

greatest attraction. Super-8 Sound Inc. of Cambridge, Mass., has its Crystal Camera Control and Sync Generator units for a range of cameras; its new Recorder II can function as location recorder, studio dubber and final transfer unit. Cinesync of Paris in its Electra system has the Auto Quartz and Diamant radio control of synchronization, and its Sono-Studio unit provides corresponding transfer and editing features. And of course fully professional multi-path editing tables are now available for Super-8, the established KEM and Steenbeck range now being joined by Cinecraft's MKM Model 824, the Schmid Diploma II and the EM 800 from CTM of Levallois.

#### Audio-Visual

For the audio visual user there was such an enormous range of slide projectors and equipment for synchronization and multi-screen presentation that even enumeration is impracticable. However, the new Electrosonic cartridge player-decoder should be mentioned with its provision for the immediate selection of two alternative programs of picture or three sound versions.

Normally, dissolves between slides requires the use of a pair of coupled projectors but the new Rollei P3800 has twin lenses in one body, using only a single slide magazine but having two separate slide stages and optical systems. The dissolve time between successive slides can be set from  $\frac{1}{2}$  to 6 s, and for automatic operation a slide change interval between 4 and 30 s can be selected.

Slide projectors using the 110 frame size were not numerous, but a new application



The SMPTE stand at the 1976 *Photokina* in Cologne, West Germany. Many hundreds of the fair's visitors stopped by and requested information about the Society's goals, services and organization. Thousands picked up our literature. Shown here are Wilhelm Roth (l.), Editor of the *Fernseh- und Kino-Technik*, the German counterpart to the *Journal*, and Pablo Weinschenk-Tabernerero (r.), Motion Picture Engineer from SMPTE Headquarters. There was great interest in the Society and its activities.

of this format was the Audiocard system shown by Revox of Regensdorf (Switzerland). In this application, 60 110-size slides are mounted on a single card or plastic sheet approximately  $6 \times 4$  in or  $15 \times 10$  cm. In the projector, which accepts this card horizontally, any of the 60 slides can be immediately selected by a numerical pushbutton encoder and shown either on a small self-contained back-projection screen 12 in (30.5 cm) wide or by front projection onto an external screen. A sound cassette

unit provides commentary or instruction and can be coupled either to select pictures in automatic sequence (not necessarily in numerical order) or to provide multiple-choice questions for students to answer through the encoder. For the preparation of Audiocard software, there is a camera unit with mounting equipment which allows any existing material such as 2-inch square slides, diagrams or printed text to be reduced and assembled in the required format.

## A Report on the 12th International Congress on High-Speed Photography

By LINCOLN L. ENDELMAN

The 12th International Congress on High-Speed Photography was held in Toronto, Canada, 1-6 August 1976 at the Inn On The Park.

The Congress was sponsored by the Canadian Science Film Association and supported by the National Research Council of Canada, the Ontario Science Centre, Society of Motion Picture and Television Engineers, Society of Photo-Optical Instrumentation Engineers, The Canadian Secretary of State, The Government of Ontario and numerous industrial firms.

There were 18 National Delegates and a total registration of about 160. National Delegates were present from Australia, Argentina, Canada, France, Hungary, Israel, Japan, Korea, Netherlands, Spain, Sweden, Switzerland, Taiwan, United Kingdom, USA, USSR, Venezuela, and West Germany. Twenty exhibitors from the USA, Canada, United Kingdom, France and Switzerland demonstrated their equipment.

There was an informal reception on Sunday, 1 August for the conference delegates and their spouses. This was followed by a

meeting of the Schardin Medal Awards Committee. The chairman was R. Schall of West Germany. Present were D. Clayton of Canada, P. J. Bradley of the United Kingdom, M. Ya. Schelev of the USSR and L. L. Endelman of the USA. A discussion was held for a potential candidate for the award and the ground rules for a candidate. A second meeting was scheduled for later in the week to make the final decision.

The Inaugural Session began Monday morning with a welcoming speech by Congress Chairman Prof. B. J. Thompson, Dean of the College of Engineering and Applied Science at the University of Rochester. This talk was followed by the official opening of the Congress by Dr. P. A. Redhead of the National Research Council. Dr. Redhead remarked upon the use of high-speed photography as a diagnostic tool with the special emphasis placed on the techniques involved in the study of laser fusion and plasma effects.

The Program Chairman, Dr. Martin Richardson, of the National Research Council of Canada, Division of Physics, then commented on the further development of high-speed photography from the previous picosecond studies to the femtosecond capabilities now being used.

