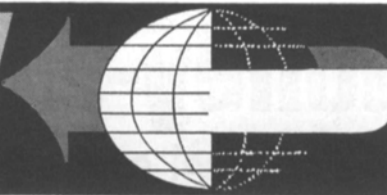


ABSTRACTS OF PAPERS FROM OTHER JOURNALS



Abstracts of papers appearing in other journals chosen for their importance and possible value to researchers as well as those of timely interest, are published in the *Journal* from time to time. Many translations of abstracts from foreign journals, chiefly those of the USSR, are made available to the *Journal* by the Research Laboratories of the Eastman Kodak Company. As a rule, translations are made of the abstracts and not of the papers. The journals in which the papers appear can be consulted at some libraries. Current issues of *Tekhnika kino i Televidinya* can be consulted at, or borrowed from the Society's Headquarters Office.

Those requiring definitive and thorough searches of current literature and patents are referred to *Abstracts of Photographic Science & Engineering Literature (APSE)*, produced by the Engineering Index, Inc., 345 E. 47 St., New York, N.Y. 10017, with the editorial cooperation of the Society of Photographic Scientists & Engineers. The subject areas are grouped below:

Aerial Photography
Cinematography
Film and Its Properties

General
Holography
Light Sources
Optics
Photogrammetry
Photographic Theory and Materials
Projection
Sound Recording and Reproduction
Space Technology
Special Applications
Television

AERIAL PHOTOGRAPHY

Automatic technique for abstracting color descriptions from aerial photography, J. Gourley, H. T. Rib and R. D. Miles, *Photo. Sci. and Eng.*, 12: 27-35, Jan.-Feb. 1968.

The use of color aerial photography is increasing in all disciplines of engineering and earth sciences. One of the problems facing the interpreter using color photography is the need for a rapid and automatic method of describing the various colors present in the photographs as an aid in the interpretation. This paper describes a simple, rapid, and reasonably accurate

method for automatically describing the colors present in aerial photographs based on measurements made with simple transmission or reflection densitometers. Four measurements are made for each sample point, using visual, red, green, and blue filters. The method describes the colors in the Munsell notation system or by descriptive names based on the ISCC-NBS system. A graphical method as well as a computer program were developed to determine the color descriptions.

Laser terrain profiler, William H. Schwieder, *Photogrammetric Eng.*, 34: 658-664, July 1968.

A description of the operational test, conducted by the Army Map Service, of an airborne system to determine its capabilities for establishing vertical control for photogrammetric mapping. The basic subsystems are: (a) a 70-mW helium-neon continuous-wave LASER distance measuring instrument; (b) a sensitive barometric altimeter system; (c) a profile recording system; and (d) a photographic system for path recovery. This paper reviews the planning, the airborne operational procedures, the data reduction techniques, and the final analysis of the results obtained from this test.

Photographic detectors IV: The measurement of contrast and range in air to ground viewing, I. Overington, *Jour. Phot. Sci.*, 15: 277-289, Nov./Dec., 1967.

This paper considers the general measurement of the contrast of objects on the ground

