ica, Defense Electronic Products Div., Washington, D.C. He had been with RCA for 32 years and had been stationed in Washington, D.C. since 1940. He attended Union College in Schenectady, N.Y., and was graduated in 1924 with the degree of Bachelor of Science in Electrical Engineering. He was employed by General Electric Co. until 1930 when he joined the RCA Manufacturing Co. in Camden, N.J. For many years a member of the Society, he served on the Papers Committee in 1956 and as Manager of the Washington, D.C., Section for the 1957–1958 term. He is author of a paper (together with S. Read, Jr.), "Some New RCA Photophone Studio Recording Equipment," which appears in the March, 1931, issue of the *Journal*.

George H. Loving

George H. Loving, General Manager of the Du Pont Company's Photo Products Dept., died in a plane crash December 8, 1963, near Elkton, Md., at the age of 56. He was returning from Puerto Rico with his wife when the Pan American Airlines jetliner in which they were passengers crashed with the loss of all aboard. He had been with Du Pont for 32 years, and during that time he had held important sales, technical and administrative positions. He joined the company as a chemist at the Gibbstown, N.J., Laboratory of the Explosives Dept., following his graduation from the University of Colorado in 1930. He spent 12 years in various technical and production posts before moving into sales. In 1943, he became Assistant Director of Sales and in 1950, Director of Sales for the Explosives Dept. In 1956 he was made Assistant General Manager of the Photo Products Dept. and became General Manager in 1963. Between 1956 and 1963 the company greatly expanded its operations in the photographic film and sensitized products field, and Photo Products became one of the fastest growing of Du Pont's 12 operating departments.

Mr. Loving was elected to the Board of Directors of the National Association of Photographic Manufacturers in 1961 and became a Vice-President of the NAPM in 1963.

Abstracts

Abstracts of papers appearing in other journals, chosen for their importance and timeliness, are published in the *Journal* from time to time. Most of these abstracts are translations, chiefly from the U.S.S.R., and are made available to the *Journal* by the Research Laboratories of the Eastman Kodak Company. As a rule, translations are made of the foreign language abstracts, not of the paper itself. The respective complete original texts can be consulted at some libraries. Current issues of *Tekh. Kino i Telev.* 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 Department of Graphics, School of Engineering and Applied Science, Columbia University in the City of New York, with the editorial cooperation of the Society of Photographic Scientists & Engineers. The editorial and business office of *APSE* is at: 632 West 125th Street, New York 27, N.Y.

The Subject areas are grouped below:

- Aerial Photography
- Cameras and Equipment (Except High-Speed)
- Cinematography (Underwater)
- Color
- Film
- General
- History (Surveys)
- Instrumentation and High-Speed Photography (Space)
- Laboratory Practice
- Lenses

AERIAL PHOTOGRAPHY

Improvements in or relating to Film Drive Mechanism for Photographic Cameras, British Pat. 931,805, R. Watts; assigned to Nat. Research Development Corp. Filed Mar. 6, 1959, 2 pp., 1 plate.

In aerial photography it is necessary to allow for the relative movement between the object and the camera by imparting compensatory motion to the film during exposure. In an aerial photographic camera in which the film is automatically advanced by power means, this image movement compensation is effected by a cam mech-

anism which causes the film speed to vary sinusoidally, the amount of image movement compensation being adjustable by causing the shutter to open at different parts of the sinusoid.—H.J.L.

A New Camera [MRB 21/1818] (in Dutch), W. F. Bonardt, *Tijds. Kadaster en Landmeetkunde, 78:* 367–71, No. 6, 1962; *Referativn ĭ Zhur., Fotokinotekhnika,* Abstract No. 8.46.29, 1963.

The aerial camera described is fitted with a Pinatar objective with an aperture of *f*/4, intended for obtaining pictures with dimensions 18 by 18cm. The lens surfaces are coated. It has a fixed stop, so that control of the exposure is carried out by means of the shutter only. The focal length of the objective is 210mm, and the angle of field of the image is 69°. The shutter is of the central type and consists of four disks with a sector cut out from each. The disks are rotated by an electric motor. Increase in the number of rotations of the latter leads to an increase in the speed of rotation of the disks and decrease in exposure. The maximum rotational speed is 9,000 rpm. Another system consists also of four disks, but with two sectors in each, and for each of their rotations the objective is opened twice. In this way exposures of 1/50 to 1/500 sec are obtained with transmission coefficients of 90°. The magazine takes 120 m of film of 20cm width. There is a separate control unit allowing for remote control of the camera. It is possible to obtain the following picture overlaps: 20, 60, 70, and 80%. The practical resolving power of the camera is 25 lines/mm at a height of 4,000 m.—S.C.G. (Translated from *Referativnyĭ Zhur., Fotokinotekhnika.*)

New Military Reconnaisance Cameras for Use at Very Large and Extremely Small Heights (in Dutch), A. Nawijn, *Tijds. Kadaster en Landmeetkunde, 78:* 337–49, No. 6, 1962; *Referativnyĭ Zhur., Fotokinotekhnika,* Abstract No. 8.46.30, 1963.

Nowadays aerial photographs are taken from both high (about 20 km) and also very low (30–150 m) altitudes. Descriptions are given of two cameras, one the TA 7M for low-altitude photography and the other the TA 90V for high-altitude work.—S.C.G.
(Abridged from *Referativnyĭ Zhur., Fotokinotekhnika.*)

Small-Format Aerial Cameras and Their Possibilities (in Russian), E. P. Arzhanov, *Izv. Vyessh. Ucheb. Zavedenĭt. Geod. i Aerofotos'emka,* 75–78, No. 5, 1962; *Referativnyĭ Zhur., Fotokinotekhnika,* Abstract No. 8.46.31, 1963.

Technical data are given for the AFA-MIIGAiK small-format aerial camera. The main kinds of work carried out with this camera are enumerated and its performance is evaluated. The Department of Aerial Photography of MIIGAiK has designed a new model of small-format aerial camera in which is used a magazine with increased capacity (35 m of film instead of 19 m). The take-up spool provides the drive for the transport mechanism; the film is kept flat pneumatically.—S.C.G.
(Translated from *Referativnyĭ Zhur., Fotokinotekhnika.*)

The VICOM Air-Photo System, Anon., *Interavia, 17:* 302–03, No. 3, 1962; *Referativnyĭ Zhur., Fotokinotekhnika,* Abstract No. 8.46.32, 1963.