A contribution submitted on 27 August 1976 by Lincoln L. Endelman, Aerospace Systems, c/o Perkin-Elmer, 411 Clyde Ave., Mountain View, CA 94040.

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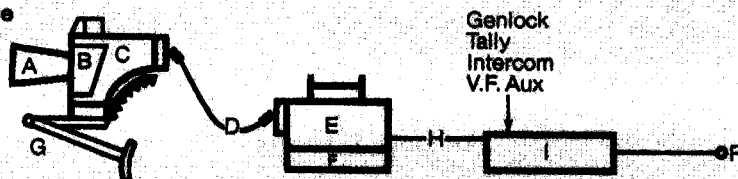
The modular SK-70 converts easily from a fully equipped, self-contained color studio camera to a modified studio camera. In the field, the studio version of the SK-70 can be connected directly to a VTR with only a co-axial cable. And for hand-held portability, the camera head features a shoulder mount, an auto-iris portable zoom lens, and a 1.5" viewfinder, along with a DC and process pack. The Digital Command Unit (DCU) with up to 3000 feet of single co-axial cable strongly enhances the capability of the SK-70. Another striking option is a 22:1 zoom lens that can be used for the studio version of the SK-70 in the field.

No matter which configuration you choose from those shown in the photo and three diagrams, the Hitachi SK-70 offers the precision and reliability of three 2/3" Saticon tubes in the camera head to insure excellent picture quality, combined with all the latest advances in broadcast camera technology.

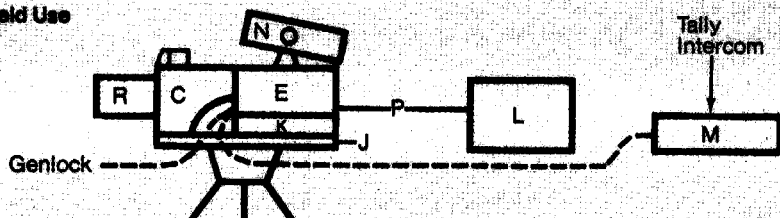
As you can see, our outstanding Hitachi SK-70 is a sound investment for broadcasters, production studios, and universities who need broadcast quality performance in a wide variety of assignments, all for the price of a single camera. We'd be pleased to arrange a demonstration of how the SK-70 can fit the following camera requirements inside or outside your TV studio, and more:



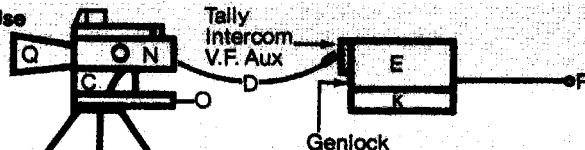
### 2. Portable Use



### 3. Field Use



### 4. Modified Studio Use



A)	Portable lens
B)	1.5" viewfinder
C)	Camera head pack
D)	Camera cable (300 ft.)
E)	Process pack
F)	D.C. pack
G)	Shoulder Mount
H)	Co-axial cable (3000 ft.)
I)	DCU
J)	Mount adapter
K)	A.C. pack
L)	VTR or FPU
M)	Operation panel
N)	5" viewfinder
O)	5" V.F. Mounting Plate
P)	Co-axial cable (video)
Q)	Portable lens w/conversion adapter
R)	Studio lens

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John Hadland, of John Hadland, Ltd., receiving the first Coleman Memorial Award in High-Speed Photography from K. Cooper.

The sessions were divided into two simultaneously presented groups. The major emphasis in the Congress was on ultra-high-speed ranges with special attention given to laser-plasma and fusion studies. Techniques and applications of high-speed photography below the 100,000-frame/s range, were not presented to any significant extent. It was especially noticeable that there was little if any mention of medical and industrial research.

The delegates in their discussions recommended that future Congresses attempt to gain a better balance of interest by encouraging greater participation by representatives doing research in the lower speed ranges, especially from the medical, industrial, and agricultural areas as well as the scientific and government programs.

The Delegates Luncheon was held on Monday with the place for the next Congress as the major item under discussion. The USSR representatives put forth a proposal that the 14th Congress be held in Moscow in 1980. Both the Japanese and the Dutch requested the 1978 Congress to be held in their countries. Professor Tsuneyoshi Uyemura, the Japanese national delegate, presented a detailed proposal which was accepted by the delegates.

Other items that were discussed included: the desirability of encouraging papers in the field of image analysis and data processing techniques; methods of certifying national delegates; possible UNESCO support; and a possible change in the name for the Congress.

