Abstracts of Papers From Other Journals

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The subject areas are grouped below:

Cameras
Cinematography
Data Processing
General and History
Holography
Laboratory Practice
Lasers
Optics
Photographic Theory and Materials
Projection
Sound
Television and Video
Tests, Measurements and Analysis

CAMERAS

The resolving power of motion-picture cameras (in Russian), G. N. Troitskiĭ, *Tr. Leningrad. Inst. Kinoinzh.*, 113-18, No. 27, 1975.

A method for determining the resolving power of certain types of 35mm professional motion-picture cameras used in the film studios of Moscow and Leningrad, has been analyzed, and the results are given. — S.C.G. (Translated from *Ref. Zh., Fotokinotekhnika*)

The measurement of noise level of motion-picture cameras (in Russian), Ya. Vakhitov and I. K. Nechaev, *Tekh. Kino i Televideniya, 20:* 9-14, No. 4, 1976.

Computational and experimental methods for determining noise level are discussed. With the aid of a computer it is shown that the levels of sound measured by noise meters using all types of correction do not agree with the noise levels. This conclusion is confirmed by psychoacoustic measurements of noise levels of some types of motion-picture cameras. - S.C.G. (Translated from *Tekh. Kino i Televideniya*)

The accuracy of different methods of testing frame unsteadiness in a professional motion-picture camera (in Russian), B. N. Tarasov. *Tr. Leningrad. Inst. Kinoinzh.*, No. 27, 1975.

A qualitative comparison has been made of the different methods of measuring the accuracy of film transport and frame separation used in Soviet motion-picture studios. — S.C.G. (Translated from *Ref. Zh., Fotokinotekhnika*)

An experimental determination of frame unsteadiness in motion-picture cameras used in film studios (in Russian), S. M. Provornov, B. N. Tarasov and E. S. Ignashova, *Tr. Leningrad. Inst. Kinoinzh.* 105-12, No. 27, 1975.

Results are given of an experimental determination of frame unsteadiness in the vertical and horizontal directions, suffered by motion-picture cameras used in film studios. Two methods of exposure were used in the study. — S.C.G. (Translated from *Ref. Zh., Fotokinotekhnika*)

Console for motion-picture measurements (in Russian), N. A. Konovarov and N. I. Lakhno, Vses. Nauchno-Tekh. Konf., Sovrem. Sostoyanie i Perspektivy Vysokoskorost. Fotogr. i Kinematogr. i Metrol, Bystroprotekhayushchikh Protsessov. "*Tezisy Dokl.*" Moscow, 1975, p. 38.

A console has been designed for the power supply and control of two SKS-1M high-speed motion-picture cameras. The console allows exact synchronization of the moment of switching on the subject, the cameras, the lights, and the measuring apparatus. The accuracy of the results of measurement is raised, in some cases by two orders of magnitude, by recording a decimal scale (frequencies of 10,000 and 1,000 Hz). Loss of working time is reduced by 30-50%. Film consumption is reduced by 30%. The reliability of the response of the measuring system is raised. Working conditions and safety are improved, and the possibilities of using the camera in scientific investigations are broadened. — S.C.G. (Translated from *Ref. Zh., Fotokinotekhnika*)

CINEMATOGRAPHY

The use of high-frequency infrared cinematography for the study of the mechanism of boiling with bubbling of the low transparency dissociating system $N_2O_4 \rightleftharpoons SNO_2$ (in Russian), S. A. Kovalev, I. Kh. Kolodtsev, and A. A. Milovidov, Vses. Nauchno.-Tekh. Konf. Sovrem. Sostoyanie i Perspektivy Vysokoskorost, Fotogr. i Kinematogr. i Metrol, Bystroprotekhayushchink Protsessov. *Tezisy Dokl.* Moscow, 1975, p. 55.

Infrared-red film and a Pentaset-35 camera were used for the study. — S.C.G. (Translated from *Ref. Zh., Fotokinotekhnika*)

The use of high-speed shadow cinematography for the study of plasma-dynamic processes in an electrode-discharge shock tube (in Russian), E. A. Kostyukevich and L. Ya. Min'ko, Vses. Nauchno.-Tekh. Konf., Sovrem. Sostoyanie i Perspektivy Vysokoskorost, Fotogi. i Kinematogr. i Metrol, Bystroprotekhayushchikh Protsessov, *Tezisy Dokl,* Moscow, 1975, p. 45.

A design for high-speed cinematography by the shadow method is described. It is used to study processes in the formation of a plasma flow and a shock wave in an electrode discharge tube with cylindrical and conical geometries of the discharge device, in the range of initial pressures of 0.5-10 mm Hg. The results of an analysis of shadow photographs are discussed. — S.C.G. (Translated from *Ref. Zh., Fotokinotekhnika*)

A high-speed cinematographic study of the reaction of a dynamic system to excitation pulses (in Russian), A. I. Sharov, *Opt.-Mekh. Prib.* Part 1. Leningrad. Leningrad University, 1974 (1975), pp. 131-39.

A method is given for carrying out high-speed cinematography on special shock devices, and some results of an experimental study of the reaction of a dynamic system to pulses of excitation are presented. — S.C.G. (Translated from *Ref. Zh., Fotokinotekhnika*)

A cinematographic study of the influence of temperature stresses on the destruction processes of certain materials (in Russian), A. I. Zaĭtsev, A. P. Korolev, A. M. Savel'ev, and V. M. Finkel', Vses. Nauchno-Tekh. Knof., Sovrem. Sostoyanie i Perspektivy Vysokoskorost, Fotogr. i Kinematogr. i Metrol, Bystroprotekhayushchikh Protsessov," *Tezisy Dokl.* Moscow, 1975, p. 133.

Results are given of a study of the kinetics of twinning and destruction, carried out on samples of coarse-grained transformer iron with the aid of high-speed cinematography. — S.C.G. (Translated from *Ref. Zh., Fotokinotekhnika*)

Quantitative characteristics of the integral method of obtaining 3-D motion-picture images, L. V. Kravchenko. *Tr. Vses. Nauchno-Issled. Kinofotoinst,* 161-170, No. 78, 1975.

A comparative analysis has been made of the results of stereoscopic motion-picture shots by the integral (lenticular screen) method, an experimental determination of the just noticeable and the just attainable criteria of the quality of the 3-D image has been carried out, and an experimental evaluation of eye-strain in observing a series of motion-picture images under various conditions. - S.C.G. (Translated from *Ref. Zh., Fotokinotekhnika*)

Professional motion-picture apparatus for the photography of stereo films by the Stereo-70 system (in Russian), L. A. Slutskiĭ. *Tr. Vses. Nauchno-Issled. Kinofotoinst,* pp. 74-97, No. 78, 1975.

