

The Exhibit Chairman, Keith Lewis, recently opened up the exhibit space to general allocation of booths. So far, the following companies have reserved space for their equipment:

| | |
|-------------------------------------|--------------------------------------|
| Arriflex Corp. of America | Edgerton, Germeshausen & Grier, Inc. |
| Avco Research & Advanced Dev. Div. | Fairchild Camera & Instr. Corp. |
| Beckman & Whitley, Inc. | Field Emission Corp. |
| Benson & Lehner, Inc. | Florman & Babb, Inc. |
| Camera Equipment Co. | Dr.-Ing. F. Früngel GmbH |
| Computer Measurements Co. | General Aniline & Film Corp. |
| E. I. du Pont de Nemours & Co. Inc. | Anso |
| Eastman Kodak Co. | Systems Development Dept. |

| | |
|----------------------------|----------------------------------|
| Heico, Inc. | Photo Sonics Inc. |
| Karl Heitz, Inc. | Polaroid Corp. |
| Hi Speed Equipment, Inc. | Prestoseal Mfg. Co. |
| L-W Products | Traid Corp. |
| Motion Picture Enterprises | Westinghouse Elec. Co. Lamp Div. |
| Neumade Products Corp. | Wollensak Optical Co. |
| D. B. Milliken Co. | Carl Zeiss Inc. |
| O'Connor Engineering Labs | Zoomar, Inc. |
| Photo-Animation Inc. | |

Other companies wishing to exhibit their products in the space still remaining should contact Keith Lewis, Eastman Kodak Co., 1000 Connecticut Ave., N.W., Suite 1101, Washington 6, D.C.

5th Congress-Papers by Session Subjects

Short Duration Light Sources

- Holdover in Xenon Flash Lamps, *Dr. Harold E. Edgerton and David Cahlander, Dept. of Electrical Engineering, Massachusetts Institute of Technology, Cambridge, Mass.*
- The Control of High-Power Xenon Flashes by Magnetic Switching, *Dr. E. J. G. Beeson, AEI Lamp & Lighting Co. Ltd., Milton Road, Leicester, England.*
- Flash-Light Source Measurement, *George H. Lunn, Aldermaston, Berks, England*
- Utilisation de Lampes Explosives Pour la Photographie par le Système Schardin, *Dr. Louis Deffet, Centre de Recherches Pour l'Industrie des Produits Explosifs (and Laboratoires des Hautes Pressions) Tir National, Place des Carabiniers, Brussels, Belgium; and R. Vanden Berghe, Centre de Recherches Scientifiques et Techniques Pour l'Industrie des Produits Explosifs, Val du Bois, Sterrebeek, Brabant, Belgium.*
- Explosive Flashlight—A New Development in an Explosion Light Source, *R. H. Stressau, 7 Summit Rd., Lake Zurich, Ill.; and Jack Gershon, 6245 North Oakley Ave., Chicago, Ill.*
- High-Intensity Explosive Light Sources, *Zev Pressman, Stanford Research Institute, Stanford Village, Menlo Park, Calif.*
- High-Intensity Fractional Microsecond Light Source, *Earle B. Brown, Farrand Optical Co., 4401 Bronx Blvd., New York, N.Y.*
- Millimicrosecond Light Source With Increased Brightness, *Dr. Heinz Fischer, CRRCP, L. G. Hanscom Field, Bedford, Mass.*

Applications of Light in High-Speed Photography

- High-Speed Photography Using Ultra-Violet Light to Eliminate Visible Light Masking In Self-Illuminating Events, *R. Wayne Anderson, Photo Lab., The Dow Chemical Co., Midland, Mich.*
- Die Anwendung der Mehrfachfunkenkamera bei der Untersuchung von Vorgängen, die eine hohe Gesamtinformation verlangen, *Dr.-Ing. H. Schardin, Rosentr. 10, Weil am Rhein, Baden, West Germany.*
- Motion Pictures of Rapid Air Currents and Shockwaves by Means of High-Frequency High-Voltage Sparks, *Dr.-Ing. Frank Früngel, Walter Thorwart and H. G. Patzke, Dr.-Ing. Frank Früngel GmbH, Hamburg-Rissen, Germany.*
- A Modern Shadowgraph System for Use in High-Velocity Aeroballistic Ranges, *Paul Thurston, Paul H. Cords, Jr., and W. R. Noyes, Photographic Div., U.S. Naval Ordnance Laboratory, White Oak, Md.*
- Submicrosecond Flash Sources, *Dr. Harold E. Edgerton, K. W. Cooper and J. Tredwell, Massachusetts Institute of Technology, Cambridge, Mass.*
- A High-Intensity Square Pulse Light Source for High-Speed Photography, *Lemuel L. Hill, Gas Dynamics Div., U.S. Naval Ordnance Laboratory, White Oak, Silver Spring, Md.*