A second meeting, held Tuesday evening, involved extensive discussions on the methods for determining national delegates. The delegates presented many different viewpoints since each country uses a different method and it was considered outside the province of the Congress to establish a standard method. The delegates were generally chosen in three different ways:

- (1) A government appointed position;
- (2) Selection by a scientific society;
- (3) Sole representation due to presentation of a paper.

The question was resolved by considering all those present as national delegates and having them carry over to the next Congress. If there were any changes the next Congress Chairman was to be notified. If a conflict arose as to who would be the proper delegate at the next meeting, the national delegates would decide whom to accept.

The next item was the language for the Congress. The decision was that the languages would be that of the host country and English. The papers would be published in the language presented, with the option given to the host country to publish the papers in other languages if they desired.

The final discussion considered changing the name of the Congress to some more general title that would be more representative of the topics covered in the papers. After much discussion it was decided that the name would not be changed.

## Social Events

Several tours and outings had been arranged for the accompanying guests. Wednesday afternoon's event was a cruise on Georgian Bay through the 30,000 Island chain. The final banquet was held on Friday night with entertainment from several different ethnic dance performers including Spanish, Croatian, Ukrainian and Slavic.

## Awards Presentations

The Schardin Gold Medal was presented by Dr. R. Shall to Dr. Martin Richardson for his contributions to the field of high-speed photography.

This Congress presented the first Coleman Memorial Award in High-Speed Photography. It was awarded by K. Cooper to John Hadland of John Hadland Ltd., for his many contributions to the development of equipment and techniques in furtherance of high-speed photography. The award is made in memory of Kenneth R. Coleman who died in 1972 at the age of 45. Among his many achievements he was largely responsible for the founding of the British National Committee for High-Speed Photography and was a very active supporter of the International Congresses. The award of a cash sum normally equivalent to £400 to £500 sterling is to be given annually in recognition of work done in support of the subject of high-speed photography, in scientific, technical or practical areas including any significant organizational or administrative contribution. Nominees or applicants may be either individual or teams of any nationality.

The Coleman Award Committee consists of representatives from The British National Committee for High-Speed Photography, The Institute of Physics, and The Royal Photographic Society.

The Congress was officially concluded by Dr. Brian Thompson after the presentation of the award.

## Publications Available

The *Abstracts* of the 12th Congress on High-Speed Photography are presently available at \$5.00 each. The *Proceedings* of this 12th Congress (Vol. 97) will be available around the end of December 1976. The cost of the Proceedings is \$40.00. The Abstracts and the Proceedings are available from: SPIE, P.O. Box 1146, Palos Verdes Estates, CA 90274.

# PROGRAM

## Monday, 2 August

### Session AA — ULTRAFAST STREAK CAMERAS — I

#### Sub-Picosecond Chronoscopy

*M. C. Adams, I. S. Ruddock, W. Sibbett and D. J. Bradley,* Imperial College of Science and Technology, London, England

#### Analysis of the Performances of a Versatile Streak Camera used for Immediate Picosecond Light Pulse Measurement

*B. Cunin, J. A. Miehe, B. Sipp,* Centre de Recherches Nucleaires, Strasbourg, France, and *L. A. Lompre, G. Mainfray and J. Thebault,* Centre de Recherches Nucleaires, Gif-sur-Yvette, France

#### Comparison of Image Converter Tubes for Ultrahigh Speed Streak Cameras

*S. W. Thomas and G. E. Phillips,* Lawrence Livermore Laboratory, Livermore, Calif.

#### High-Speed Image Converter Tube for the Investigation of Laser Radiation with Picosecond and Femtosecond Temporal Resolution

*B. I. Bryukhnevitch, H. S. Vorob'yev, V. V. Korobkin, A. M. Prokhorov, B. M. Stepanov and M. Ya. Schelev,* Lebedev Physical Institute, Moscow, USSR

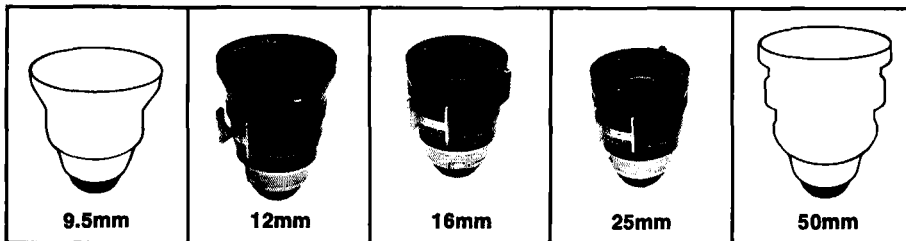
#### Dynamic Range of Image Converter Cameras in $10^{-10}$ Second Region

*S. Majumdar,* Royal Holloway College, Surrey, England



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costs more money to develop, naturally. But, given a good designer, you get a better lens.