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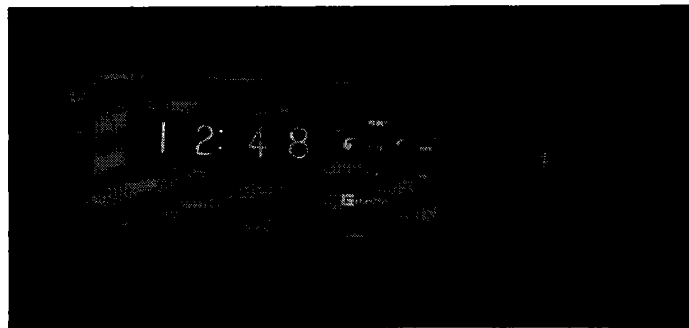
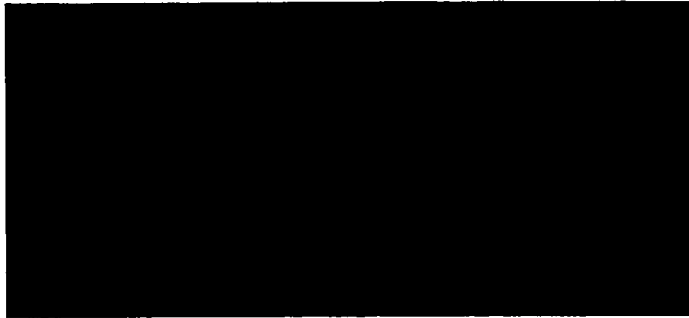
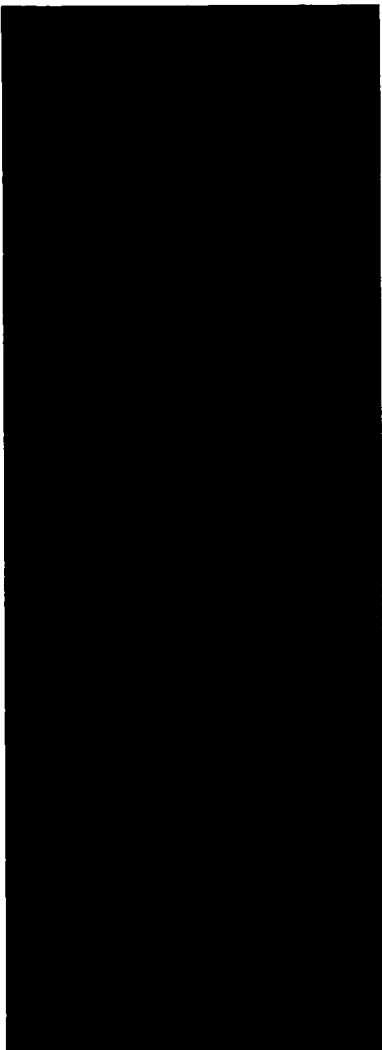
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against their immediate background. The problems of range measurement when studying range dependent brightness parameters in the air to ground viewing situation are also considered. It is shown that, while considerable errors must be accepted when using the simplest form of instrumentation, useful results can be obtained with no other equipment than a good quality kine camera mounted in an aircraft.

CINEMATOGRAPHY

Image graininess in cinematography (in Russian), V. G. Komar, *Tekh. Kino i Televideniya*, 12: 3-9, Apr., 1968.

The relation between graininess and modulation-transfer function (frequency-contrast characteristic) is discussed mathematically, and the transmission of graininess through the several links in the chain of operations leading to the production of a release print is analyzed. The curves of brightness fluctuation, visible to a viewer, against density show a maximum in the neighbourhood of a positive density of 1, and it is suggested that graininess estimations for the cinematograph process be made with the criterion of a positive density of 1 or 0.5 — S.C.G.

FILM AND ITS PROPERTIES

Average statistical density indices of black-and-white and color film prints (in Russian) S. A. Boldyreva, S. A. Drukker, A. M. Kusitsyn, and M. A. Murashova, *Tekh. Kino i Televideniya*, 12: 6-11, Mar., 1968.

A statistical survey has been made of densities of motion-picture film print produced in the Soviet Union, in order to obtain data for use in the working out of standards for screen illumination. The results of measurements on black-and-white, multilayer color and imbibition 35mm prints are presented graphically and in tabular form. — S.C.G.

Black-and-white reversal films of medium speed (in Russian), V. V. Vasil'ev, V. V. Okonechnikov, and S. A. Verkhovets, *Tekh. Kino i Televideniya*, 12: 10-12, Apr., 1968.

The photographic properties and processing instructions are set out for two Soviet black-and-white reversal films designated OCh-45 and OChT-45. They are produced in 16mm, 16mm (2 × 8) and 8mm widths for television and amateur use. — S.C.G.

GENERAL

Radio ancestors—an autobiography by Robert H. Marriott, Haraden Pratt, *IEEE Spectrum*, 5: 52-61, June 1968.

Modern electronics has evolved from the static of wireless, with its bigger and better spark coils, patent infringement suits, fraudulent stock schemes, and a mass of hasty legislation to bring order out of chaos.

HOLOGRAPHY

Holography and integral photography, Robert J. Collier, *Physics Today*, 21: 54-63, July 1968.