Electric and Electronic Shutters

- Image Converter System With Fast Image Group Repetition Rate, *John H. Hett and R. King, Hett Associates, 24 Burton Place, Cresskill, N.J.*
- Development of Photographic Electronic Shutter Tubes, *L. Mandell, Imperial College of Science and Technology, London, England.*
- The "Astrocon" Tube and Its Application to High-Speed Photography, *A. E. Anderson and G. W. Goetze, Physics Project Laboratory, Westinghouse Research Laboratories, Beulah Rd., Churchill Borough, Pittsburgh 35, Pa.*
- A Kerr-Cell Camera With Synchronized Light Source for Millimicrosecond Reflected-Light Photography, *George A. Theophanis, Avco Corp., Research & Advanced Development Div., 201 Lowell St., Wilmington, Mass.*
- Multiple Kerr-Cell System With Square Shuttering Characteristics, *Dr.-Ing. Frank Früngel and L. Liebing, Dr.-Ing. Frank Früngel GmbH, Hamburg-Rissen, Germany.*

Stereo, Spectra and Micro Studies

- Design and Application of a High-Speed Time-Resolving Spectrograph, *Donald Baker Moore and John K. Crosby, Stanford Research Institute, Stanford Village, Menlo Park, Calif.*
- High-Speed Spectroscopic Instruments, *Dr. F. D. Harrington, U.S. Naval Research Laboratory, Washington, D.C.*
- A Stereoscopic High-Speed Framing-Camera Technique for the Study of Shaped-Charge Liner Collapse, *Bradley O. Reese, Stanford Research Center, Stanford Village, Menlo Park, Calif.*
- High-Speed Photographic Recording of Dual Data at High Magnification, *B. H. Amstead, College of Engineering, University of Texas, Austin 12, Texas.*
- High-Speed Motion-Picture Photography of Microscopic Phase Changes, *Dr. J. E. Benjamin and J. W. Westwater, 213 East Chemistry Bldg., Division of Chemical Engineering, University of Illinois, Urbana, Ill.*

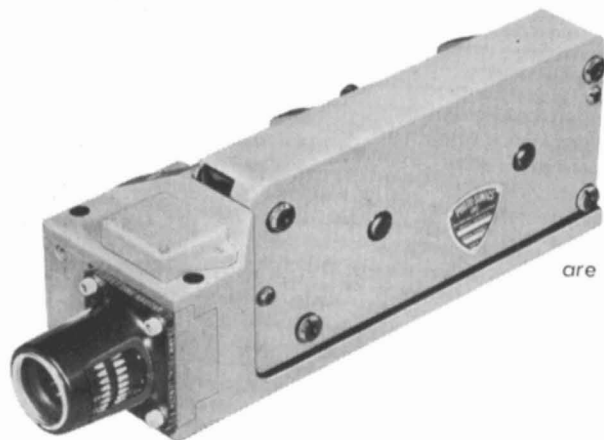
Cameras: Sweep and Streak

- An *f/1* Streak Camera for Use in the Ultra-Violet, *J. Dyson, R. F. Hemmings and R. T. Waters, Associated Electrical Industries Ltd., Research Laboratory, Aldermaston Court, Aldermaston, Berks, England.*
- Streak Camera Development at the National Research Council, *E. H. Dudgeon, National Research Council, Division of Mechanical Engineering, Ottawa, Canada.*
- The Improved *f/10* Sweeping-Image Camera: A Versatile Model for Explosive Research, *Berlyn Brixner, P.O. Box 1663, Los Alamos, N.M.*
- A High-Speed Rotating Mirror With Greater Dynamic Resolution, *Willard E. Buck, Box 357, Boulder, Colo.*
- VFK-UVQJM High-Speed Drum Camera, *Jam Hampl, Meopta Optics and Fine Mechanics, Research Institute, Prerov, Czechoslovakia.*