The principles of stereoscopic viewing are set out, together with the technical requirements which were taken into account in designing stereo motion-picture cameras. The main characteristics of the Stereo-70 system and the apparatus made for it are given. New elements in the design of the apparatus are discussed. Possibilities of further improvements in the apparatus are indicated. - S.C.G. (Translated from *Ref. Zh., Fotokinotekhnika*)

The use of image converters for the cinematography of the Northern Lights (in Russian), B. Z. Gorbenko, V. A. Kozlov, N. P. Lyubukhina, Yu.Kh. Sultanov and P.Ya. Sukhoivanenko, Vses. Nauchno-Tekh. Konf., Sovrem. Sostoyanie i Perspektivy Vysokoskorost. Fotogr. i Kinematogr. i Metrol, Bystroprotekhayushchikh Protsessov, *Tezisy Dokl.* Moscow, 1975, p. 18.

A description is given of the instrumentation used in a cinematographic study of the Northern Lights, in which use was made of image converter tubes. — S.C.G. (Abridged from *Ref. Zh., Fotokinotekhnika*)

DATA PROCESSING

Signal Processing Applications of Charge-Coupled Devices, J. Mavor, *Radio and Electronic Eng., 46:* 412-420, Aug./Sept. 1976.

The charge-coupled device is essentially a

sampled-data, analog shift register which permits many signal processing functions to be implemented in analog form. This paper reviews the development of these devices for communication, radar and sonar applications, and summarizes the advantages of the charge-coupled concept over digital techniques.

A Modular Approach to the Hardware Implementation of Digital Filters, M. A. Bin Nun and M. E. Woodward, *Radio and Electronic Eng. 46:* 393-400, Aug./Sept. 1976.

Recent advances in the technology of medium and large scale integrated circuits (m.s.i. and l.s.i.) have made possible economical hardware implementations for real-time digital filtering. A flexible design approach for such implementations is presented. The processing mode can be varied to give any hybrid structure between the purely serial and parallel realizations. This leads to a design approach which can be adjusted to suit hardware availability. The resulting structures are modular and are in line with current trends in m.s.i. and l.s.i. technology in that they lend themselves readily to implementations using semiconductor read-only or random access memories.

A Versatile Memory System for Console Automation, Carl DeWilde, *Jour. Aud. Eng. Soc. 24:* 821-824, Dec. 1976.

A technique which greatly expands the capabilities of console automation systems is described. In addition to enlarging the number of functions that can be controlled by this system, it also eliminates the time delays and reduces the track-to-track crosstalk problems that were inherent in most of the earlier automation systems.

GENERAL AND HISTORICAL

A History of High-Quality Studio Microphones, Harry F. Olson, *Jour. Aud. Eng. Soc. 24:* 798-807, Dec. 1976.

The advent of radio broadcasting, electrical recording of disc records, and sound motion pictures, all in the 1920s stimulated the development and commercialization of high-quality studio microphones as follows: the omnidirectional condenser and dynamic microphones of the 1920s, and the bidirectional velocity and unidirectional microphones of the early 1930s. Microphones are still classified in these three basic types of directivity. Important and significant state-of-the-art improvements have been made through the years to the present time.

The economic development of film production in the USSR: results and tasks, V. G. Chernov, *Tekh. Kino i Televideniya, 20:* 6-10, No. 7, 1976.

The development of the production of films for cinema and television in the Soviet Union during the 5-year plan 1971-1975 is reviewed. The output and efficiency of the studios and laboratories of the Soviet film industry are discussed. — S.C.G.

Progress of motion-picture technology: review of the most important work of 1975 (*in Russian*), *Anon., Tekh. Kino i Televideniya, 20:* 12-25, No. 5, 1976.

A review is given of progress during 1975 in the film industry in the Soviet Union, covering new apparatus for shooting, processing and projecting films. — S.C.G.

HOLOGRAPHY

A method of high-speed motion-picture holography (in Russian), V. M. Ginzburg, A. S. Dubovik, B. M. Stepanov, L. S. Ushakov and Yu. I. Filenko, Vses. Nauchno-Tekh. Konf., Sovrem. Sostoyanie i Perspektivy Vysokoskorostn, Fotogr. i Kinematogr. Metrol, Bystroprotekhayushchikh Protsessov, *Tezisy Dokl.,* Moscow, 1975, p. 65.

A study has been made of the problem of coding the reference waves used in the recording of separate superimposed holograms. An experimental and theoretical comparison has been made of the coding methods from the point of view of their application in high-speed motion-picture holography. — S.C.G. Translated from *Ref. Zh., Fotokinotekhnika*

A study of high-resolution photographic materials for cineholography (in Russian), O. B. Serov, G. A. Sobolev and V. N. Chursin, *Tr. Vses. Nauchno-Issled. Kinofotoinst,* 193-198, No. 78, 1975.

The requirements foreseen for photographic materials for recording cineholograms are discussed. Results of studies on two emulsions are discussed, together with the determination of the optimum thickness of the emulsion layer. — S.C.G. (Translated from *Ref. Zh., Fotokinotekhnika*)

LABORATORY PRACTICE

Monobath Color Processing, M. R. V. Sahyun, *Photog. Sci. and Eng., 20:* 238-241, Nov./Dec. 1976.

We describe an aqueous color processing monobath, which includes a color developing agent and a fixing agent and is formulated with a pH of above about 13.2. Such high pH monobaths provide negative photographic dye images occurring in conjunction with substantially invisible silver deposits. The kinetics and chemical mechanisms involved in processing with these solutions are discussed.

Editing Table with Time-Code Control, Karl-Heinz Trissl, *Rundfunktech. Mitteil. 20:* 203-210, Oct. 1976.

The use of the time code considerably facilitates the work at the editing table. Simple pressure on a button can start an automatic process which at choice synchronizes the sound with the picture (and vice versa) or brings the picture film or magnetic sound record to a preselected point. An electronic selection and control device developed by the Institut fur Rundfunktechnik ensure that: the code is read out in synchronism with the pictures at the picture and sound sides; within a sequence, where the code is continuously present, reading-out faults never occur in practice; interruptions in the code, such as might occur when changing sequences, are indicated reliably and clearly. A logic-controlled motor ensures that the synchronizing process is carried out as quickly as possible, without going beyond the target point. The additional electronic device can be incorporated also in older editing tables.

Apparatus for the measuring of the length of unprocessed motion-picture film (in Russian), E. L. Kotlyarevskii (NIKFI, Moscow). *Tekh. Kino i Televidenya, 20:* 27-30, No. 4, 1976.

Devices for measuring the length of unprocessed motion-picture film depend on counting the number of perforations. The variation in the number of perforations per meter of the different film formats complicates the circuitry of the binary counters. Measuring apparatus with simplified circuitry is described, based on the use of multistable gas-discharge devices and dekatrons. — S.C.G.

A study of the influence of the working composition of a developer and soluble halides on the photographic characteristics of different types of positive motion-picture film under production conditions of processing (in Russian), V. A. Nigmatulina, *Tr. Vses. Sci.-Res. Nauchno-Issled. Kinofotoinst.,* 33-45, No. 77, 1975.