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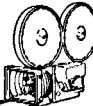
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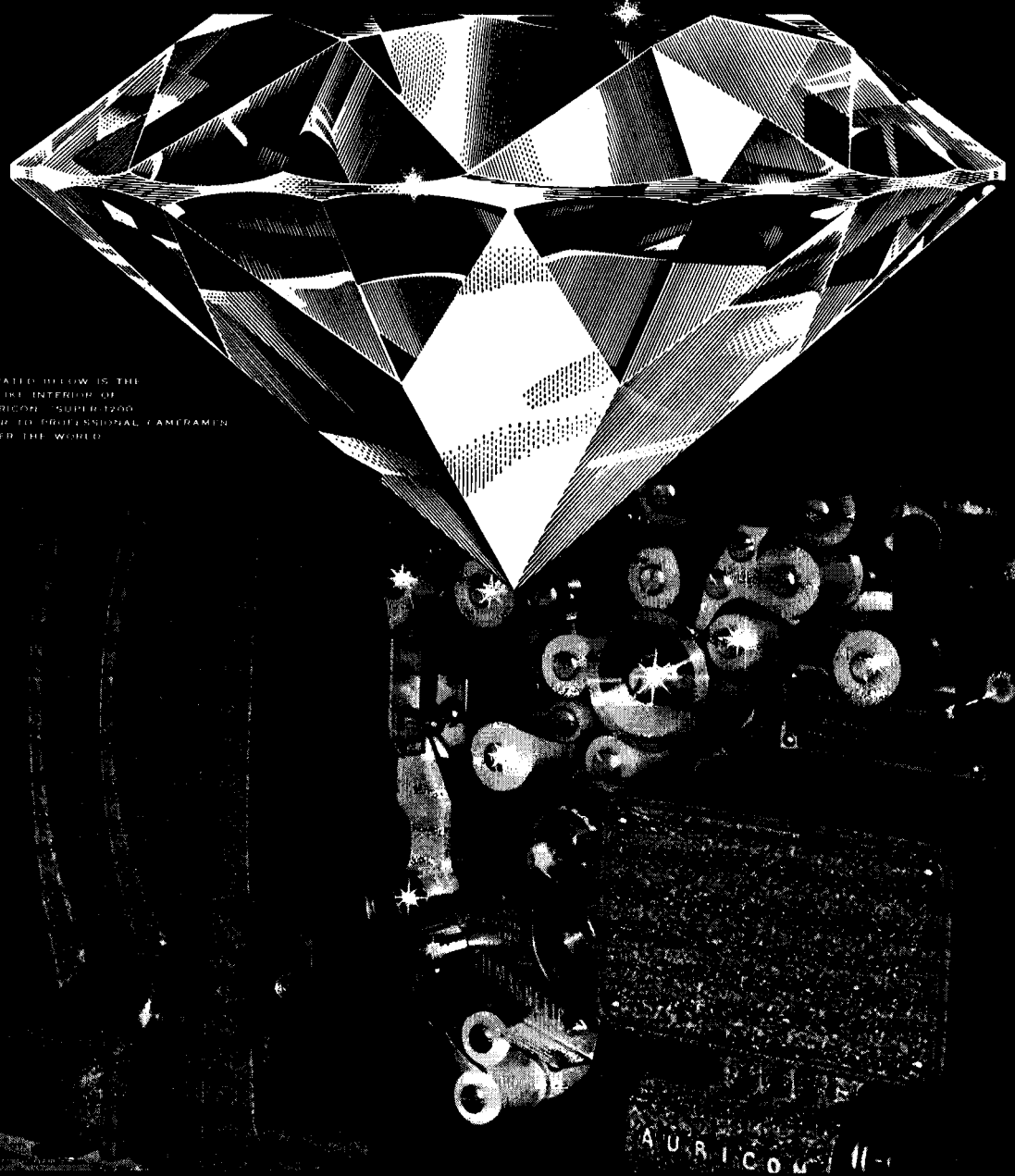
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The role of holes in the photographic process, J. Malinowski, *Jour. Photographic Science*, 16: 57-62, March/April 1968.