The firm of Computing Devices (Canada) in collaboration with a number of English firms has made the VICOM apparatus for aerial photography, intended for aeroplanes of the type of the Lockheed CF-104. The camera uses 70mm film, and exposures are made automatically with a frequency of 1 to 8 frames/sec. The main motor drive of the camera requires 2.8 to 3.5 amp, the drive of the iris diaphragm requires 0.4 amp, and the heater (which allows work to be carried on at temperatures down to −20 C) requires 4 amp from a 28-v, dc supply. The magazine holds enough film for 500 photographs. The system for compensating for image displacement allows the earth to be photographed at a flight speed of up to 1400 km/hr at a height of 55 m. In a modification of the apparatus for work at night flash bombs are used. A special device records the basic navigational information (position and course of the aeroplane) on each frame. Exposure is controlled automatically by means of a photoelectric exposure meter. Typical equipment of an aeroplane for photography from low altitudes includes four cameras, set in the lower part of the fusilage, behind the nose wheel. The optical axes are directed forward, to the left, to the right and downwards.—S.C.G.
(Translated from *Referativnyĭ Zhur., Fotokinotekhnika.*)

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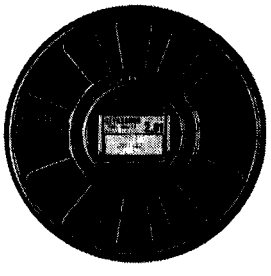

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Publicem

Determination of the Distortion of the Objective of the NAFA MK-75 Camera (in Russian), V. A. Yurevich, *Byul. St. Nablyudeniya Iskusstv. Sputnikov Zemli*, 30–3, No. 29, 1962; *Referativnyĭ Zhur., Fotokinotekhnika*, Abstract No. 8.46.42, 1963.

In order to determine the suitability of the NAFA MK-75 aerial camera for accurate astrometric work, a study has been made of the distortion of the Uran-16 *f*/3.5, 75cm objective which is used in it. The results indicate that the camera can be successfully used for the photography of artificial earth satellites that cannot be recorded with standard cameras because of their low brightness, with an accuracy in the measurement of position about 2.5 times greater than the accuracy of standard cameras.—S.C.G.
(Abridged from *Referativnyĭ Zhur., Fotokinotekhnika.*)

CAMERAS AND EQUIPMENT (Except High-Speed)

Yashica U-Matic Camera, Anon., *Amateur Cine World, 6:* 159–163, No. 4, July 25, 1963.

The U-Matic 8mm reflex camera has a 9mm to 28mm *f*/1.8 Yashinon zoom lens focusing from infinity to 1 m, and reflex through-the-lens viewfinding. The fully automatic exposure control has manual over-ride. A mask which can be screwed to the camera provides two hinge-down neutral density filters, × 2 and × 4, to cover the photocell, matching similar filters fitted over the lens. An electric drive motor, powered by four penlight batteries, gives running speeds of 16, 24 and 12 frames/sec. There is unlimited back-wind for superpositions but no means of taking single-frame exposures. The camera is manufactured by Yashica.—N.W.

Construction of Crown Cameras, Anon., *Amateur Cine World, 6:* 316–318, No. 8, Aug. 22, 1963.

Some constructional details, with close-up illustrations and a quick reference table listing the features of each of the three Crown Zoom cameras, are given.—N.W.

I Test the Lido IV, Anon., *Amat. Cine World, 6:* 270–271, 278, No. 7 Aug. 15, 1963.

The Lido IV is a sprocket-feed spool-loading 9.5mm motion-picture camera. The mechanism was originally designed for Classic 9.5mm or Monoplex-Duplex operation but has now been fixed in the Classic position. A spring motor gives four running speeds. The standard four-element *f*/2.5 fixed-focus 20mm S.O.M. Berthiot Cinor lens can be used with a Hyper-Cinor wide-angle attachment giving a focal length of 9.5mm, or with telephoto attachments.—N.W.

Improvements in the 16-SP Motion-Picture Camera (in Russian), V. P. Kontarev, *Tekh. Kino i Telev., 7:* 68–9, June 1963.

Some faults in the design of the Russian-made 16-SP camera, much used by the Soviet television studios, are pointed out, and modifications made to it at the Moscow television studios are described.—S.C.G.

Projection in Relief (in French), Anon, *Orientation Tech., 17:* 121–22, No. 6, 1962; *Referativnyĭ Zhur., Fotokinotekhnika*, Abstract No. 8.46.24, 1963.

A short description is given of the Simda stereoscopic camera, using 16mm film, and the Simda 3D projector for the projection of stereoscopic pairs of different sizes. The camera is provided with a 25mm objective, set permanently at the hyperfocal distance. The capacity of the spool is 7.5 m.—S.C.G.
(Translated from *Referativnyĭ Zhur., Fotokinotekhnika.*)

Equipment for the "Konvas-Avtomat" Camera (in Russian), L. N. Perfidskiĭ, *Tekh. Kino i Telev., 7:* 70–1, Sept. 1963.

Brief descriptions are given of three pieces of apparatus designed in the Central Studios for Documentary Films, U.S.S.R., for use with the Konvas-Avtomat motion-picture camera. They are: a device for adjusting an anamorphotic attachment; apparatus for focusing objectives; and a new design of the tachometer and apparatus for adjusting it.—S.C.G.

Improvements in or Relating to Kinematographic Apparatus and Mechanisms Suitable for Use Therein, British Pat. 938,610, S. V. Cronin; Assigned to Specto Ltd. Filed Feb. 25, 1959, 4 p., 1 pl.

A clutch for connecting coaxial shafts has a cam on the driving shaft co-operating

Inspect every foot before it leaves your plant with the HFC High Speed Heavy Duty Inspection Projectors -- 16mm & 35mm models now available.