A study has been made of the products formed or washed out of film when it is developed, on the photographic variables of TsP-8R, TsP-7 and TsP-10 (Soviet color motion-picture positive) films, and in particular when they are processed together. The influence of the soluble halides on the photographic properties of these films has been studied. The practically possible and tolerable quantities of halides in a developer solution under production conditions in the machine processing of TsP-8R film stock have been established. — S.C.G. (Translated from *Ref. Zh., Fotokinotekhnika*)

Improvement of the film transport system in motion-picture film printers (in Russian), G. Yu. Prosvirnin, *Tr. Leningrad. Inst. Kinoinzh.,* 23-30, No. 27, 1975.

The design of the film-transport mechanism for positive film stock in motion-picture printers is discussed. Depending on conditions, the transport mechanism can give a constant moment of force relative to the axis of rotation of the support of the transport roller, or constant tension, irrespective of the lack of accuracy of the loading of the part of the positive film between the transport and printing sprockets. The use of the improved mechanism in apparatus of the 12P type raises its operational reliability in comparison with KMTs-1 apparatus. — S.C.G. (Translated from *Ref. Zh., Fotokinotekhnika*)

Design and manufacture of sprockets for mechanisms for the contact printing of motion-picture films with continuous motion of the film (in Russian), G. Yu. Prosvirnin and S. M. Pertsev, *Tr. Leningrad. Inst. Kinoinzh.,* 31-39, No. 27, 1975.

A method is given for calculating and designing sprockets having teeth with an evolvent profile. The design of a tooth shaping instrument is given and data for the construction of a machine are presented. — S.C.G. (Translated from *Ref. Zh., Fotokinotekhnika*)

An experimental study of the characteristics of pulldown mechanisms and a band of motion-picture film (in Russian), A. M. Melik-Stepanyan, O. P. Makarov and N. V. Dashevskaya, *Materials of a Scientific Conference of Instructors, Leningrad Institute of Motion-Picture Engineers,* 1975, pp. 130-132.

A method has been worked out for the experimental study of the kinematic characteristics of pulldown mechanisms and the band of 16mm motion-picture film transported by them, taking into account the natural vibrations of the film as a result of the elastic connection of the section of film being transported with the pulldown tooth. Laboratory equipment for carrying out the study is discussed. — S.C.G. (Translated from *Ref. Zh., Fotokinotekh.*)

A study of the possibility of calculating frequency-contrast functions (MTFs) from resolving power (in Russian), V. G. Baranova, M. I.

Blyumberg and T. M. Levenberg, *Materials of a Scientific Conference of Instructors, Leningrad Institute of Motion-Picture Engineers,* 1975, pp. 146-147.

The modulation transfer function is widely used at present to estimate the definition of an image. The use of MTF in the solution of technical problems is made difficult by the complications in obtaining them. In order to simplify their calculation, a method of approximate calculation from resolving power data of a photographic material is proposed. — S.C.G. (*Ref. Zh. Fotokinotekh.*)

Frequency-contrast functions (MTFs) of photographic materials in different spectral regions (in Russian), Yu N. Gorokhovskiĭ, I. M. Davydkin and T. A. Lomachenkova, *Materials of a Scientific Conference of Instructors, Leningrad Institute of Motion-Picture Engineers,* 1975, p. 149.

MTF has been obtained for photographic materials exposed to light of different wavelengths and spectral MTF curves have been derived. — S.C.G. (*Ref. Zh. Fotokinotekh.*)

Improving the masking of color motion-picture films for duplicating (in Russian), L. V. Grechko, A. I. Sviridenko, and M. N. Sviridenko, *Tekh. Kino i Televideniya, 20:* 15-18, Apr. 1976.

Experimental coatings have shown that it is possible to improve the masking of a duplicating film, while retaining and even improving latitude, by coating the middle layer as two half layers with colorless couplers in one and masking couplers in the other. — S.C.G.

The processing of black-and-white negative and duplicating motion-picture film stock in one developer (in Russian), B. I. Lazis and E. R. Zhuravel', *Tekh. Kino i Televideniya, 20:* 67-68, Apr. 1976.

Experimental work is described that shows it to be possible to process negative and duplicating film stock in the same processing machine by using different quantities of replenisher according to the type of film passing through. — S.C.G.

LASERS

Non-destructive read-out of analog information from thin-film stripe-domain type magnetic recording materials (in Russian), N. A. Kolbanovskaya, A. M. Morozov, I. A. Pan'shin and E. A. Podpalyĭ, *Zh. Nauchn. Prikl. Fotogr. Kinemat., 20:* 455-457, No. 6, 1975.

A magneto-optic method, based on the meridional Kerr effect, is proposed for reading out information from a stripe-domain magnetic material. A scanning beam from a ruby laser operating under single-mode conditions is polarized and focused onto the surface of the film at an angle and the reflected beam is measured with a differential readout device. — S.C.G.

Laser color recording directly on nine-inch color film, Merle Hannah and William Harris, *Opt. Eng., 15:* 119-123, Mar.-Apr. 1976.

A laser color recorder is described which yields Landsat (earlier called Earth Resources Technology Satellite) or similar high-resolution images directly on photographic color film. This development, sponsored by NASA Goddard Space Flight Center, provides the capability for transferring computer-formatted magnetic tape data directly to positive or negative color imagery. Designed to circumvent the current task of reconstructing color images by combining individual (monochrome) color separation negatives, this recorder yields Landsat pictures, directly, with growth potential for the recording of advanced, high-resolution color image sensor data.

Three individual laser beams, representing the three primary colors, are modulated separately, then combined precisely to form a single beam of light. This synthesized beam, in which the instantaneous hue and intensity are determined by the modulating signals, is focused on the recording film through a rotating scanning mirror. The entire scanner assembly is translated across the format length to form a raster image directly on the photographic color film.

OPTICS

Fiber Optic Cables, R. E. J. Baskett and S. G. Foord, *Elect. Comm., 52:* 49-53, No. 1, 1977.

Now that practical glass fibers can be produced, the problem is to combine the individual fibers into a cable to withstand normal handling. The glass used is inherently brittle and the small cross-sectional area involved makes it susceptible to catastrophic damage during handling. The paper discusses the development aimed at improving the tensile strength of fibers by applying plastic coatings. Better mechanical properties can be obtained by providing additional components for tensile and radial reinforcement, including steel of Kevlar strength members and various filling materials. Practical experience over the next few years will determine the relative merits of the wide range of present cable designs and materials.

Measurement of Transmission Properties of Optical Fibers, M. Chown and R. Worthington, *Elect. Comm. 51:* 242-248, No. 4, 6 1976.

During the early years of optical fiber development, engineers were mainly concerned with the optical attenuation. Now that this parameter has been reduced to an acceptable level they are concerning themselves with the wider range of parameters that determine transmission quality. These include attenuation, absorption, scatter loss, pulse dispersion, and refractive index profile. A number of techniques have been developed at Standard Telecommunication Laboratories, a British research center of ITT, for measuring these parameters. Many of these measurements are of particular interest to system designers, while diagnostic measurements are of more interest to the fiber development engineer. Launching methods have also been closely studied. Future applications of these measuring techniques will include measurements on installed cables and on-line monitoring of fibers during manufacture.