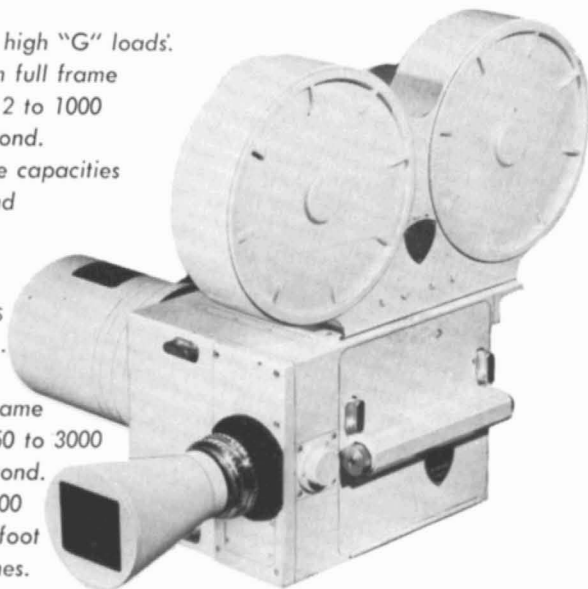
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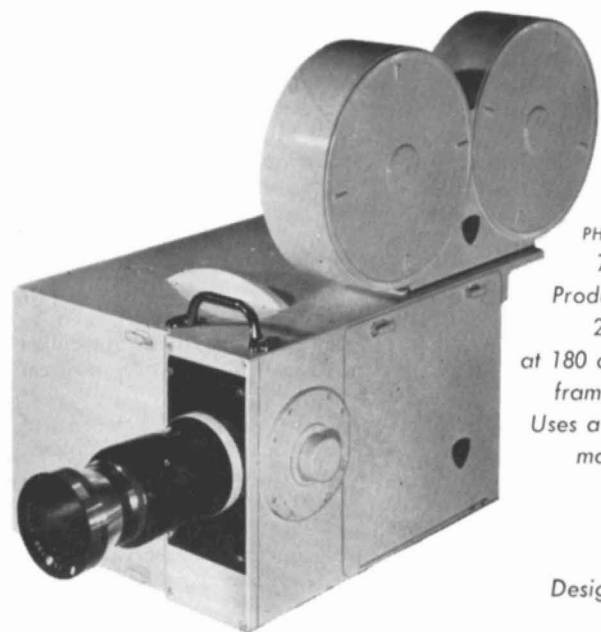
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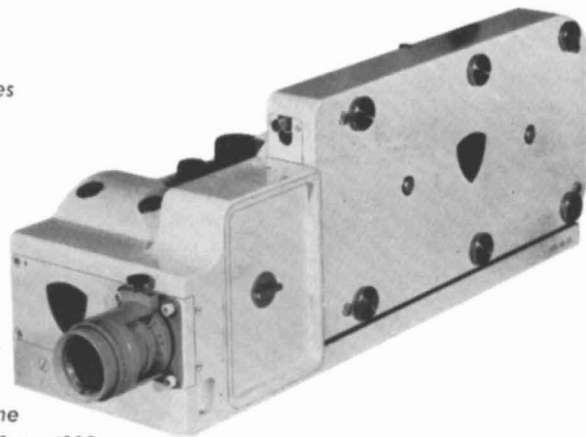
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Cameras: Rotating Mirror and Smear

The CORE Camera (Continuous Receptivity—One Rotating Element), *J. N. Whyte, A.R.D.E., Fort Halstead, Sevenoaks, England.*

A New Ultra-High-Speed Framing Camera Combining a Rotating Mirror With a Film Drum, *T. Uyemura, Institute of Industrial Sciences, University of Tokyo, Yayoi-Cho, Chiba-City, Japan.*

Model 200, Reflecting Optics, Sweep Camera, *Thure Anderson, 18829 Lamson Rd., Castro Valley, Calif.*

Smear-Camera Techniques, *T. P. Liddiard, Jr., and B. E. Drimmer, U.S. Naval Ordnance Laboratory, White Oak, Md.*

Intensification Techniques

High-Sensitivity Television as an Aid to Low Light-Level Photographic Recording, *B. A. Bang, Bendix-Friez, 1400 Taylor Ave., Baltimore, Md.*

Electronic Image Intensification—An Image Intensifier Using Cathode-Conductivity, *Robert A. Chippendale and J. R. Folkes, A. E. I. Research Laboratory, West Road, Templefields, Harlow, Essex, England.*