NEW

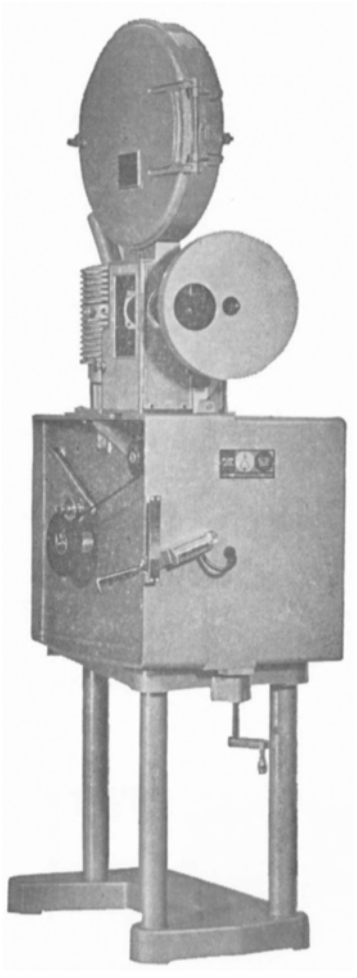
The projector is a converted front shutter Simplex with a two pin intermittent. 16mm or 35/32 film runs at a speed of 144 ft. per minute while 35mm film runs at a speed of 165 ft. per minute.

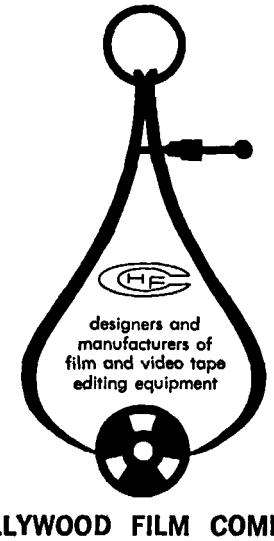
1. A variac controls the light intensity.
2. A 500 watt lamp is used for 16mm and a 1,000 watt for 35mm (a blower is used to cool the lamphouse).
3. A 2½ inch projection lens is furnished with each unit.
4. A start-stop lever controls the power to the lamp and motor.
5. The magazine and take up core takes up to 3,000 ft. of film.
6. Upper guide rollers are made to handle the film from either direction of the feed reel.
7. A free wheeling take off flange is provided in the magazine.
8. A lamp near the takeup reel permits hand inspection of the film prior to takeup.

NOUVEAU

Le projecteur contient un obturateur Simplex anterieur transformé avec deux clavettes intermittent. Les films de 16mm ou 35/32 tournent avec une vitesse de 144 pieds à la minute, tandis que les films de 35mm tournent avec une vitesse de 165 pieds á la minute.

1. Le regulateur de voltage d'intensité d'eclairage.
2. La lampe de 500 watt est nécessaire pour les films de 16mm, et de 1000 watt, pour les films de 35mm (un ventilateur est mise pour rafraichir la chambre de la lampe).
3. L'objectif de 2½ est instalé.
4. La manette de mise en marche et d'arret controle en meme temps la lampe et le moteur.
5. La boite de films avec noyau peut contenir 3000 pieds du films.
6. La roue supérieure est construite de manière de recevoir le film dans les deux directions, nourrie par la bobine centrale.
7. Une roue est instalée pour libérer rapidement le film de la boite.
8. La lampe se trouve pres de la bobine recepteuse, et donne toute facilité pour inspecter le film a main dans le projecteur.





NUOVO

Questi proiettori sono Simplex transformati, otturatore al fronte, meccanismo di scatto di due punte. La velocitá di proiezione in 16 o 35/32mm e di 144 piedi per minuto, e in 35mm, di 165 piedi per minuto.

1. Controllo manuale della luminositá della lampada.
2. Lampada di 500 watt per 16mm e di 1000 watt per 35mm.
3. Obbiettivo di proiezione di 2½".
4. Maniglia per controllo di motore e lampada di proiezione.
5. La cassetta porta pellicola puo contenere 3000 piedi.
6. I rulli superiori di guida sono construiti per operare con film provenente di ambi lati della bobina svolgitrice.
7. Disco con montatura sporgente nel magazzino.
8. Una lampadina illumina la bobina avvolgitrice, permettendo l'ispezione manuale del film prima che si avvolga nel proiettore.

NUEVO

Esta máquina es un proyector simplex convertido, obturador al frente y movimiento intermitente a doble grifa. Para 16mm o 35/32mm, la velocidad fija de proyección es de 144 pies por minuto, para 35mm es de 165 pies por minuto.

1. Un reostato controla la intensidad de la lampara de proyección.
2. Para 16mm se usa una lampara de 500 watt, y una de 1000 watt para 35mm (un chorro de aire ventila las lámparas en ambos casos).
3. Cada unidad está provista de un lente de proyección de 2 pulgadas y media.
4. Una palanca de control opera el motor y la lampara simultáneamente.
5. Capacidad de proyección: rollos de hasta 3000'.
6. Los rodillos de guía superiores operan con la película en ambas direcciones.
7. La tapa de la bobina de carga es desenroscable.
8. Una lámpara ubicada junto a la bobina de toma permite la inspección manual de la película antes que se rebobine en la bobina superior del proyector.

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with a lever attached to the driven shaft to lock the shafts together, this lever being linked to another lever attached to the driven shaft and co-operating with a third lever attached to the fixed frame of the mechanism.—A.S.C.

Bolex H8 Reflex Camera, No. 33 (I.C.P. Test Reports), P. M. Bernard, *Ind. Comm. Photographer, 3:* 35–36, No. 4, Aug. 1963.

The H8 is similar in construction to the 16mm H16 Reflex camera. The camera turret accommodates a range of three lenses, the 5.5mm wide angle, 12.5mm normal and 36mm telephoto. A diaphragm presetting device allows the aperture to be opened to focus or frame and closed to the preset value. The variable shutter can be partially closed in exceptionally strong light and can be used with an automatic "fader" attachment. Spool ejectors are fitted.—N.W.

Improvements in or Relating to Moving-Picture Filming Cameras, British Pat. 931,157, J. Hampl; assigned to Meopta Prerov. Filed Oct. 13, 1959, 4 pp., 3 plates.

A motion-picture camera using 16mm film is adapted for taking either two side-by-side rows of pictures of standard 8mm frame size or a single row twice as wide giving wide-angle pictures. This is achieved by having suitable masks associated with the film gate and viewfinder and by providing for transverse adjustment of the lens.—A.S.C.

Eumig S2, N. Dyer, *Amateur Photographer, 126:* 206–207, July 31, 1963.