An Advanced Optical Objective Lens, R. H. Wight, *Photogrammetric Eng. and Remote Sensing,* 52: 1049-1055, Aug. 1976.

A low distortion objective lens was required to cover a 140-degree field-of-view with good resolution, high speed and relative illumination, and broadband (silicon sensor) spectral response. The development philosophy adopted and the results obtained are discussed together with potential applications to photogrammetric requirements.

The Electronic Time-Code Device for Camera and Sound-Tape Equipment, Arthur Heller and Gerhard Holoch, *Rundfunktech. Mitteil. 20:* 195-202, Oct. 1976.

The article describes the electronic time-code device for recording purposes, that is to say, for the film camera and audio tape recorder, as well as the master clock and marking equipment. The chosen clock design with the very simple locking method for the slave clocks is explained in detail, as being an important component of a design which is both operation-orientated and easy to maintain.

Extreme errors of numerical integrations in colorimetric calculations, Noboru Ohta and Gunter Wyszecki, *J. Opt. Soc. Am., 65:* 834-838, July 1975.

The tristimulus values of object-color stimuli are commonly calculated by means of the weighted-ordinate method at constant wavelength intervals. By assuming that the tristimulus values are calculated accurately when the wavelength interval is $\Delta\lambda = 5$ nm, we have estimated the extreme errors that can occur when other approximate numerical integrations are used, such as Simpson's rule or Durand's rule of integration. The extreme errors, are always very large and are caused by jagged spectral distributions of the object-color stimuli included in this study.

Refracting replica aspheric optics, H. Howden and J. A. Clarke, *Opt. Eng., 15:* 197-201, May-June 1976.

A new technology is described for making transparent thermosetting plastic replica mouldings of optical quality. The finished mouldings are sufficiently accurate for a wide range of applications in image-forming lenses, and particularly for the manufacture of quantities of identical aspheric lenses. The moulded lenses are made in the form of a thin layer of plastic of suitably chosen properties bonded during the moulding process onto one or both faces of a prepared glass substrate. The substrate is first ground and polished to a convenient flat or spherical form. An accurate optically worked negative glass block is used as a mould tool to form the plastic to the correct shape, and the plastic is then polymerized before the finished lens is removed from the tool. The difference in profile between the mould tool and the glass substrate is taken up by variations in thickness of the plastic layer.

For lenses with a large amount of asphericity various techniques are used for avoiding the profile errors which could otherwise result from the effects of cure shrinkage of the plastic. Details of the technology are described and also its application to the manufacture of Schmidt corrector plates used in an $f = 200$ mm 1:0.7 lens for a professional large screen color TV projector now in factory production.

The possibility of applying simple methods of measurement in estimating the quality of optical systems (in Czech), V. Blumová and J. Polášek, *Sb. pr. Výzk. Ústavu Zvuk., Obraz., a Reprod. Tech., 5:* 59-69, 1974.

It is shown that resolving power, as a criterion for estimating the quality of optical image-forming systems, does not satisfy the high requirements of the evaluation of the quality of motion-picture camera objectives. The measurement of MTF under operational conditions is laborious. It is suggested that the structure of the image formed by the lens being tested, with modulation by a continuous optical wedge of varying density, should be evaluated. — S.C.G. (Translated from *Ref. Zh., Fotokinotekh.*).

Chromatic correction of axial light-rays in the calculation of photographic objectives (in Russian), I. S. Timofeev, *Izv. Vŷssh. Ucheb. Zavedenii. Prib., 18:* 113-119. No. 6, 1975.

A functional relation between the chromatic difference of spherical aberrations, the chromatic aberration of position, and aberrations of the secondary spectrum, has been derived from the constructional data of a multi-lens optical system. From this relation, the possible types of chromatic correction of axial light-rays in practical schemes for photographic objectives are discussed. — S.C.G. (Translated from *Ref. Zh., Fotokinotekh.*).

An objective with a wide range of variation of focal length (in Russian), M. S. Stefanskiĭ and I. E. Isaeva, *Opt.-mekh. Prom.*, 14-18, No. 7, 1975.

Some analytical relations and computing formulae are derived referring to afocal 4-component attachments for any multiple change of magnification. Specific points concerning high-magnification systems are discussed, calculations are made, and a 25X system is given. — S.C.G. (Translated from *Ref. Zh., Fotokinotekh.*).

PHOTOGRAPHIC THEORY AND MATERIALS

The modernized PIKh-M apparatus for the determination of the strength of film materials (in Russian), M. G. Mazŷrin and M. B. Meerzon. *Tr. Vses. Nauchno-Issled. Kinofotoinst.* 22-31, No. 76, 1975.

A description is given of improvements to the apparatus (PIKh-M) and to the method of determining the strength of motion-picture materials. Results are given to illustrate the possibility of setting different test conditions. Recommendations are given for the use of the apparatus for research purposes and for the technical control of products in manufacture. — S.C.G. (Translated from *Ref. Zh., Fotokinotekhnika*)

Apparatus for the determination of the tear strength of motion-picture film materials (In Russian), G. I. Belorusets, M. B. Meerzon, A. I. Serebrennikov and I. M. Fridman, *Tr. Vseś Nauchno-Issled. Kinofotoinst.* 45-50, No. 76, 1975.

The earlier Elmendorf apparatus has been used as the basis for the development of a precision apparatus of the pendulum type, allowing the determination of the tear strength of individual samples of motion-picture film under given temperatures and humidities. The results of the test on the apparatus for sensitivity and reproducibility are given. — S.C.G. (Translated from *Ref. Zh., Fotokinotekhnika*)

A method of dynamic conditioning in the measurement of the electric characteristics of motion-picture films (in Russian), S. Sh. Akhmedzhanova, L. S. Gordeev, A. Ya. Kessel' and I. A. Fedorina, *Tr. Vses. Nauchno-Issled. Kinofotoinst.* 99-104, No. 76, 1975.

Equipment is described for the measurement of the electrical characteristics of motion-picture film with conditioning of the film under dynamic conditions. It is shown that the time of preparation of the samples under these conditions is appreciably shortened in comparison with conditions in a humidity chamber. — S.C.G. (Translated from *Ref. Zh., Fotokinotekhnika*)

The PSPK-3M apparatus for the determination of the curl of motion-picture film (in Russian), M. G. Mazyrin, M. B. Meerzon and A. I. Serebrennikov, *Tr. Vses. Nauchno-Issled Kinofotoinst.*, No. 76, 1975.

A description is given of the improved design of the PSPK-3M apparatus for the determination of the curl of motion-picture film at different relative humidities. The method of determining curl is presented together with two methods for the preliminary conditioning of the film samples: the "express method" and the normal method. The first method is shown to have advantages over the second. Curl values are given for some motion-picture film stock of Soviet and foreign origin, tested under conditions of temperature and humidity specified for the method. — S.C.G. (Translated from *Ref. Zh., Fotokinotekhnika*)

The KML-1M apparatus for the determination of the impact strength of motion-picture materials under given conditions of temperature and humidity *(in Russian) L. P. Zarutskiĭ, M. G. Mazŷrin, Zh. F. Moteneva, A. I. Serebrennikov, S. A. Tupalova and I. M. Fridman. Tr. Vses. Nauchno-Issled. Kinofotoinst.* 10-21, No. 76, 1975.

