Russian), E. V. Nikul'skiĭ, *Tekh. Kino i Televideniya, 9:* 26–32, Aug. 1965.

A discussion is given of technological schemes for and some points connected with the preparation of original magnetic recordings for wide-screen and ordinary types of wide-gage (i.e., 70mm) films.—S.C.G. (Translation of author's abstract.)

Magnetic soundtrack on 16mm film (in Russian), *Tekh. Kino i Televideniya, 9:* 29–37, Sept. 1965.

The question of providing 16mm film prints with magnetic sound on a mass-production basis in the Soviet Union is discussed in the following sections: **Improving the quality of magnetic soundtracks,** S. S. Lysova and L. Yu. Rishelov; **The production of 16mm film prints with magnetic soundtracks,** V. V. Sokolov and B. V. Trofimov; **16mm film prints with magnetic soundtracks,** I. V. Borisenko and E. P. Kuritsina.—S.C.G.

Integrating the use of film and tape in sound recording, N. Leevers, *Brit. Kinemat. 47:* 24–31, No. 2, Aug. 1965.

Cine-sound recordings on unperforated magnetic tape are synchronised by means of a control track on the tape. Six control-track formats are in use: Pilot-tone, Neopilot, Electronicam, Perfectone, BBC, and Synchropulse. The essential and desirable features of a mobile recorder are listed. One of the requirements of the newer production techniques is the recording of long sequences during which a number of cameras may be used, intermittently, and in which the sound recording is the only continuous record. A system is described in which each camera codes its own film by pulse marks exposed in the soundtrack area. The pulse is provided by a common generator. The sound record carries corresponding pulse recordings together with identity marks corresponding to any cameras running at a particular time.—G.I.P.L.

TELEVISION

The possibilities of NTSC color transmission with additional reference transmission, Norbert Mayer, *Television Soc. Jour., 11:* 68–73, No. 3, July/Sept. 1965.

A small carrier of special nature is added to the NTSC signal in order to obtain an Additional Reference Transmission (ART). In the receiver, this additional carrier is separated from the chrominance signal by the aid of a delay line and is then used as a subcarrier in the demodulators. For reception either an NTSC-receiver evaluating the normal burst or a special receiver with a delay line may be used. The NTSC transmission is thereby completely insensitive to differential phase, as far as the ART receiver is concerned.

The performance of such a conception was investigated in detail. The ART-receiver shows the same sensitivity to flat noise between coder and decoder as the normal NTSC-receiver. The sinusoidal interference sensitivity is also the same. The compatibility is slightly worse compared with NTSC as it is in the SECAM and PAL systems. Judging from first results, the ART reception appears to be somewhat less sensitive to multichannel reception compared with the normal NTSC reception. Further work has indicated simpler possibilities to evaluate the average differential phase error of the transmission path and to control by this the chrominance demodulation. In this case the receiver does not need the delay line, but a synchronized switch only.

Subjective quality of color television pictures impaired by gain and delay inequalities between the luminance and chrominance channels, J. W. Allnatt, *Proc. IEE, 112:* 1819–1824, Oct. 1965.

Using a previously proposed quality-grading method, tests have been made of the effects of gain and delay inequalities between the luminance and chrominance channels of a 625-line NTSC-type broadcast color-television system. Fifty per cent favorable opinions are obtained with pictures impaired by a gain inequality, expressed as the error in chrominance-channel voltage gain of ±56%; 95% favorable opinions are obtained with a gain inequality of ±36%. For delay inequality the corresponding values are ±350 and ±210 ns, respectively.

F.M. systems of exceptional bandwidth, M. O. Felix, *Electronics Record* (*Proc. IEE, 112:* 1659–1668, Sept. 1965).

Until the advant of television tape recorders, the only frequency-modulated systems in use were ones in which the frequency spectra of the modulating and modulated signals were well separated.

In television tape recorders, these bands are not merely adjacent but actually overlap. The analysis of such systems of "exceptional bandwidth" emphasizes three points: (a) The instantaneous frequency and amplitude of a waveform cannot be uniquely defined; the approximations involved become serious in such systems. (b) It follows that one cannot synthetize a distortionless FM system. It is therefore important to distinguish the implicit distortion from that which may be avoided. (c) These systems are very sensitive to amplitude distortion and, especially to second-order components. Finally, the paper discusses the practical design of modulators and demodulators.

Combination of film pulldown time with the afterglow of the luminophore in television image recording (in Russian), P. G. Tager, *Zh. Nauch. i Prikl. Fot. i Kinemat., 10:* 294–296, No. 4, July–Aug., 1965.

In order to calculate the best combination of pulldown time and afterglow of the screen, in the recording of television images on film, a computer program has been used. The results are presented graphically and discussed.—S.C.G.

Improvement of a motion-picture channel operating with a vidicon (in Russian), I. I. Shelfis, V. F. Rodionov, A. A. Sokolin, and K. O. Zagorovskiĭ, *Tekh. Kino i Televideniya, 9:* 8–16, June, 1965.

Methods are discussed for improving the quality of the transmission by television of motion-picture films, based on the use of a complex antinoise correction, aperture correction (with automatic regulation of the degree of correction depending on signal swing) and a gamma-correction for the automatic control of the level depending on the density of the film.—S.C.G. (Translation of authors' abstract.)

Continuous-tone characteristics of a television image in the transmission of a negative film (in Russian), A. V. Vykhodets, *Tekh. Kino i Televideniya, 9:* 34–40, July 1965.

An expression is derived for the gradient of the continuous-tone characteristic of a television image in the tele-cine projection of motion-picture negatives. The problem of corrections to this characteristic is discussed.—S.C.G. (Translation of author's abstract.)

Project Ranger television system, B. P. Miller, *RCA Rev., 26:* 424–449, No. 3, Sept. 1965.

The function of the Ranger television system was to transmit close-up pictures of the lunar surface to Earth. The philosophy, design, and performance of the television system are described. The television system consisted basically of six slow-scan vidicon cameras whose outputs were used to frequency-modulate two 60-w transmitters. The two signals, approximately 1 mc apart, were radiated by a high-gain parabolic antenna. The ground receiving station, located at Goldstone, Calif., used an 85-ft parabolic antenna. Several high-dfinition photographs of the lunar surface are included to provide a complete description of the performance of the system.

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