This simple, inexpensive 8mm cine camera has a Eumigon 12.5mm *f*/1.8 fixed-focus lens and fully automatic exposure control. The electric motor gives a fixed film speed of 16 fps. Accessories include Schneider wide-angle and telephoto lenses. The manufacturers are Eumige Elektrizitäts und Metallwaren Industry, Austria.—N.W.

CINEMATOGRAPHY (Underwater)

The Film, an Efficient Tool for the Study of Handling Operations, H. Bonnière, *Manutention, 12:* 113–16, No. 89, 1962; *Referativnyĭ Zhur., Fotokinotekhnika,* Abstract No. 5.46.240, 1963.

An example is given of the use of cinematography for studying the work of the shipping department of a factory. A 16mm motion-picture camera was set up at a height of 4 meters on the wall of a neighboring building. For obtaining an image covering a wide field, a wide-angle objective (*f*/8, 10mm) with a large depth of field was used. The camera carried out automatic photography at a frequency of one frame in three minutes for a month. The film obtained was projected at a frequency of 24 frames/sec. The film made it possible to get an idea of the overall picture of the movement of trucks, workers and transport, and to determine the bottlenecks. After a preliminary viewing the film underwent careful study on the basis of which tables for the movement of automobiles and service personnel were drawn up, together with graphs of the utilization of packing areas with time. On the basis of the result a more adequate method of operating the department was constructed.—S.C.G.
(Translated from *Referativnyĭ Zhur., Fotokinotekhnika.*)

The Use of Underwater Motion-Picture and Still Photography for Measuring the Coefficient of Turbulence under Natural Conditions (in Russian), A. V. Mal'er, *Trudy Okeanogr. Komis. Akad. Nauk SSSR,* 43–4, No. 14, 1962; *Referativnyĭ Zhur., Fotokinotekhnika,* Abstract No. 8.46.266, 1963.

A report is given on a group of underwater researches carried out by the Leningrad Hydrometeorological Institute for determining the coefficient of turbulence. Descriptions are given of the apparatus used for determining the turbulence and the principles of determining the coefficient of turbulence by underwater photography.—S.C.G.
(Translated from *Referativnyĭ Zhur., Fotokinotekhnika.*)

International Standardization in the Field of Motion-Picture Technology (in Russian), S. D. Karipidi, *Tekh. Kino i Telev., 7:* 62–6, Aug. 1963.

A review is given of the Fourth Conference of the Technical Committee ISO/TA-36 "Cinematography" of the International Organization for Standardization. Discussions took place in four Sections: (1) motion-picture film; (2) ap-

paratus; (3) screen systems and characteristics of cinemas; (4) sound.—S.C.G.

Small Light Sources for Cinematography (in Russian), Yu. S. Moskalenko, *Tekh. Kino i Telev., 7:* 73, Aug. 1963.

Lighting equipment for amateur cinematographers available in the U.S.S.R. is briefly described.—S.C.G.

Apparatus for Underwater Photography, (in Polish), W. Wiśniewski and J. Woliński, *Fotografia, 10:* IV–V, No. 8, 1962; *Referativnyĭ Zhur., Fotokinotekhnika,* Abstract No. 4.46.111, 1963.

Apparatus is described for underwater photography with the Druh camera (Poland). The camera is placed in a bag of transparent elastic and impermeable plastic. The objective mount is provided with a ring with a supplementary lens (0.5 diopter), which allows photography at distances up to 2 m with the objective set for infinity. The edge of the bag grips the ring with a tightly drawn rubber band. The ring carries a wire-frame viewfinder. The diaphragm and exposure are set before the bag is put on. The recommended conditions for photography on a sunny day and with a sandy bottom are: depths up to 2 m, stop $f/8$, exposure 1/50 sec, film speed 21° DIN. Practical means of setting up the apparatus and sketches of the separate elements are given.—S.C.G.
(Translated from *Referativnyĭ Zhur., Fotokinotekhnika.*)

Some Problems of Optics and Light-Sources for Underwater Photography (in Russian), E. V. Babak, *Tekh. Kino i Telev., 7:* 57–61, Aug. 1963.

In underwater photography the camera objective is separated from the subject by layers of air, glass and water. The optics of such a system differs from that of normal photography and consequently special precautions are required to overcome aberrations and focusing difficulties. Difficulties encountered in using artifical light sources under water are also discussed.—S.C.G.

The Problem of the Reproduction of Spatial Relations in Stereoscopic Cinematography (in Russian), V. S. Shchekochikhin, *Tekh. Kino i Telev., 7:* 41–9, Aug. 1963.

Methods of estimating spatial relations in stereoscopic images are discussed. Experimental results are given from an investigation into the dependence of the perception of the distance of stereoscopic objects on parallax, viewing distance, and dimensions of the picture on the screen.—S.C.G.
(Translation of Author's Abstract.)

COLOR

The Calculation of Exposures in Printing Color Films (in Russian), N. G. Shamshteĭn, *Tekh. Kino i Telev., 7:* 21–9, July 1963.

Factors affecting the exposure in printing color positives from color negatives are discussed, and formulas are derived for calculating exposures so as to give the correct equivalent neutral image of an achromatic scale. The exposure of current Soviet color motion-picture film stock is discussed in the light of these equations.—S.C.G.

FILM

Test Films (in Polish), A. Walczak. *Kinotechnik, 16:* 3774–776, No. 174, 1963; *Referativnyĭ Zhur., Fotokinotekhnika,* Abstract No. 8.46.250, 1963.

A description is given of the FTS test film for testing 35mm and 16mm projectors. It has been produced by FODU, the Polish motion-picture technology research and servicing center. The first part of the film is an original negative of four test objects. The first serves for determining the image sharpness and geometrical distortions, the second for testing travel ghost due to the shutter, the third for estimating the stability of the picture and its dimensions in relation to the screen, and also for controlling operation of the pulldown mechanism, and the fourth test object is for measuring the speed of travel of the film. The special feature of the test film is the second part which contains six positives of specially chosen frames with different characteristic pictures. These allow a general visual control of the quality of projection, and provide a subjective evaluation of the various aspects of picture quality.—S.C.G.
(Abridged from *Referativnyĭ Zhur., Fotokinotekhnika.*)

GENERAL

Photography in Design Engineering, J. L. Epsy, *Am. Engineer, 32:* 23–28, No. 10, 1962; *Referativnyĭ Zhur., Fotokinotekhnika,* Abstract No. 5.46.237, 1963.