Descriptions are given of an improved design of a pendulum-type impact tester (KML-1M) with a conditioning chamber, and of the method of evaluating the impact strength of motion-picture materials under given conditions of temperature and humidity. Results are given of a study of the temperature dependence of the impact strength of supports and some motion-picture films (as a system) from domestic and foreign production. — S.C.G. (Translated from *Ref. Zh., Fotokinotekhnika*)

Apparatus for the determination of microhardness of motion-picture films and other film materials (in Russian), M. B. Meerzon, A. I. Serebrennikov, N. M. Nemirovskaya and I. M. Fridman, *Tr. Vses. Nauchno-Issled. Kinofotinst.* 73-82, No. 76, 1975.

On the basis of the PMT-3 microhardness tester, apparatus has been designed and a method has been devised for the determination of the microhardness of film materials under static and dynamic conditions. Microhardness values are given for some motion-picture films of Soviet and foreign origin. — S.C.G. (Translated from *Ref. Zh., Fotokinotekhnika*)

The PIES-2 apparatus for the determination of the strength of swollen emulsion layers of motion-picture films (in Russian), M. B. Meerzon and S. A. Tupalova, *Tr. Vses. Nauchno-Issled Kinofotoinst.*, No. 76, 1975.

Improved design and operating principles are described and a method is given for determining the strength of the emulsion layer of a motion-picture material in the swollen condition. Some test strengths of different types of photographic material are discussed. — S.C.G. (Translated from *Ref. Zh., Fotokinotekhnika*)

The POKP-5 apparatus for the determination of the strength of edges and of between-perforation areas of motion-picture film (in Russian), V. E. Almazov, M. B. Meerzon, and I. M. Fridman, *Tr. Vses. Nauchno-Issled. Kinofotoinst.*, 32-44, No. 76, 1975.

Apparatus and methods are described for the determination of the strength of edges and between-perforation areas of motion-picture films. The apparatus allows one to evaluate the resistance to wear of film materials from the results of accelerated tests. — S.C.G. (Translated from *Ref. Zh., Fotokinotekhnika*)

The economic effectiveness of the introduction of scientific study (in Russian), E. V. Teterin and Z. A. Sidorova, *Tr. Leningrad. Inst. Kinoinzh.*, No pp. given (No. 27, 1975)

A number of features are pointed out, connected with the determination of the economic effectiveness of introducing scientific studies into cinematography. Examples are given of calculations of the economic effectiveness of the introduction of quality control methods into the large-scale printing of photographic soundtracks of release prints and electronic color analyzers into the processing laboratories of film studios. — S.C.G. (Translated from *Ref. Zh., Fotokinotekhnika*)

An experimental study of the influence of the tension of the sprocket belt on the speed fluctuations of a tape information carrier in transmission mechanisms of motion-picture apparatus (in Russian), S. M. Provornov, A. V. Sokolov and N. A. Ivanushkin, *Tr. Leningrad. Inst. Kinoinzh.*, 91-97, No. 27, 1975.

Features of sprocket belt transmission are discussed, and a method is given for the measurement of the magnitude of the speed fluctuations of a signal carrier with different belt tensions. Optimum values of belt tension for different values of the width are given. — S.C.G. (Translated from *Ref. Zh., Fotokinotekhnika*)

A study of the aging process of color photographic papers by color sensitometry on color fields (in Russian), D. K. Balabukha and S. I. Potapovich, *Zh. Nauchn. Prikl. Fotogr. Kinemat., 20:* 446-448, No. 6, 1975.

Colorimetric sensitometry is based on the reproduction of colorimetrically defined patches on a test-chart. The method has been used to study the aging characteristics of some Soviet color paper stocks. — S.C.G.

A study of the quality of the color reproduction of motion-picture and photographic materials with the aid of colorimetric sensitometry (in Russian), G. G. Novikova, I. M. Sokolova and V. I. Sivkov, *Materials of a Scientific Conference of Instructors, Leningrad Institute of Motion-Picture Engineers,* 1975, pp. 141-142.

A number of applications of the method of colorimetric sensitometry in the Leningrad Institute of Motion-Picture Engineers are discussed. — S.C.G. (Abridged from *Ref. Zh., Fotokinotekh.*).

Some points concerning the physico-mechanical properties of the plasticized support of motion-picture materials (in Russian), V. G. Timofeeva, I. V. Borisenko, L. M. Marchenko, E. K. Podgorodetskiĭ and P. V. Kozlov, *Tekh. Kino i Televideniya, 19:* Nov. 1975.

The effect of plasticizers on the brittleness of triacetate film support has been studied. Curves showing the effect of concentration on impact strength, folding strength, and tearing strength are given for 1-nitro-methyl-2-propanol, trichlorethyl phosphate and butyl stearate. — S.C.G.

The bases of control of some photographic indices of color film shots (in Russian), L. P. Krŷlov and L. A. Kozŷreva, *Tekh. Kino i Televideniya, 19:* 13-17, Nov. 1975.

Questions of density, contrast and balance are discussed from the point of view of the preparation of film shots in the making of color motion-picture films. — S.C.G.

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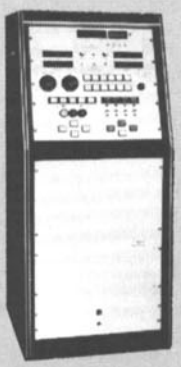

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Diffusion in a motion-picture film emulsion (in Russian), F. S. Bolotnikov *Tekh. Kino i Televideniya, 19:* 26–28, Dec. 1975.

Equations are derived for calculating the changes in time of the concentration field of diffusing substances, e.g. the constituents of a developer solution, in the gelatin of the emulsion layer of a photographic film. An equation for the mean concentration over the thickness of the emulsion layer is also given. The theory is checked against experiment. — S.C.G.

Rapid processes for obtaining a photographic image by diffusion transfer (in Russian), Yu. I. Zhurba and V. A. Cherkasov, *Tekh. Kino i Televideniya, 19:* 29–32, Dec. 1975.

A short review is given of research and development in the field of rapid processes for obtaining a photographic image by diffusion transfer methods. These processes are shown to hold promise for the future. — S.C.G. (Translated from *Tekh. Kino i Televideniya.*)

The problem of image detection on a background of noise (in Russian), V. V. Kopÿtov, *Tekh. Kino i Televideniya, 19:* 39–43, Dec. 1975.

A method of restoring an image is based on the use of the statistical properties of images and noise. An attempt is made at applying a "law of adequacy" to the problem of the spatial filtration of images. A computer experiment is analysed. — S.C.G. (Translated from *Ref. Zh., Fotokinotekh.*).

Exposure in scientific photography (in Japanese), Tajame Mataichi, *Journal NDI, 24:* 405–410, No. 7, 1975.