Investigations on the photoresponse of silver halides carried out on large crystals have provided new information on the properties of photo excited holes and electrons. This information may now be used to describe the mechanism of the photographic process, paying due attention to the fate of holes which until now has been more or less obscure. The experimental evidence now available favours the assumption that in less than a microsecond both holes and electrons, released on the absorption of light quanta in a silver bromide grain, are independently and separately trapped. According to the transport mechanism of Gurney and Mott, interstitial silver ions neutralize the trapped electrons, forming in this way the silver atoms of the latent image specks. The temperature dependence of the lifetime and mobility of photoexcited holes indicate that, in the volume of the crystal, trapped holes are also neutralized by mobile point defects of the lattice. Silver ion vacancies are likely to participate in

this neutralization process forming complexes with the trapped holes. Diffusion studies of photoexcited holes have indicated an apparent diffusion coefficient of these complexes with the mobility of other ionic defects of the crystal lattice. The hole complexes were found to dissociate on the surface of the crystals, thus establishing a concentration gradient relative to the interior. In this way the bromide equivalent to the photolytic silver formed during exposure is transferred on the surface of the grain. The proposed scheme provides also a natural explanation of the solarization process observed with heavier exposures.

Equivalent-lens theory of holographic imaging, W. Lukosz, *Jour. Optical Soc. Am.*, 58: 1084-1099, Aug. 1968.

A theory of holographic imaging is formulated in terms familiar from conventional optics. The effects of the curvatures and off-axis angles of the reference and read-out waves are described by equivalent thin lenses and prisms. The formation of the true-image wavefield is found to be completely analogous to the conventional imaging of the object wavefield by the equivalent lenses and prisms. To explain the conjugate image, we introduce the concept of time reversal. The conjugate-image wavefield is the time-reversed object wavefield conventionally imaged by equivalent lenses and prisms (and a plane mirror). The finite size and resolution of the photographic plate are taken into account. The size of the plate determines the effective aperture of the equivalent lenses

and prisms, it is equivalent to a diaphragm in the hologram plane. The modulation transfer function of the plate has the same effect as a diaphragm inserted in the imaging bundle during the recording (or the reconstruction) with its center at the reference (read-out) point. The two diaphragms limit the field of view and the resolution.

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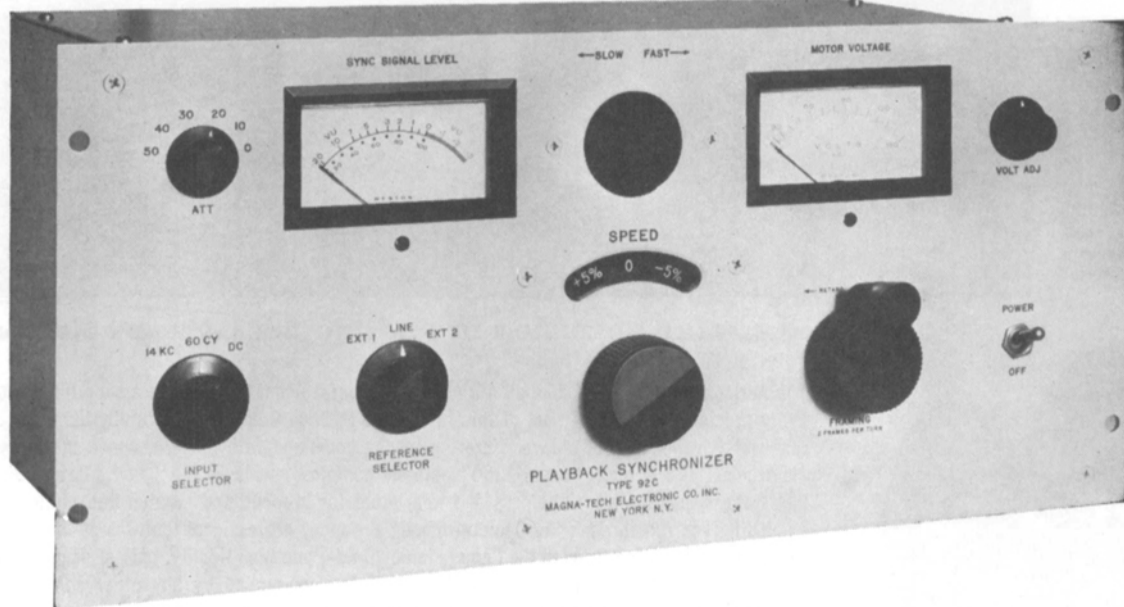
Studio and television luminaire performance using tungsten halogen lamps, R. E. Levin and T. M. Lemons, *Illuminating Eng.*, 63: 366-375, July, 1968.