Very-High-Gain Image-Intensifier Systems and the Photography of Single Photons With Microsecond Time Resolution, *Martin L. Perl and Lawrence Jones, Physics Dept., University of Michigan, Ann Arbor, Mich.*

Tirage des Photographies Sous-Exposées par les "Contrasteurs Optiques," *Miche! Cloupeau, Laboratoire de Recherches Electromiques de la Sorbonne, 11 rue Pierre Curie, Paris 5, France.*

Flash X-ray

50-Millimicrosecond Flash X-Ray Photography System for Hypervelocity Research, *Dr. W. P. Dyke, Linfield Research Institute, McMinnville, Ore.; and Frank J. Grundhauser, 210 Ford St., McMinnville, Ore.*

Installation Triple de Radiographie Eclair à 600 kv, *Dr. J. Viard, Poudrerie Nationale, Sévran, Seine-et-Oise, France; and L. Beaudouin, 16 Rue Roger Salengro, Aulnay s/Bois, Seine-et-Oise, France.*

X-Ray Flash Cinematography of Small Objects, *Heiny Alberti, Dr.-Ing. Frank Früngel and Walter Thorwart, Dr.-Ing. Frank Früngel GmbH, Hamburg-Rissen, Germany.*

Megovolt Flash X-Ray Equipment, *E. W. Walker, A.W.R.E., Aldermaston, Berks, England.*

Applications of Flash Radiography, *J. S. McVeagh, A.R.D.E., Sevenoaks, Kent, England.*

X-Ray Flash Cinematography up to 12,000 Images/S., *A. Stenzel, Hauptstr. 193, Weil am Rhein, Germany; and Dr. G. Thomer, Hauptstr. 274, Weil am Rhein, Germany.*

Application of Image Intensifier in Flash Radiography, *Dr. G. Thomer, Hauptstr. 274, Weil am Rhein, Germany; and Dr. Rudi Schall, Rosenstr. 11, Weil am Rhein, Germany.*

High-Speed Radiographic and Optical Techniques Applied to Hypervelocity Impact Studies, *J. William Gehring, Jr., Ballistic Research Laboratories, Aberdeen Proving Ground, Md.*

Measurements on the Density of Gas in an Argon-Discharge by Soft X-Ray Flashes, *Karl Vollrath, Rosenstr. 12, Weil am Rhein, Germany.*

Unusual Techniques

New Methods in Design and Computing for Special Optical Systems, *Raphael Boolsky, Ave. de Miremont 10, Geneva, Switzerland.*

Unusual Application of Optical Instrumentation at NOTS, *D. Keyes, W. Koiner, W. Lambert, G. Silberberg and D. Tiemann, USNOTS, China Lake, Calif.*

Some Unconventional Methods of High-Speed Photography, *Dr. J. S. Courtney-Pratt, Bell Telephone Labs., Murray Hill, N.J.*

Cameras: Multiple-Shuttered

High-Speed Intermittent-See, *Robert L. Rodgers, D. B. Milliken Co., 131 North Fifth Ave., Arcadia, Calif.*

A Rotating-Mirror Framing Camera Based on a Focal-Plane Shutter Principle, *Dr. Sigmund J. Jacobs, J. D. McLanahan and P. F. Donovan, U.S. Naval Ordnance Laboratory, White Oak, Silver Spring, Md.*

The Use of Focal-Plane Shutters in Rotating-Mirror Framing Cameras, *Dr. Sigmund J. Jacobs, U.S. Naval Ordnance Laboratory, White Oak, Md.*

Kerr-Cell Framing Camera, *W. C. Goss, R. 1257, Bldg. 112, Lawrence Radiation Laboratory, University of California, P. O. Box 808, Livermore, Calif.*

Tripod Size High-Speed Framing Camera, *R. J. Krumhansl, 451 La Vista Rd., Walnut Creek, Calif.*

Materials for High-Speed Photography

A Comparison of 35mm High-Speed Films Under Forced Development Conditions, *Zev Pressman, Stanford Research Institute, Stanford Village, Menlo Park, Calif.*

High-Speed Direct Recording Papers, *Herman D. Hunt, E. I. du Pont de Nemours & Co., Inc., Photo Products Dept., Parlin, N.J.*