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What we've got now is *three* lenses — 12mm, 16mm and 25mm. They're all f/1.2, T/1.3. Two more T/1.3s are in production — a 9.5mm and a 50mm.

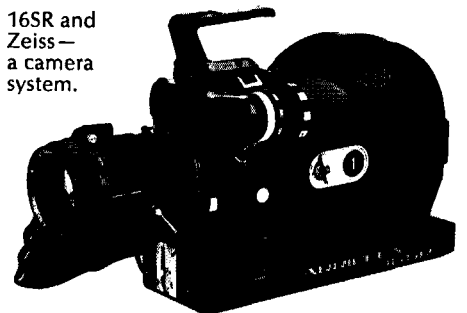
### Close focus

Minimum focusing distances: For the 12mm, 8 inches; for the 16mm, 10 inches; for the 25mm, 15 inches. They all stop down to f/11. And they're designed to deliver Zeiss quality at *every* stop, not just wide open.

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and of course allows matching the BVP-100's colorimetry to that of other cameras.

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## Session AB — OPTICAL METHODS

### Analysing Rapid Surface Motions with Moiré Fringes

*P. Fry, H. Taylor and H. Swift*, University of Dayton, Dayton, Ohio

### Application of Moiré Method to Measurement of High-Speed Deformation

*T. Tsuno and Y. Nakamura*, University of Tokyo, Tokyo, Japan

### Interference Measurements Without Using the Interferogram in White Light

*V. S. Sukhorukikh and E. P. Kazandzan*, Moscow, USSR

### Colorization of Schlieren Images

*C. E. Miller*, Massachusetts Institute of Technology, Cambridge, Mass., and *R. F. McDowell*, Education Communications/System, Boston, Mass.

### Colored Picture of Transparent Medium

*G. D. Salamandra and N. M. Wentzel*, Krzhizhanovsky Power Institute, Moscow, USSR

## Session AC — ULTRAFAST STREAK CAMERAS — II

### Picosecond Chronoscopy of Repetitive Weak Light Sources

*K. Helbrough*, Hadland-Photonics Ltd., Bovington, England, and *M. C. Adams, W. Sibbett and T. H. Williams*, Imperial College, London, England

### Space and Time Resolution in Fast Imaging Tubes

*C. Loty*, Laboratoires d'Electronique et de Physique Appliquées, Limeil, France

### A Magnetically Focused Photoelectronic Streak Camera Tube

*C. B. Johnson, J. M. Abraham and E. H. Eberhardt*, ITT/Electro-Optical Products Div., Fort Wayne, Ind., and *L. W. Coleman*, Lawrence Livermore Laboratory, Livermore, Calif.

### Camera a Balayage de Fente Picoseconds et Systeme d'Acquisition Associe

*R. Dupuy, N. Fleurot, J. P. Gex, M. Lamy and J. Y. LeGall*, C.E.A. Centra d'Etudes de Limeil, Villeneuve-Sainte-Georges, France

### Temporal Resolution of the Electron Optical Photochronographic Method

*V. S. Bulygin, Ya. A. Drozhbin and B. M. Stepanov*, Moscow, USSR

### Optical Deflection Streak Camera

*S. W. Thomas*, Lawrence Livermore Laboratory, Livermore, Calif.

### The Dynamic Range of Four Image Converter Tubes in Nanosecond and Subnanosecond Photography

*P. Dooley, V. I. Little, S. Sim and S. Majumdar*, Royal Holloway College, Surrey, England

## Session AD — APPLICATIONS — HOLOGRAPHY

### High-Speed Real-Time Holographic Interferometer

*T. Uyemura, Y. Yamamoto, Y. Fujimori and M. Ohara*, The University of Tokyo, Tokyo, Japan

### Improved Time Resolved High Speed Holography

*J. J. Ashmarin, Yu. A. Bychovsky, V. A. Greedin, Ya. U. Zysin and A. J. Larkin*, Moscow, USSR

### High Speed Holocinematography of Laser-Induced Cavitation Bubbles in Liquids

*W. Lauterborn and K. J. Ebeling*, Universitat Gottingen, Gottingen, Germany

### Hypervelocity Particle Measurements by Holographic Methods

*M. L. A. Gassend and W. M. Boerner*, University of Manitoba, Winnipeg, Canada

### The Holographic Investigation of a Hypersonic Target Material Subject to Impact with a Water Droplet

*T. J. Marcisz and R. Aprahamian*, TRW Inc., Redondo Beach, Calif.