An experiment by the Eastman Kodak Company in using photography in the planning of workshops, factories, technological processes, etc., is described. Photography can also serve as a reliable guide in the installation of equipment and understanding the purpose for which it is intended. Such photographs are stuck onto standard sheets of paper and provided with the necessary written instructions. In complicated cases resource is had to photodrawings, a combination of a photograph and a supplementary sketch of drawing. After the project has been completed the photographs or slides of the different details and units are used for exchange of information, for cost control and for judging the efficiency of planning, etc. When a large number of copies is not required the Polaroid camera can be used for rapidly obtaining the prints. Recommendations are given for the quickest and cheapest methods of preparing photographs and their rational use. It is emphasized that expenditure on such photographs is offset by the economy in time, equipment and convenience in working.—S.C.G.
(Translated from *Referativnyĭ Zhur., Fotokinotekhnika.*)

Investigation of Non-Recurring Phenomena, E. R. Sorenson and D. C. Gajdusek, *Nature, 200:* 112–14, Oct. 1963.

The making of an anthropological research film in unedited form is described. The field records are spliced in chronological order, discarding only technically useless lengths. A main title and credit titles are added and appropriate titles signalling changes in time, place or subject are inserted throughout the film. A magnetic sound stripe is put on so that recorded field sound and narrated comments can be added. It is claimed that such a research film is of more value than a more carefully edited and rearranged documentary.—M.D.G.

Reproducing Drawings, Anon., *Aircraft Production, 24:* 330–336, No. 9, 1962; *Referativnyĭ Zhur., Fotokinotekhnika,* Abstract No. 5.46.251, 1963.

In England wide use is made of electrography in conjunction with microfilm for the duplication and storage of engineering drawings and information material. For example, two aeroplane construction firms, Bristol Aircraft and the Stevenage Division of English Electric Aviation, are using Filmsort aperture cards carrying a 35mm microfilm frame. Enlargement from microfilm is carried out with a Copyflo apparatus. The new duplicating system cuts the cost almost in half. In selecting originals to be microfilmed, the use of those in the Ao format should be kept to a minimum; originals can be made in India ink or pencil; line widths should be not less than 4.8 mm, and the distance between lines not less than 1.6 mm. The quality of microfilming should be controlled with the aid of a test chart, the quality of which is checked in the Copyflo apparatus, sensitometric and similar measurements also being carried out. The microfilm laboratory should be equipped with a microfilm apparatus for single-frame printing on 35mm film of the Sumoprint type, apparatus for processing and drying microfilms, a densitometer, apparatus for mounting the microframes onto the punched cards, a Copyflo 5B electrographic enlarger, reading apparatus, a microcopying duplicator of the Uniprinter type and other equipment and instruments. An example is given of a scheme for microfilming and electrographic enlargement.—S.C.G.
(Translated from *Referativnyĭ Zhur., Fotokinotekhnika.*)

HISTORY
(Surveys)

Towards a Higher Level of Technology in the Photographic and Motion-Picture Industry (in Czech), B. Kafka. *Jemná mech. a opt., 7:* 364–67, No. 12, 1962; *Referativnyĭ Zhur., Fotokinotekhnika,* Abstract No. 7.46.3, 1963.

The level of technology in the manufacture and design of photographic and cinematographic cameras is a basic factor influencing the quality and price of the goods. The author analyzes the causes preventing the achievement of high economic indices and discusses the possible ways of improving and simplifying the industrial processes.—S.C.G.
(Translated from *Referativnyĭ Zhur., Fotokinotekhnika.*)

Craftsmanship by Machine, L. A. Mannheim, *Perspective* (London), *5:* 5–11, No. 1, 1963.

Postwar trends in the German photographic industry are described. These include the growth of automated production techniques and consequent elimination of the smaller manufacturing firms. Zeiss

now accounts for nearly 50% of German camera and lens production, and Bayer (Agfa, Perutz, etc.), for 80% of film and chemical manufacture.—M.J.T.

Fachnormenausschuss Kinotechnik (Committee for Motion-Picture Technical Standards) Autumn Meeting in Munich, 8–13, Oct. [1962] (in German), *Filmvorführer, 9:* 2–4, No. 11, 1962, *Referativnyĭ Zhur., Fotokinotekhnika,* Abstract No. 7.46.5, 1963.

The proceedings of the meeting are summarized.—S.C.G.
(Abridged from *Referativnyĭ Zhur., Fotokinotekhnika.*)

The World's Photographic Industries, L. A. Mannheim, *Brit. J. Phot. Annual* (formerly *Brit. J. Phot. Almanac*), *1964,* 183–199, [Oct. 1963].

The photographic industries of the world include not only those directly making photographic goods but also a number of associated industries. The optical glass industry is reviewed in relation to the manufacture of camera lenses and cameras. Political factors in the camera field are discussed, in particular the 'benevolent paternalism' operating in West Germany and Japan and the state-controlled photographic industries of the Soviet Union and Eastern Europe. There are still small companies making cameras and accessories, but the manufacture of sensitized materials is almost completely in the hands of a few firms, which, with the exception of the Kodak organization (which is itself invading the chemical market) and Gevaert, are under the control of giant international chemical concerns. The market is surveyed, including production for export, the competition between the German and Japanese camera industries, the development and production policies in different countries and the fight for outlets. Four pages of tables of market information are included.—S.C.G.

INSTRUMENTATION AND HIGH-SPEED PHOTOGRAPHY (Space)

Photographing Spark Formation, Anon. *Elec. Times,* **142:** 688, No. 19, 1962; *Referativnyĭ Zhur., Fotokinotekhnika,* Abstract No. 5.46.277, 1963.

A short note is given on the method worked out by the Bell Telephone Laboratories for studying the formation of sparks in different types of relays with the aid of high-speed photography with frequencies up to 400,000 frames/sec. Photography is carried out in x-rays or in certain cases in the high-intensity radiation of ruby lasers. Photographs are obtained on a plate which is rapidly displaced about the end of a fiber-optics light conductor. When x-rays are used the fiber optics are combined with a phosphor layer.—S.C.G.
(Abridged from *Referativnyĭ Zhur., Fotokinotekhnika.*)

A Super-Fast Recorder for Day and Night Observation of Space Vehicles Using a Light Amplifier Capable of Suppressing the Background and Discriminating Moving Objects, *Z. Flugwiss., Referativnyĭ Zhur., Fotokinotekhnika,* **10:** 423–27, No. 11, 1962; Abstract No. 7.46.308, 1963.