Sur les Causes des Ecart de Réciprocité aux Tres Courts Temps de Pose, *Dr. Henri Sauvenier, Université de Liège, 1A Quai Roosevelt, Liège, Belgium.*

A Photometric Study of Brief Light Sources Associated With Photographic Emulsions, *M. Philbert and C. Veret, Office National d'Etudes et de Recherches Aéronautiques, 29-39 Ave. de la Division-Leclerc, Chatillon-sous-Bagneux, Seine, France.*

Applications: Ballistics

The New Technique for Measurement of Velocity of High-Speed Objects, *W. W. Atkins and D. A. Hall, U.S. Naval Research Laboratory, Washington 25, D.C.*

Study of Chemical Reactions in Gases Emerging From the Muzzle of a Gun by Means of High-Speed Photography, *Prof. Kartar Singh, Faculty of Chemistry and Metallurgy, Institute of Armament Studies, Kirkee, Poona 3, India.*

Microsecond Observations of the Dynamic Response of Explosives to Very High Rates of Loading, *R. H. Stressau, 7 Summit Rd., Lake Zurich, Ill.; and H. Napadensky and J. Savitt, Armour Research Foundation, Illinois Institute of Technology, 10 West 35 St., Chicago 16, Ill.*

High-Speed Measurement of Shock Compressibility of Solids in the 1 Mb Range, *Dr. Rudi Schall, Rosenstr. 11, Weil am Rhein, Germany.*

A Photographic Technique for Observing the Behavior of Porous Materials When Rapidly Compressed, *R. H. Stressau, 7 Summit Rd., Lake Zurich, Ill.; and H. Napadensky and J. Savitt, Armour Research Foundation, Illinois Institute of Technology, 10 West 35 St., Chicago 16, Ill.*

Application of the Slit-Aperture Camera for Observation and Data Acquisition, *Stanley Keen, Development and Proof Services, Aberdeen Proving Ground, Md.*

Applications: Miscellaneous in Industry

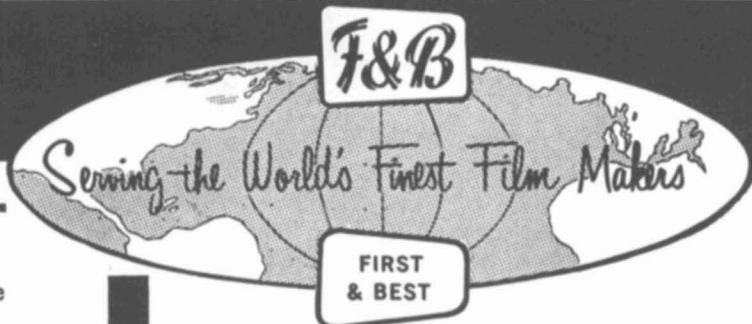
The Micro-Photography of Dilute Fiber Suspensions Moving at High Speed, *E. L. Scott, The Mead Corp., Chillicothe, Ohio.*

High-Speed Photography in the Development of a New Form of Pulveriser, *Dr. Ronald Jackson, British Coal Utilization Research Association, Randalls Road, Leatherhead, Surrey, England.*

Fundamental Research and New Theories in Canning Machinery as Developed by High-Speed Motion Picture Studies, *C. C. Collier and John J. Larish, 103 East Maple, Hoopston, Ill.*

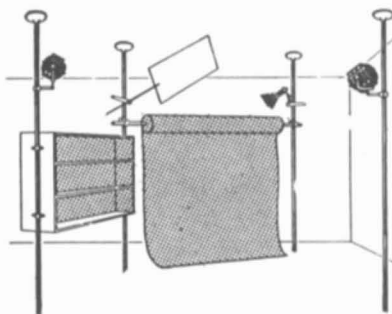
A Variety of Applications of High-Speed Photography at Outboard Marine Research Center, *Daniel H. Lamb, Outboard Marine Corp., Research Center, 4109 North 27 St., Milwaukee 16, Wis.*

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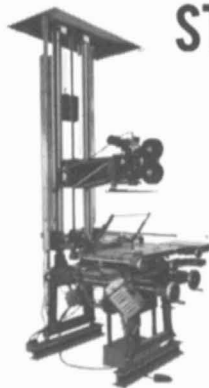
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High-Speed Photographic Studies of Electrically Exploded Metal Films and Wires, *K. N. Kreyenhagen, Explosive Ordnance Div., Aerojet-General Corp., Azusa, Calif.; and G. Woffinden and Dr. Louis Zernow, Aerojet General Corp., Downey, Calif.*