The new tungsten halogen incandescent lamps have tremendous potential in television, motion picture, and theatrical applications. The fact that their lumen output and color temperature do not change appreciably during life would, by itself, mark this source as significant. There is the further advantage that, for a given lumen output, the tungsten halogen lamp will have a rated life up to several times that of a comparable conventional lamp. Alternatively, if the lives of the two lamps are made equal, the tungsten halogen lamp will exceed the conventional lamp in lumen output.

OPTICS

Glass/plastic fiber transmission characteristics, Donald A. Pontarelli, O. Harry Olson, Anatoli Brushenko and Arthur C. Menadier, *SPIE Jour.*, 6: 128-131, Apr./May, 1968.

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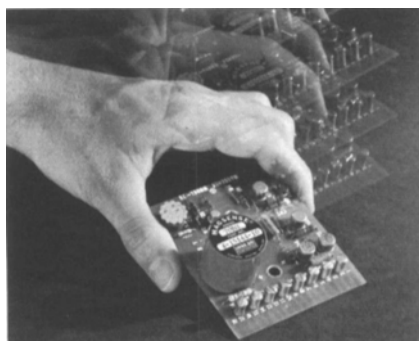
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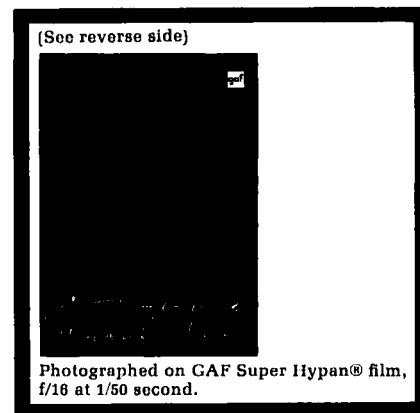


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The transmission behavior of various length light guides made of synthetic fibers is discussed. Comparison is made between different lengths and fiber sizes, with bundle diameters held constant. An attempt has been made to locate absorption bands suspected to exist within these fibers at approximately $0.9 \mu\text{m}$. The nature of material studies either in process or anticipated is covered, the objectives of which are to improve the color, brightness and wavelength efficiency of polymer fibers.

Consideration for fiber optic application to cathode-ray tubes, Andrew A. Mueller, *SPIE Jour.*, 6: 44-48, Dec., 1967/Jan. 1968.

Consideration is given to answering the application engineer's questions regarding the relative importance of fiber size, extra mural absorbing material, numerical aperture, geometry, and general cost effectiveness of fiber optic plates when used in a cathode-ray tube. Also included is a concise description of the various deficiencies of typical fiber optic products, the distortions, blemishes and their impact upon system performance. One example of a successful combination of fiber optics and a miniature cathode ray tube is described in detail.

Wavelength multiplexing in fiber optics, Charles J. Koester, *Jour. Opt. Soc. of Am.*, 58: 63-70, Jan. 1968.

Two ways are described in which dispersion can be used to improve the information transfer through fiber bundles. First, the use

of dispersion at the entrance and exit ends of a fiber-optics image-transmitting bundle produces an image with resolution improved by about a factor of two. The individual fiber elements are not seen in the image. Second, it is possible to reduce drastically the number of fibers in the bundle and still transmit a complete image. One way is to arrange a number of rows of fibers parallel to each other but spaced a distance apart. The dispersion is perpendicular to the rows. Each row of fibers carries a chromatic image of the object. At the exit end the different chromatic images from the various rows of fibers are recombined by a dispersion system similar to that at the entrance end. Thus, each image point is reconstructed by a plurality of wavelengths. The image can therefore contain color as well as intensity information. The improvement of information transfer per fiber depends on the number of rows and on the ratio of dispersion distance to fiber diameter. It is shown that with a ratio of 100, a 20-row fiberscope can transfer the same effective information as a conventional fiberscope containing 660 rows. The relationship between dispersion and achromatic field is discussed and a comparison is given of prism and grating dispersion systems.