The wide-spread use of automatic processing machines limits the possibility of allowing for exposure in the processing. It is therefore especially important to set exposure correctly in making a photograph. Problems of the correct exposure of the light-sensitive materials used in scientific photography, which are subject to the action of both visible and invisible radiation (UV-, X-, and γ-rays, electrons, etc.), are discussed. The factors determining correct exposure are distinguished in detail. In particular, consideration is given to the forms of photographic material for different kinds of photographic recording, radiation, conditions of exposures and conditions of assessing the quality of the final photographic image. — S.C.G. (Translated from *Ref. Zh., Fotokinotekh.*)

The development of non-silver polymer detectors based on cellulose derivatives for the recording of charged particles (in Russian) Ya. M. Veprik and V. P. Romanenko, *Materials of a Scientific Conference of Instructors. Leningrad Institute of Motion-Picture Engineers,* 1975, pp. 162–163.

Studies have been carried out on the influence of the components of the film-forming solution on the recording properties of polymeric (cellulose nitrate) detectors, and also on the best formulation to give the required properties. The factors studied include the degree of polymerization, the level of nitration, the nature and concentration of the plasticizer, and the solvent. Their effect on the selectivity of etching of the polymer is discussed. — S.C.G. (Abridged from *Ref. Zh., Fotokinotekh.*)

PROJECTION

A study of the vibrations of the Ksenon motion-picture projector and their influence on pitch fluctuations (in Russian), G. V. Levitin, and N. V. Dashevskaya, *Tr. Leningrad. Inst. Kinoinzh.,* 75–90, No. 27, 1975.

Measurements have been made of the magnitude and spectral composition of vibrations. A relation has been obtained between the coefficient of speed fluctuation, K_s, and the vibrations of a motion-picture projector. The mechanism of this relation is explained, and it is shown that the different vibrational speeds of a smooth drum and a mechanical slit lead to a parasitic frequency modulation of the signal being reproduced. A method for the experimental determination of K_s has been worked out. Two modifications of the sound unit of Ksenon type motion-picture projectors have been studied.

An evaluation has been made of the influence of the pressure-plate of the sound unit, of the method of mounting the bearing of the spindle of the smooth roller [capstan?], and also the method of mounting the sound unit as a whole, on K_s. — S.C.G. (Translated from *Ref. Zh., Fotokinotekhnika*)

The problem of the tolerable wear of film-transport sprockets of 35mm motion-picture projection apparatus (in Russian), V. S. Yakimovich and S. M. Pertsev, *Tr. Leningrad. Inst. Kinoinzh.* 125–131, No. 27, 1975.

A method, with experimental results, is given for studying the tolerable wear of film-transport sprockets, which, being worn themselves, affect the wear of film prints in a marked manner. It is shown that wear of the tooth profile of a sprocket influences projection quality. A typical picture of tooth profile wear is given, and the change in angular pitch of the sprocket in relation to the amount of wear of the teeth is shown graphically. The tolerable degree of wear has been found. — S.C.G. (Translated from *Ref. Zh., Fotokinotekhnika*)

SOUND

Producing TV Display From Audio Cassettes, W. J. Hannan, *RCA Engineer, 22:* 21–25, Apr./May 1977.

A book-sized box of electronics takes encoded information from a stereo cassette player and displays is as alphanumeric and graphic information on a television set. Voice, music, or sound effects accompany the television display.

A Low-Noise High-Output Capacitor Microphone System, Richard S. Burwen, *Jour. Aud. Eng. Soc. 25:* 278–283, May 1977.

The dynamic range of a capacitor microphone has been considerably extended by means of an advanced FET feedback amplifier. This microphone delivers +20 dBm into 600 ohms at maximum sound pressure levels of 110, 125, or 140 dB. Its *A*-weighted noise level of 15 dB is contributed mostly by the capsule instead of the amplifier.

The Application of Digital Techniques to the Measurement of Loudspeakers, J. M. Bermand and L. R. Fincham, *Jour. Aud. Eng. Soc. 25:* 370–384, June 1977.

A new approach to the problem of the measurement of loudspeaker characteristics is presented. A digital processor is used to obtain the loudspeaker's transfer function from a direct measurement of the impulse response. The measuring method is discussed in detail along with the forms of display which have so far been used. Some applications are discussed briefly. Finally, the method is shown to be suited to a system approach to the study and development of loudspeakers.

The Louisiana Superdome Sound System, J. Jacek Figwer, *Jour. Aud. Eng. Soc. 24:* 554–561, Sept. 1976.

The Louisiana Superdome, an enclosed stadium with a seating capacity of 95,000 was designed for a variety of uses ranging from sports events through entertainment to large conventions. The loudspeaker systems employed are described as well as the functional and electrical arrangement of components and some observations on the performance of the system.

Concepts in the frequency and time domain response of loudspeakers, R. C. Heyser, *Monitor — Proc. IREE, 37:* 67–76, Mar. 1976.

Up until slightly less than a decade ago, the measurement of the frequency response of loudspeakers was generally restricted to the amplitude of the sound pressure. The phase of the sound pressure was all but ignored as was the time-domain acoustic response. This was dramatically altered when published measurements, made using a newly developed coherent processing technique, showed that many loudspeakers had significant non minimum-phase portions of their frequency spectrum and that all loudspeakers had a complicated behavior of their frequency response for the period of time following an impulsive excitation. The effect of this was to prove that the long established measurement of anechoic steady-state amplitude response was not sufficient to properly characterize the acoustic response of loudspeakers. An industry had to change its standard of measurement.

Once phase measurements could be made accurately, a nagging inconsistency in measured time delay was observed which led to the formulation of a deeper physical concept. This, in turn, led to the prediction, with subsequent verification, of time-delay distortion; to a derivation of the analytical basis for kinetic and potential energy density partitioning in dynamic processes; to the recognition that the time-domain response must also be considered an entity with a magnitude and a phase and to the introduction of a particular frequency response measurement based upon a very simple psycho-acoustic observation. Present developments in loudspeaker analysis are concerned with understanding the role that linear and non-linear electroacoustic properties play in the listening experience.

A method of series-parallel storage of sound information in the scoring and re-recording of motion-picture films (in Russian), E. A. Musaelyam, *Tekh. Kino i Televideniya, 19:* 20–23, Nov. 1975.

A description is given of experimental work carried out in the Tadzhikfilm Studios on the preparation of a monophonic soundtrack by first recording all the sound information on four parallel tracks of a 35mm magnetic tape, e.g. dialogue, commentary, noise effects and music. — S.C.G.

A feasibility study of the recording of black soundtracks in motion-picture cameras (in Russian), S. F. Alekseeva and G. A. Gel'pern, *Materials of a Scientific Conference of Instructors, Leningrad Institute of Motion-Picture Engineers,* 1975, pp. 92–95.