Values and Problems of High-Speed Photography

Method for Analysis of High-Speed Films, *Dr. F. Topfer, 15 Rue Sohet, Liège, Belgium.*

Some Philosophical Aspects of High-Speed Photographic Instrumentation, *Morton Sultanoff, Ballistic Research Labs., Aberdeen Proving Ground, Md.*

What Is the Sensitivity of a Photographic System?, *F. H. Perrin, Research Laboratories, Eastman Kodak Co., Rochester 4, N.Y.*

Study of Resolution Limits in High-Speed Recording, *Thomas E. Holland, Beckman & Whitley, Inc., 993 San Carlos Ave., San Carlos, Calif.*

Value Received — The Use of High-Speed Photographic Techniques in Research and Industry, *R. Wayne Anderson, Photo Lab., The Dow Chemical Co., Midland, Mich.*

Applications: Survey Papers

Review of High-Speed Camera Facilities at U.C.L.R.L., *Dr. David C. Oakley, Lawrence Radiation Laboratory, Livermore, Calif.*

Progress in High-Speed Recording at A.W.R.E., *K. R. Coleman and A. Skinner, A.W.R.E., U.K. Atomic Energy Authority, Aldermaston, Berks, England.*

The Evolution of Photographic and High-Speed Cinematographic Techniques at the Laboratoire Central de l'Armement Since the Congress in Paris in 1954., *Dr. Paul Devaux, Laboratoire Central de l'Armement, Arcueil (Seine), France.*

High-Speed Photography Applied to High-Speed Aerodynamics at the National Physical Laboratory, Teddington, *R. J. North, Aerodynamics Div., National Physical Laboratory, Teddington, Middlesex, England.*

A Review of Photographic Instrumentation for Ballistic Data Acquisition, *L. E. Davidson, Engineering Labs., Aberdeen Proving Ground, Md.*

Application: High-Speed Flow Dynamics

A Study of the Structure and of the Ultrasonic Emission From A High-Speed Jet of Air Using an Ultra-Rapid Electronic Camera, *François Canac and Mlle. M. Merle, Centre de Recherches Scientifiques, Industrielles et Maritimes de Marseille, 66, rue St.-Sebastian, Marseille (B. du R.), France.*

Photographic Investigation of a Fluid Jet Impinging on a Heated Plate, *G. F. Cochrane and Ralph G. Nevins, Mech. Eng. Dept., Kansas State University, Manhattan, Kansas.*

The High-Speed Photography of Liquid/Solid Impact, *Dr. J. H. Brunton, PCS Laboratory, Free School Lane, University of Cambridge, England.*

A Photomicrographic Arrangement Applied to the Study of the Atomization of Liquid Carburants in a Combustion Chamber, *M. Diamant, 8 Place d'Iéna, Paris 16, France.*

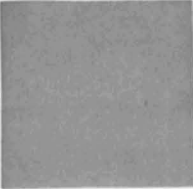
Photographic Study of Time Variations in the Drop-Size Distribution of a Liquid Spray, *M. F. Heidmann, NASA, Lewis Research Center, 21000 Brookpark Rd., Cleveland 35, Ohio.*

High-Speed Photography of Hypersonic Phenomena by Schlieren-Interferography, *H. Oertel, Institut France-Allemand de Recherches, St. Louis, Haut-Rhin, France.*

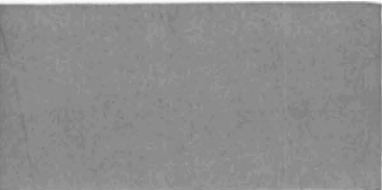
Über das Modellverhalten von Wirbeln im Stosswellenrohr, *Heinz Reichenbach, Katharinenstr. 25, Freiburg i/Br, Germany.*

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Educators . . .