Methods are described for photographing rockets and rapidly moving artificial satellites in unfavourable lighting conditions. The methods have been worked out and tested at the Wright Patterson Base. Good results were obtained by using a closed television channel for increasing the threshold sensitivity of the normal photographic system. Two systems have been studied for extinguishing the luminescent background of the sky. The simpler of these is capable of suppressing the signal obtained from the uniformly illuminated background, and signals from the installation if they are weaker than the signal from the subject. The suppression of the background and other contaminations is carried out in this system by a threshold amplitude limiter of the electronic contour of the video amplifier. The second system — a dynamic background compensator — reproduces on the screen of a photomultiplier only moving objects, suppressing the luminescence of the background and signals radiating from stationary objects. The special value of this system is emphasized in warfare owing to the ease of discrimination of moving objects on the television screen, on which there is usually background information in the form of clouds, hills, etc. The video signal so obtained which corresponds only to a moving object is obtained with the aid of a special transformer, similar to the orthicon with image transfer, but having, unlike the latter, a system controlling the secondary emission of electrons bombarding the anticathode. Another method which allows one to obtain the same results, is based on the alteration of the normal orthicon with image transfer into a differentiator orthicon using an enlarged anticathode with a mica-collecting target.—S.C.G.
(Translated from *Referativnyĭ Zhur., Fotokinotekhnika.*)

Very-High-Speed Photography, J. T. Harris, *Discovery, 24:* 32–37, Aug. 1963.

The optical and mechanical problems associated with the production of extremely high frame speeds are emphasized. The use of Kerr cells, image converters and image dissection is briefly discussed.—R.S.B.

Unusual Uses of High-Speed Photography in Industry and Science (in Russian), V. P., *Tekh. Kino i Telev., 7:* 74–5, Aug. 1963.

An account of the work of the English Company, High-Speed Instrumentation Ltd., is based on material in *British Kinematography, 41:* 132–38, No. 6, 1962.—S.C.G.

Space Photography (in Italian), F. Fiorio. *Alata, 18:* 29–32, No. 11, 1962; *Referativnyĭ Zhur., Fotokinotekhnika,* Abstract No. 8.46,-295, 1963.

Special features in the photography of cosmic space are the complexity and high cost of the apparatus, the high quality of the film used, and the difficulty of transmitting the pictures obtained from a satellite back to the earth. The main causes of the complexity of the apparatus are the necessity for complete automation, and the need for high quality photographs. The film used has a speed 100 times greater than that of normal 35mm film. However, the high speed of the film in combination with the high quality of the camera optics renders the transmission of the image to the Earth difficult, since the quantity of information on the photographs is much

greater than can be transmitted by even the most advanced television systems. The difficulties of processing the film on board a space craft and some of the optical problems encountered in the photography are discussed.—S.C.G.
(Abridged from *Referativnyĭ Zhur.*, *Fotokinotekhnika.*)

Schlieren Photography of Projectile Wakes Using Resonance Radiation, D. A. Leonard and J. C. Keck, *ARS Jour.*, *32:* 1112–1114, No. 32, 1962; *Referativnyĭ Zhur.*, *Fotokinotekhnika*, Abstract No. 4.46.333, 1963.

The use of resonance radiation is discussed for increasing the sensitivity of a system for the photography of wakes arising in the tracks of fast-moving objects (e.g., rifle bullets). In the experimental work use was made of potassium vapor with a strong resonance line at 5896 A, and light with a wavelength close to 5896 A which allowed the sensitivity to be increased several times and gave high quality photographs.—S.C.G.
(Translated from *Referativnyĭ Zhur.*, *Fotokinotekhnika.*)

Observation of Artificial Earth Satellites with the Aid of a Tri-Axial Guided Camera (in Russian), M. K. Abele and K. K. Lapushka, *Byul. St. Optich. Nablyudeniya Iskusstv. Sputnikov Zemli*, 5–7, No. 29, 1962; *Referativnyĭ Zhur.*, *Fotokinotekhnika*, Abstract No. 8.46.27, 1963.

A camera designed for the observation of artificial earth satellites is described. It has a tri-axial mounting: with the aid of the vertical and horizontal axes, the third axis can be orientated on the pole of the mean visible arc of the orbit. On tracking an artificial satellite against the celestial sphere the camera must rotate about the third axis only, then the direction of the displacement of the satellite in the focal plane will be perpendicular to the third axis. The camera uses the Uran-16 $f/3.5$, 75cm lens for aerial photography and a magazine with intermittent compensation. For bringing the rates of travel of the film and the satellite image together over all the visible arc of the orbit, a variable-frequency generator in the camera feeds the magazine drive. The generator frequency is changed with the aid of a program disk fastened to the axis of the telescope-guide. The control telescope, working through a relay system, directs a reversible motor, which rotates the camera to that region of the sky where the passage of the satellite is expected. The camera shutter is operated automatically. The results of regular observation carried out with this camera are discussed.—S.C.G.
(Translated from *Referativnyĭ Zhur.*, *Fotokinotekhnika.*)

Photographic Study of Arc Initiation and Stabilization in a Plasma Jet, Anon., *ARS Jour.*, *32:* 1097–1098, No. 7, 1962; *Referativnyĭ Zhur.*, *Fotokinotekhnika*, Abstract No. 5.46.276, 1963.

A 16mm Wollensak Fastax camera with a speed of 1000 frames/sec has been used for studying the initial stages in the formation and stabilization of plasma strings in an arc apparatus. The arc was brought into operation with the aid of a Tesla circuit. Argon was fed continuously into the apparatus chamber while the arc was burning. The usual time necessary for stabilizing the arc was taken to be equal to 5 sec. From the photographs it was evident that after the Tesla discharge the arc grows quickly, but its behavior is unstable as a result of the clockwise rotation of the arc relative to the surface of the cathode; irregular changes occur in its diameter, length and intensity. This is explained by the action of convection currents, electromagnetic effects and turbulent motion of the gas in the chamber. It was found that on altering the direction of introduction of the gas the direction of rotation of the arc relative to the electrode was altered. A detailed discussion is given of the influence of these factors on plasma strings in arcs, and also the occurrence of processes which determine the stability.—S.C.G.
(Translated from *Referativnyĭ Zhur.*, *Fotokinotekhnika.*)

Equipment for the Cinematography of Microscopic Objectives With Simultaneous Recording of Dimensions (in German), U. Kümmel and D. Palme, *Exp. Tech. Physik.*, *10:* 166–71, No. 3, 1962; *Referativnyĭ Zhur.*, *Fotokinotekhnika*, Abstract No. 5.46.255, 1963.