If photographic emulsions are exposed to pseudothermal radiation and laser radiation for periods of time less than or equal to the coherence time of the radiation, the mean number of grains developed due to the interaction with four or more photons will differ. This difference of density is attributed to the fundamental difference of the photon statistics of thermal light and laser light. A density vs. log exposure curve is calculated and the gamma for exposure to thermal light is found to be lower than that due to laser light. An experimental method of determining this difference is described.

Photographic detectors V: Automatic data handling of film records, A. M. Newton and E. P. Lavin, *Jour. Photo. Sci.*, 16: 148-153, July/Aug. 1968.

This paper discusses ways of automatically retrieving brightness data from photographic emulsions and processing them in an electronic computer. Consideration is given to the correction of the errors inherent in photographic systems and it is pointed out that if this correction is sufficiently comprehensive the way is open to the much fuller exploitation of the potential of such systems.

Comparative noise performance of photographic emulsions in holographic and conventional imagery, J. W. Goodman, R. B. Miles and R. B. Kimball, *Jour. Opt. Soc. Am.*, 5: 609-619, May 1968.

An analysis of an idealized film-grain model suggests that any photographic emul-

PHOTOGRAPHIC THEORY AND MATERIALS

Effect of photon distributions on photographic grain, William M. Rosenblum, *Jour. Opt. Soc. Am.*, 58: 60-62, Jan. 1968.

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sion may be significantly more sensitive in holographic imagery than in conventional imagery. Experiments with Kodak Plus-X emulsion show that such an improvement of sensitivity can indeed be realized.

PROJECTION

The projection ratio in the showing of 70mm films (in Russian), K. Entz, *Tekh. Kino i Televideniya*, 12: 17-19, Mar., 1968.

A discussion is given of the advantages of 70mm cinematography and the projection ratio, i.e. the ratio of the width of the projected image to the projection distance (or to the spectator at the greatest distance from the screen), as shown in the standards of different countries and met with in the showing of 70mm films. S.C.G. — (Trans. from *Tekh. Kino. i Televideniya*)

SOUND RECORDING AND REPRODUCTION

The film projector—magnetic reproducer double sound system at CBS Television Broadcast Center, New York, *Audio Eng. Soc.*, 16: 157-162, Apr. 1968.

A double sound system enables magnetic sound to be reproduced on a playback device (dubber) which is synchronized to a film projector's picture output. Both drive motors are powered from a common source and synchronized through belt-driven selsyns. Eight projectors and four dubbers comprise the system, with expansion capabilities for three additional projectors and two dubbers. A switching system interconnects any four of the 32 possible synchronization combinations and simultaneously routes each dubber's sound output into the appropriate projector's sound circuits. The system has been found especially useful for newscasts and documentary programs.

Improving the quality of the reproduction of multichannel magnetic soundtracks, W. Wieland (in Russian, trans. from German), *Tekh. Kino i Televideniya*, 11: 65-68, October, 1967.

Defective reproduction of multichannel soundtracks is due to lack of balance between the separate channels and poor contact between the track and the magnetic head, among other things. The use of a magnetic test film is recommended for achieving the proper balance. — S.C.G.

Speed, pitch and timing errors in tape recording and reproducing, John G. McKnight, *Jour. Audio Eng. Soc.*, 16: 266-274, July 1968.

Because tape is a plastic medium driven by a capstan in a complicated rolling process, an accurate specification of "tape speed" is not simple. However, it is shown that even a complete specification of tape speed alone is not adequate to specify the pitch and timing error because changes of the recorded wavelength due to tape length changes cause additional independent timing and pitch errors of up to 1.0%. These are significant in comparison with the NAB tape speed tolerance of $\pm 0.2\%$. Measurement techniques are also reviewed.

A completely solid-state audio-follow video switching system, M. H. Stoll, *Jour. Audio Eng. Soc.*, 16: 301-306, July 1968.

This paper presents basic concepts of audio-follow-video and the conception and design of an operating solid-state system of this type. The audio-follow electronics include an all-dc-controlled solid-state switching system and a dc remote-controlled fader for audio.

Synchronous sound for motion pictures, Loren L. Ryder, *Jour. Audio Eng. Soc.*, 16: 291-295, July 1968.

The synchronization of sound with motion pictures, an important concern of motion picture and video-tape producers, is examined. The several methods normally used in handling and retaining sound synchronization from the original camera shooting to the final projection are described and their relative advantages and disadvantages discussed.