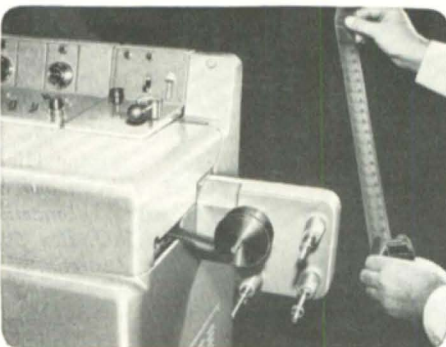
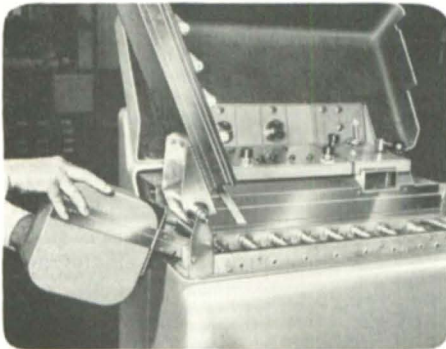
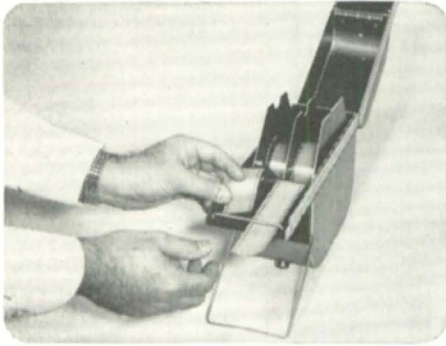
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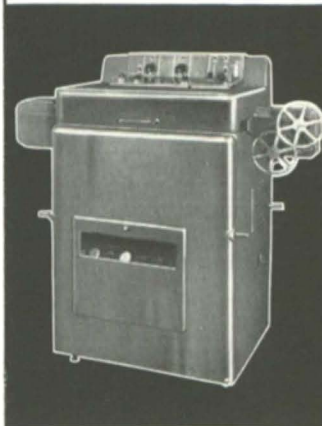
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| Filmline Model "K," 16mm Neg. Positive Processor, w/air compressor, syphon and transfer pump, angle iron stand, 1200 ft. capacity..... | 1,000.00 |
| Sound Magnasync recorder, 16mm X-400.... | \$ 600.00 |
| Projection GPL—Jan Projector w/speakers—Genova Movement..... | 1,000.00 |
| Lighting Colortran Jr. Kit..... | 137.50 |
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Conclusion of list of technical papers
to be presented at the 5th International
Congress on High-Speed Photography

Applications: Miscellaneous

Application of High-Speed Photography
in Nuclear Reactor Development,
*George W. Lindholm, Argonne National
Laboratory, 9700 South Cass Ave., Argonne,
Ill.*

The Use of High-Speed Photography
and Photoelastic Coatings for the
Determination of Dynamic Strains,
*Major C. A. Cole and J. F. Quinlan, U.S.
Naval Medical Field Research Laboratory,
Camp LeJeune, N.C.; and J. F. Zand-
man, Instruments Div., The Budd Co., P.O.
Box 245, Phoenixville, Pa.*

Underwater High-Speed Photography,
*J. V. Pfaum, 2536 Norfolk St., National
City, Calif.*

Photographic Problems, Techniques and
Instrumentation in Sea Animal Loco-
motion Studies, *Dr. Irving Rehman, 5153
Tampa Ave., Tarzana, Calif.*

Control Systems

Quenching Spark Gaps as Trigger
Element in High-Speed Motion Anal-
ysis Cinematography, *Walter Thorwart
and Dr.-Ing. Frank Früngel, Dr.-Ing.
Frank Früngel GmbH, Hamburg-Rissen,
Germany.*

Precision Speed Control of a High-Speed
Camera, *David Cahlander, Massachusetts
Institute of Technology, Cambridge, Mass.*

Remote Control Unit for High-Speed
Multiple Motion, *Fred Metlen, 1705
Summit Ave., Boeing Airplane Co., Seattle,
Wash.*

An Automatic Control System for a
High-Speed Cine Camera, *John G. G.
Hempson, Ricardo & Co., Ltd., Shoreham-
by-Sea, Sussex, England.*

A New Approach to Ultra High-Speed
Camera Control, *Gordon A. Greene and
E. Godin, Sandia Corp., Sandia Base,
Albuquerque, N.M.*

Pulse Program Generator, *Jakob H. Hohl
and R. Munger, Research Laboratory,
IBM Corp., Zürichstr. 108, Adliswil-
Zürich, Switzerland.*

Trigger Unit for High-Speed Camera,
*C. P. Johnson and S. A. Lott, Defence
Standards Laboratories, Department of
Supply, P.O. Box 50, Ascot Vale, W2,
Victoria, Australia.*