A description is given of equipment with various uses, particularly, cinemicrography of phenomena occurring in the breakdown of an insulator. With the aid of a semi-transparent (or ordinary) mirror a scale (or scales) with an arrow marking some value (e.g., voltage, current strength) is taken side by side with the image. It is possible to change the position of the subject and to alter the scale of the picture directly during shooting. Two types of equipment are described: for color photography and for photography in monochromatic light.—S.C.G.
(Translated from *Referativnyĭ Zhur.*, *Fotokinotekhnika.*)

Cinematographic Determination of the Advance and Retardation of a Metal During Rolling (in Russian), Yu. T. Abdulov, *Trudy Inst. Metallurgii. Ural'skiĭ Fil. Akad. Nauk SSSR*, 69–75, No. 9, 1962; *Referativnyĭ Zhur.*, *Fotokinotekhnika*, Abstract No. 8.46.273, 1963.

A method is described for determining the magnitude of the advance and retardation of a metal during rolling by cinematography of the motion of the front and rear end of the strip and the rotation of the rollers, with the subsequent measurement of the displacement on the film. The Konvas and SKS-1M cameras were used.—S.C.G.
(Abridged from *Referativnyĭ Zhur.*, *Fotokinotekhnika.*)

The Lighting of a Hydrogen Bubble Chamber for Photographing Bubbles of Small Dimensions (in Russian), V. M. Gorbunkov, *Pribory i Tekh. Eksp.*, 41–45, No. 6, 1962; *Referativnyĭ Zhur.*, *Fotokinotekhnika*, Abstract No. 5.46.268, 1963.

The small efficiency of bubble chambers in recording occasional events and the distortion which arises in working with bubbles of large dimensions call for a decrease in dimensions. Different possibilities of decreasing the diameters of the bubbles are considered, starting from the diffraction theory of the image and a photometric analysis of the change of illumination over the field of vision and in depth. Conclusions are

drawn about the necessity of increasing the dimensions of the light source, which is not possible with the use of existing autocollimation systems of illuminating hydrogen chambers. A new autocollimating system makes it possible to increase the size of the light source while decreasing the illumination of the mirror images of the tracks down to the intensity of their mirror images from the unilluminated transparent surface of the glass.—S.C.G.
(Translated from *Referativnyĭ Zhur., Fotokinotekhnika.*)

Some Applications of Ultra-Rapid Photography in the Study of Shock Waves (in French), R. Reymond, *Collog. intern. centre nat. recherche sci.*, 281–284, No. 109, 1962; *Referativnyĭ Zhur., Fotokinotekhnika*, Abstract No. 4.46.338, 1963.

A report is given of apparatus for ultra-rapid photography with a Kerr cell and an Askania *f*/4.5 40cm lens. A high potential (45 kv) is applied to a system of spark-discharge gaps and a delay line. Times of exposure from 70 down to 1 μsec are obtained. An explosion was used which lasted for 18 μsec. For photography in daylight, electronic flash with a capillary discharge tube was used. With the aid of this apparatus black-and-white and color (in an atmosphere of argon) photographs of the shock waves were made. A special electronic circuit ensured synchronization of the operation of the camera and the flight of a shell. The apparatus has been used for the study of the dynamic characteristics of a cylindrical explosive.—S.C.G.
(Abridged from *Referativnyĭ Zhur., Fotokinotekhnika.*)

Ultra-High-Speed Photography, K. R. Coleman, *Repts. Progr. in Phys., 26:* 269–305, 1963.

The literature on photography with exposure times shorter than 50 μsec is surveyed.—S.C.G.

The Adaptation of the NAFA-3c/25 and NAFA-3c/50 and Other Cameras for the Observation of Satellites (in Russian), B. A. Firago, *Byul. St. Optich. Nablyudeniya Isskusstv. Sputnikov Zemli*, 15–18, No. 25, 1962; *Referativnyĭ Zhur., Fotokinotekhnika*, Abstract No. 4.46.349, 1963.

Azimuth Device for the NAFA-3c/25 Camera [for the observation of artificial satellites] (in Russian), A. M. Isaev, *Byul. St. Optich. Nablyudeniya Isskusstv. Sputnikov. Zemli*, 9–11, No. 25, 1962; *Referativnyĭ Zhur., Fotokinotekhnika*, Abstract No. 4.46.348, 1963.

LABORATORY PRACTICE

A Study of the Relations Between the Sensitometric Characteristics of Negative Films and Results from Exposure Control in Cinematography, E. D. Katsenelenbogen, *Tekh. Kino i Telev., 7:* 19–26, June 1963.

An experimental confirmation has been made of the suitability of using characteristic curves constructed as a plot of the variation of optical or printing densities with lighting intensity, at constant exposure time, for calculating exposures in cinematography. The agreement between densities obtained in shooting and given densities corresponding to the subject brightnesses, and found from the characteristic curves, is completely satisfactory in practice.

The results were similar for both black-and-white and color negative films, but in the case of the latter (one of the older Soviet color motion-picture set) the most accurate results were obtained by using the characteristic curve of the red-sensitive layer.—S.C.G.

Estimation of the Optical Density of a Black-and-White Image During Duplicating of Motion-Picture Films (in Russian), L. P. Krylov, *Tekh. Kino i Telev., 7:* 7–11, Aug. 1963.

It is shown experimentally that in making copies on duplicating film the printing density of a black-and-white image can differ considerably from the visual diffuse density. In particular for very-fine-grain motion-picture films the ratio of copying gamma to visual gamma can reach as high as 1.5. The difference between the two kinds of densities changes with the type of film and conditions of development. For duplicating work, therefore, printing densities should be used, and should be determined directly instrumentally.—S.C.G.