SPACE TECHNOLOGY

Atmospheric effects on propagation at millimeter wavelengths, E. E. Altshuler, V. J. Falcone, Jr., and K. N. Wulfsberg, *IEEE Spectrum*, 5: 83-90, July 1968.

Millimeter waves, with their relatively large available bandwidths, are being investigated as the logical means for meeting earth-to-space communication requirements. One important factor is the attenuation under a variety of atmospheric conditions.

Satellite ground station receivers, P. J. Cott, *Point To Point Telecommunications*, 12: 24-37, Jan. 1968.

Every unit of the communication receiver in a satellite ground station has to possess a high performance to enable the station to operate with INTELSAT III. The low-noise receiver uses a cooled parametric amplifier, followed by a mixer which converts the signal to an intermediate frequency, where it is filtered, amplified, equalized for group delay and transmitted through a cable if required. The final unit is a demodulator which for television is very wide band, and for telephony a special type giving threshold extension.

SPECIAL APPLICATIONS

Considerations for fiber optic application to cathode-ray tubes, Andrew A. Mueller, *SPIE Jour.*, 6: 44-48, Dec. 1967/Jan. 1968.

Consideration is given to answering the application engineer's questions regarding the relative importance of fiber size, extramural absorbing material, numerical aperture, geometry, and general cost effectiveness of fiber-optic plates when used in a cathode-ray tube. Various deficiencies of typical fiber optic products, the distortions, blemishes and their impact upon system performance are described. One example of a successful combination of fiber optics and a miniature cathode ray tube is described in detail.

High-voltage electron microscopy, V. Ellis Cosslett, *Physics Today*, 21: 23-33, July 1968.

British, French, Japanese and United States teams added accelerators to electron microscopes. Now voltages ten times conventional levels permit viewing of thicker, more representative specimens.

The scanning electron microscope: a new tool in disc-recording research, J. G. Woodward, M. D. Coutts and E. R. Levin, *Jour. Audio Eng. Soc.*, 16: 258-265, July 1968.

The scanning electron microscope (SEM) has only recently become generally available as a commercial device. The combination of high resolution and high magnification with a remarkable depth of focus provided by the SEM, together with simple procedures in specimen preparation, make this instrument admirably suited for use in disc-recording research and development. A description of the SEM is given, and photomicrographs of details of recording and playback styli and of new and worn groove walls in records are shown.

Imaging through a randomly inhomogeneous medium by wavefront reconstruction, Jack D. Gaskill, *Jour. Opt. Soc. Am.*, 5: 600-608, May 1968.

When an object and collecting pupil are separated by a medium that has random spatial and temporal variations of refractive index, a conventionally formed image may be severely degraded over the entire field of view of the imaging system. By using lensless Fourier-transform holography, considerable improvement of image resolution can be obtained within a limited field of view. The nature of the degradation of the reconstructed images is analyzed for both long and short exposures under the assumption that the random log amplitude and phase fluctuations across the collecting pupil are locally stationary processes with gaussian statistics. Experimental results support the analysis in a qualitative manner.

Shearing interferometry by wavefront reconstruction, Olof Bryngdahl, *Jour. Optical Soc. Am.*, 58: 865-871, July 1968.

Lately, practical applications for holographic techniques have been found in interferometry. These techniques are usefully applied to shearing interferometry. Different kinds of shear are treated, and in several cases the optical system is significantly simplified, compared to the corresponding conventional setups. Both zero-order (no tilt) and multiple-fringe (tilt between wavefronts) interferograms can be achieved, as well as a simple method for displaying the second derivative of phase variation in an object. Experimental results of holographic shearing interferometry are shown.

Color film for television, Dr. G. B. Townsend, *British Kinemat. Sound and Telev.*, 49: 338-242, Nov. 1967.

The fundamental parameters of each part of the combined film-television process are enumerated and are shown to be incompatible in several important respects. Those electronic methods which are currently available for improving the reproduced picture are described. The mismatch between cinema film and television places constraints on the film production crew and leads to a set of recommended practices for use when shooting film for color television. The television industry needs film emulsions and processing which have been specifically designed for television, and such requirements appear to be technically feasible.