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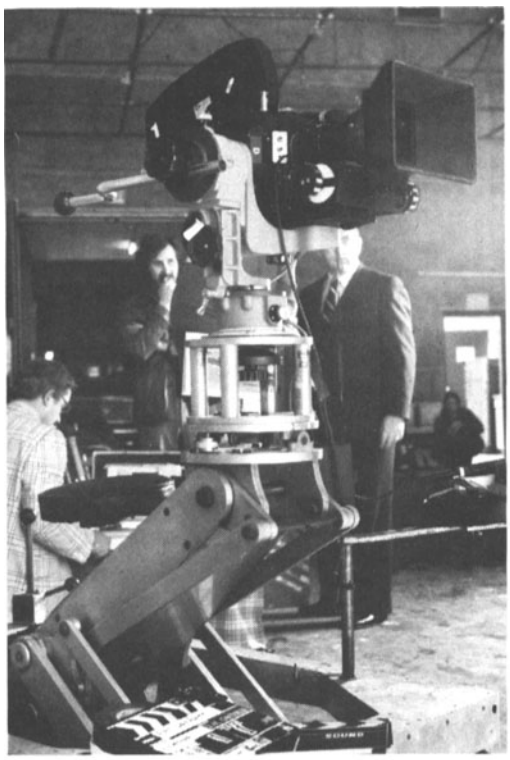

Canadian cinematographer David M. Ostriker (at right) shooting a television commercial with his own CP-16R and Studio Rig.
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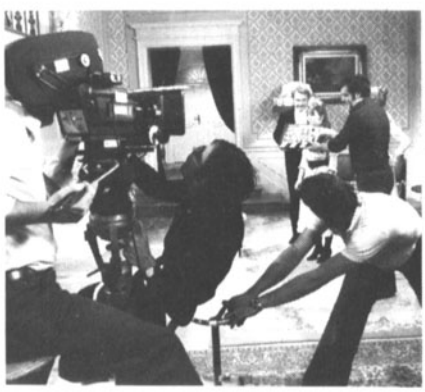

The CP-16R with Studio Rig on a soundstage in Vienna, during the filming of a musical comedy feature for television.
Television features and specials in Austria, West Germany, and indeed all over Europe, are shot in 16mm, and the CP-16R is rapidly becoming the preferred camera (even in the heart of "Arriland") for filming such productions because of its outstanding quiet operation.

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been found to be necessary to design a light modulator for recording black soundtracks, which gives high reliability and stability in practical use. A study has been made of recording soundtracks with the AL 102V photodiode which is based on silicon carbide activated with scandium, with emission of radiation from the face. Experiments and calculation of the necessary brightness of the source showed that for recording soundtracks with sufficient density photodiodes from normal production are not suitable. To solve this problem it is necessary for industry to master the production of photodiodes with a brightness of not less than 5000 cd/m^2. — S.C.G. (Translated from *Ref. Zh., Fotokinotekh.*)

TELEVISION AND VIDEO

A 14 GHz 2 kW Klystron for Earth Stations of Satellite Broadcasting Systems, Shigemoto Murata, Michikiyo Takahasi, Kaizo Yamamoto and Yoji Morishita, *NHK Laboratories Note,* No. 206, Jan. 1977.

A 14-GHz 2-kW klystron has been developed as the transmitting tube for earth stations of a satellite broadcasting system. To make the transmitter as compact as possible, the klystron was chosen after a trade-off study between the klystron and the TWT. The klystron has five cavities with high-efficiency tuning, and employs permanent magnet focusing with samarium-cobalt and forced-air cooling for the body and collector. The klystron is operated with a beam voltage of 9.8 kV and a beam current of 0.78 A, and can deliver saturated output power of 2.5 kW minimum at any 50-MHz band in the 14.0 to 14.5-GHz range. The power gain at 2 kW is 42 dB minimum.

Development of 120 Mbit s^{-1} Digital Line System for Field Trial and Production, M. C. Betts, P. Norman and D. B. Waters, *Elect. Comm. 51:* 150-158, No. 3, 1976.

An earlier laboratory demonstration model proved the feasibility of building a 120 Mbit s^{-1} digital line system. As a result, a full scale field trial system with two terminals, two power feed stations, and 33 two-way dependent repeaters, was manufactured and installed on an existing coaxial link between Guildford and Portsmouth. This field trial proved that all the development objectives had been met and the design has now been finalized for full scale production.

TV-PCM 6 Integrated Sound and Vision Transmission System, H. Dirks, G. Steudel and Zschunke, W., *Elect. Comm., 52:* 62-67, No. 1, 1977.

For the transmission of the vision and sound components of a television signal either a separate sound line is used or the sound signal is transmitted on a subcarrier situated above the vision signal. These separate sound links have economic and operational drawbacks. Subcarrier methods require a higher bandwidth and separate lines are costly and liable to interruption. These drawbacks can be avoided using integrated sound methods, where the sound is transmitted in the time intervals of a composite TV signal. The method developed at Standard Elektrik Lorenz, a German company of ITT, has already been described in principle but the present paper reports on its further development, measurements, and tests.

An Economic OB Locking System, P. Marchant, *ABU Tech. Rev., 49:* 13-15, Mar. 1977.

The problem of mixing or performing special effects between two asynchronous video signals is one that will probably be with us for a very long time to come. Advances in technology only change the manner in which we deal with the basic problem. In this paper an outside broadcast (OB) locking system, the result of an ITCA Research and Development Project, and the background that led to the adoption of this particular approach are described.

In order to obtain the benefits of the full field synchronizer, but without the heavy capital cost involved, it was decided to engineer a Mini Synchronizer using a modified digital time base corrector and some additional synchronizing pulse generator control equipment. In this system the relative slip rate of the outside broadcast and studio video signals is minimized by use of very accurate and stable subcarrier oscillators. Once the OB is initially phased and is within range of the time base corrector, the residual drift of the OB with respect to the studio is compensated for by the TBC. This means that the OB can be regarded as a synchronous source for as long as the TBC range is not exceeded.

Optical Transmission of Voice and Data, Ira Jacobs and Stewart E. Miller, *IEEE Spectrum 14:* 33-41, Feb. 1977.

Fiber-optic transmission systems offer powerful advantages over conventional coaxial cable and metallic wire links. Increased bandwidth, smaller diameter, lower weight, lack of crosstalk, complete immunity to inductive interference, and the potential ability to deliver signals at lower costs are bringing fiber-optic systems out of the laboratory into strong competition with conventional systems in telecommunications, computers, military systems, and many other areas. At the same time, the technology behind the elements of fiber-optic transmission systems has been rapidly maturing, paced by important developments in optical sources, cables, detectors, couplers, modulators, and repeaters.

Time Coding — A Modern Facility in Film Editing, Herbert Grosskopf and Manfred Stubbe, *Rundfunktech. Mitteil. 20:* 183-187, Oct. 1976.

After reviewing the methods of picture-synchronous sound recording available nowadays for the production of films for television, the authors explain the method recommended by the E.B.U. for recording a time code on the picture and sound carriers, for which a prototype installation was constructed at the Institut für Rundfunktechnik in 1975. A brief description of that equipment provides the framework for the following three papers, which deal with the problems of recording, coding and interpreting the time information and explain in more detail the design of the apparatus.