Equipment for the Rapid Processing of Motion-Picture Materials (in Russian), N. I. Kirollov and E. M. Fel'dsherov, *Tekh. Kino i Telev., 7:* 71–81, July 1963.

A literature review is given of equipment for rapid and ultra-rapid processing of motion-picture films, and in particular of developments outside the U.S.S.R.—S.C.G.

Methods of Coating Magnetic Tracks on Narrow-Gauge Motion-Picture Films (in Russian), G. V. Avilov, *Tekh. Kino i Telev., 7:* 72–8, Sept. 1963.

A review is given of recent developments outside the U.S.S.R. in the coating o magnetic tracks on 8mm and 16mm films.—S.C.G.

Contamination of Magnetic Soundtracks and How to Prevent It (in Russian) (Paper read at the Fifth Congress of UNIATEC in Moscow), J. Carles, *Tekh. Kino i Telev., 7:* 21–4, Sept. 1963.

Processing of 70 and 35mm Color Motion-Picture Films on the 90P-1 Developing Machine (in Russian), G. Ya. Vyadro, *Tekh. Kino i Telev., 7:* 60–63, Apr. 1963.

The 90P-1 developing machine is two-sided with an independent drive on each side, intended for the processing of 70 and 35mm negative and positive color motion-picture film in Soviet studios. A number of defects of the machine in its original form are mentioned, and when these are attended to the machine is an economic proposition for the processing of long lengths of film, but not for short lengths.—S.C.G.

Practical Motion-Picture Sensitometric Control, L. J. Wheeler, *Brit. Kinemat., 43:* No. 2, 36, Aug. 1963.

Classical sensitometric control systems in commercial processing laboratories often involve a considerable number of highly skilled technicians. This is because large volumes of processing solutions are em-

ployed which, to be economical, must be continuously analyzed and replenished. In recent years the use of film in television created a need for the on-sight rapid processing of relatively small daily footages to standards of quality comparable with those of the large commercial laboratories. These requirements were coupled with a desire for compact, economical daylight-operated machines, a minimum crew and a simplified system of sensitometry. These needs have been largely satisfied by the combination of machines such as the Lawley Junior, high activity developers such as Ilford Cinephen and the "total loss" system of sensitometric control established by the B.B.C. and published in their Engineering Monograph No. 33. This paper is based upon (this) Monograph.

Quality Control in Black-and-White Laboratory Operation, G. E. E. France, *Brit. Kinemat., 43:* No. 2, 52, Aug., 1963.

The basis of (the) control system (at Pathe Laboratories) can be simply stated: it is to feed all relevant information to one central point or control center. The center is staffed by personnel trained basically in sensitometry but with a general all-round knowledge of laboratory procedures. It serves to establish standard processes and procedures and to set their tolerance limits, as well as to diagnose and correct faults by continuous evaluation of the established processes. Furthermore, it ensures that the processes so established are capable of reproducing consistent high-quality results with as little variation from the agreed standard as possible. Finally, it undertakes to test and assess the value of any new product or process which will improve the quality or increase the speed of any operation within the laboratory.

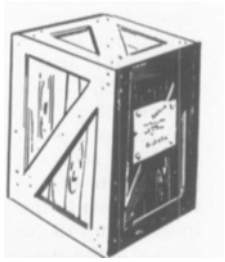
LENSES

Long Lens Survey, *35mm Phot., 6:* 297–300, 312, No. 5, Sept. 1963.

Details of lenses of focal length from 85mm up to 135mm are listed.—N.W.

The Pentovar Objective with Variable Focal Lengths (in Russian), V. Naundorf, *Nemetskiĭ Eksport,* 22–3, No. 5, 1963; *Referativnyĭ Zhur., Fotokinotekhnika,* Abstract No. 8.46.54, 1963.

A description is given of the Pentovar objective for the Pentaflex-8 motion-picture camera. It has a range of variation of focal length of 8 to 32mm and an aperture of *f*/2. The objective comprises 17 separate cemented lenses arranged in five groups. Between the first two fixed groups (counting from the film) lies a semi-automatic diaphragm, and the following two movable groups served to change the focal length, while the front fixed group is for photography at distances down to 0.5 m, counted from the plane of the film. The objective is well-corrected for chromatic aberration and is suitable for both black-and-white and color photography.—S.C.G.
(Translated from *Referativnyĭ Zhur., Fotokinotekhnika.*)



new products
(and developments)

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Erratum: Wow and flutter content of the EMT Studer C-37 tape recorder is ±0.04%. It was erroneously given as ±0.4% on p. 918, November, 1963, *Journal.* The recorder was announced by Gotham Audio Corp., 2 W. 46 St., New York 36.

Projection and schlieren lens assemblies for the first production of the Talaria color projector (*Journal,* Apr., 1963, p. 332) will be supplied by the Kollmorgen Corp., Northampton, Mass., according to a recent announcement. The projector, developed by General Electric Corp., will be used by National General Corp., a 220-theater exhibitor, in a nation-wide theater television network, according to present plans. Telephone lines are used to transmit closed-circuit television shows in color projected on motion-picture screens by the Talaria. Features of the new projector include a special control fluid; a novel light-gathering system utilizing the very high light output of a 5-kw xenon arc lamp; and a simplification of the projection optics so that all three primary colors are projected with only two output light beams. The projector has a high-power light source and an optical projection system similar to that of a motion-picture projector; but in place of the printed motion-picture film a thin layer of viscous fluid is used. The control fluid is continuously scanned by an electron beam in the same manner as the phosphor on the face of the picture tube in a conventional TV set. Instead of producing a picture directly on the control layer, the scanning process controls the light from the lamp which passes through the control layer in such a manner that the picture is produced on a large screen.

The Plumbicon closed-circuit color TV camera (*Journal,* Nov., 1963, p. 917) and the Eidophor large-screen color television were linked for a series of demonstrations conducted at the Pentagon, Washington, D.C., November 25–26 by Theatre Network Television, Inc. (TNT). The Plumbicon camera is about one-fourth the size of the image-orthicon type of cameras and is said to be more sensitive to light than vidicon cameras, requiring only about one-third of the lighting level required by color vidicon cameras. Developed by Philips of the Netherlands and imported by North American Philips, the camera is available in color and in black-and-white.