Recording and Scanning the Time Code, Klaus Altmann and Heinz Link, *Rundfunktech. Mitteil. 20:* 188-194, Oct. 1976.

The time code for the picture-synchronous sound recording in television-film production must be recorded on the individual information carriers picture film, magnetic sound tape, magnetic sound film — and reproduced for the subsequent processing. In deciding upon the system, account had to be taken, of the existing carrier formats and their information tracks, as well as of the additional possibility of utilizing the equipment with the 50-Hz pilot-tone method. The mutual interaction (crosstalk) of the various kinds of information stored on a carrier was of particular importance in the choice of the system parameters.

Possibilities and Problems of the Technical Realization of Two-Way Cable-Television Systems, Wolfgang Horak, *Rundfunktech. Mitteil., 20:* 173-182, Oct. 1976.

Two-way cable-television systems primarily fulfill the function of distributing broadcast sound and television programs over cables. However, by an extension of the technical equipment and, if necessary, modification of the network structure of usual distribution systems, they also provide the possibility of communication between the individual subscriber and the cable-television center.

Testing Color Reproduction by Means of a Programmable Color-Bar Generator, Heinwig Land and Gerhard Illetschko, *Rundfunktech. Mitteil. 20:* 242-246, Dec. 1976.

According to an international agreement regarding color television technique, colored areas should be reproduced on the screen in such a manner that their color stimuli agree with those of the original when these latter are lighted with standard illuminant type D 65. Because programs are normally televised with studio lighting, the color reproduction can be appraised visually only very incompletely. The electronic production of the chrominance signals of test colors in a programmable color bar generator and their reproduction on a picture monitor at the same time as the colors obtained by way of a television camera offers, on the other hand, favorable possibilities of comparison.

A System-Compatible Digital Color-Television Signal, Jurgen Heitmann, *Rundfunktech. Mitteil. 20:* 224-236, Dec. 1976.

Uniform transmission channels for data, speech and picture signals can in future offer considerable financial advantages. The article discusses the extent to which the projected 34-Mbit/s digital PCM transmission channel is suitable for the transmission of a color television signal. The author puts forward a system which is compatible not only with the several European color television standards, but also with the PCM coding which is already in use for television studio equipment.

Experimental Research of the All-Solid-State Color TV Camera, Kazuhiro Sato, Takamitsu Kamiyama, Syusaku Nagahara, Kenji Takahasi and Mikio Ashikawa, *J. Inst. TV Engrs. of Japan, 30:* 983-989, Dec. 1976.

The solid-state image sensors with a greater number of elements and less cost are being produced in recent years. The advantages of the solid-state image sensor lie in its smaller size, lower power consumption, longer life, lower operating voltage, and so on. Besides, various problems associated with the conventional television pickup tubes can be avoided. There are other problems to be solved, however, before a solid-state image sensor can be put into practical use in a color television camera system. The authors have designed and developed an experimental all solid-state color television camera using three MOS type image sensors (54 × 96 element) which have been developed originally for use in a card reader. This paper describes the performance of improved image sensors and some of the characteristics of the experimental camera including sensitivity, signal-to-noise ratio and registration.

Applications of the Pyroelectric Vidicon, T. Conklin, *Opt. Eng. 15:* 510-515, Nov.-Dec. 1976.

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at room temperature. They image in any wavelength band within the 2-400 μm range. For the 8-14 μm band, the PEV has a typical minimum resolvable temperature (MRT) of less than 1C of 250 TVL. When operated with increased pedestal current, the MRT can be reduced to 0.6C at 250 TVL. This paper reviews the significant parameters of the PEV, vis., electron-beam discharge lag, sensitivity, and thermal spread in the target, and some applications. These include fire location (specifically, forest fire mapping), security, industrial uses, and medical diagnostics. Forest fire mapping has been cooperatively done by Philips Laboratories and the Canadian Forestry Service. During that exercise, local sources of burning totally obscured by smoke were readily located by the PEV system. The unique ability of the PEV to detect motion lends itself to security applications. A chopping and storage mode of operation has been developed for industrial and medical applications. With this technique, the integrated signal from several frames can be displayed as a static image. Images of a circuit board show components operating at elevated temperatures. Veinal structures in various parts of the human body have been easily imaged with this system.

Subjective Effects of Bit Errors in a PCM Color Television System, Richard A. Ulene, *RCA Review, 37:* 320-357, Sept. 1976.

Subjective testing was made of human observers' response to PCM television pictures degraded with varying amounts of binary symmetric channel noise. Several approaches are discussed for evaluating picture quality measurements, the final choice being the Relative Preference method based on Thurstone's Law of Comparative Judgment. A suitable model for human response to visual stimuli is developed, as well as the analytical methods for analyzing the data from the subjective experiments. The experiments employ the method of paired comparisons to generate the appropriate data for the model. A description of the experiments is given and of the equipment used to generate the impaired television images. Of particular importance is the generation device used to inject known amounts of errors into the PCM communication lines. This device generates eight nearly uncorrelated error streams by sampling the outputs of three random noise generators. A computer program was used to estimate the parameters of interest from the observed preferences, calculate confidence intervals on the estimates, and also to perform a goodness-of-fit test on the estimated parameters using the hypothesized model. The parameter estimation method is the maximum-likelihood procedure. The results indicate that PCM television picture quality is more dependent on the brightness level and the amount of detail in the picture than conventional analog television picture quality. The results of the TASO tests of 1958 are cited for purposes of comparison. Limitations of the procedures are discussed and suggestions for future work are made.

TESTS, MEASUREMENTS AND ANALYSES

Fast computation of tristimulus values by use of Gaussian quadrature, Robert Wallis, *J. Opt. Soc. Am., 65:* 91-94, Jan. 1975.

In colorimetric work, the calculation of tristimulus values is typically accomplished by one of the standard numerical-integration schemes, such as Simpson's rule. However, great computational savings can be achieved by use of a more sophisticated approach. By computing the orthogonal polynomials associated with the CIE color-matching functions, the method of Gaussian quadratures can be applied. For certain types of color-matching problems, the Gaussian technique is at least twice as fast, for the same accuracy, as conventional methods.

Relation between Munsell and Swedish Natural Color System scales, Deane B. Judd and Dorothy Nickerson, *J. Opt. Soc. Am., 65:* 85-90, Jan. 1975.

The degree to which Munsell hue, value, chroma and the Swedish Natural Color System variables of blackness, whiteness, redness, yellowness, greenness, and blueness describe the same color space is shown by simple formulas. The pattern and small size of the *V/C* residuals obtained with the approximate formulas presented in this paper showed that: (1) a simple relationship exists between the Munsell and NCS systems, (2) when all experimental errors of production of samples are eliminated, it should be possible to convert notations of the two systems, from either one to the other accurately, (3) the samples of each system simply represent different sampling and description of what is essentially the same color space, and (4) there is little difference, ultimately, whether a description of color space is arrived at experimentally in terms of color differences (as for the Munsell parameters), or in terms of color resemblances, or character (as reported for the NCS 1969 sampling in terms of six elementary color sensations).