### Application de l'Holographie Ultra-rapide a Reference Arriere a l'Etude de Deformations Dynamiques

*P. Smigielski, H. Fagot and F. Albe*, Institut Saint Louis, Saint Louis, France

### The Methods of Cineholographic Studies of High-Speed Processes

*A. S. Dubovik, Yu. I. Filenko, V. M. Ginzburg, B. M. Stepanov and I. S. Ushakov*, Moscow, USSR

## Tuesday, 3 August

## Session BA — X-RAY AND NUCLEAR RADIATION TECHNIQUES

### Characteristics of Flash X-Ray Sources

*D. J. Magel and C. M. Dozier*, Naval Research Laboratory, Washington, D.C.

### Cine-Radiography with Continuous X-Ray Sources

*A. E. Houston*, J. Hadland (P.I.) Ltd., Bovington, England, and *P. A. E. Stewart*, Rolls Royce Ltd., England

### Application de la Radiographie-Eclair a la Mesure de la Densite d'un Jet de Charge Creuse

*F. Jamet*, Institut Franco-Allemand de Recherche de Saint Louis, Saint Louis, France

### Fast Neutron Radiography

*E. H. Jager and F. R. Thomanek*, Messerschmitt-Bolkow-Blohm GmbH, Schrobhausen, Germany

### X-Ray Studies on Length Reduction of Perforating Rods at High Impact Velocities

*A. Stilp and V. Hohler*, Ernst-Mach-Institut, Freiburg, Germany

### Introduction des Ecrans Renforceurs aux Osyulfures de Terres Rares en Radiographie-Eclair

*F. Jamet*, Institut Franco-Allemand de Recherche de Saint Louis, Saint Louis, France

## Session BB — APPLICATIONS — SHOCK AND EXPLOSIVE PHENOMENA

### Investigation of Very Short Cavitation Shock Waves by Coherent Optical Methods

*K. Hinsch and E. Brinkmeyer*, Universitat Gottingen, Gottingen, Germany

### High-Speed Photography of Transient Cavitation on Marine Propellers

*J. K. Vandiver and C. A. Wales*, Massachusetts Institute of Technology, Cambridge, Mass.

### Investigation of Spatial Instability in Unconfined Discharge Channel

*V. I. Ziltsov, B. Ya. Lutset, A. A. Nilnikov, V. A. Samodergin, N. I. Sereda and L. K. Shchukin*, Moscow, USSR

### Studying Small Scale Explosive Cratering Phenomena Photographically

*A. Piekutowski, R. Andrews and H. Swift*, University of Dayton, Dayton, Ohio

### Pulsed Laser Stereophotography of Miniature Exploding Foils

*D. L. Paisley*, Monsanto Research Corp., Miamisburg, Ohio

### Super High-Speed Photorecording in Analysis of Electric Explosion of Conductors

*A. M. Iskoldski, Yu. E. Nesterikihin and A. F. Shestak*, Institute of Automation of Electrometry, Novosibirsk, USSR

## Session BC — HIGH-SPEED X-RAY DEVICES

### Sub-Picosecond X-Ray Streak Camera Development for Laser Fusion Diagnostics

*A. J. Lieber, H. D. Sutphin, C. B. Webb and A. H. Williams*, Los Alamos Scientific Laboratory, Los Alamos, N.M.



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### High-Time Resolution X-Ray Streak Camera with X-Ray Microscope

*N. Feurot, J. P. Gex, N. Lamy, C. Quinnesiere and R. Sauneuf*, Commissariat à l'Energie Atomique, Limeil, France

### Picosecond X-Ray Diagnostics

*D. Landheer, W. Sibbett and D. J. Bradley*, Imperial College of Science and Technology, London, England

### Ultra Fast Shutter Tube for Soft X-Ray Imaging

*C. Loty*, Laboratoires d'Electronique et de Physique Applique, Limeil, France

### Response of Ultrafast Scintillators

*J. D. Cheng, K. G. Tirsell and G. R. Tripp*, Lawrence Livermore Laboratory, Livermore, Calif.

### Fiber Array Technique for Subnanosecond X-Ray Framing Camera

*J. C. Cheng, L. G. Multhaus and G. R. Tripp*, Lawrence Livermore Laboratory, Livermore, Calif.

### Film: *The Microchannel Plate*

*J. Graf*, Laboratoires d'Electronique, Limeil-Brevannes, France, and *A. Woodhead*, Mullard Research Laboratories, Redhill, England

## Session BD — APPLICATIONS — BALLISTICS

### Synchrospeed — A New Synchroballistic Camera

*A. E. Houston, A. Tabrar and J. S. McVeagh*, Newhouse Laboratories (UK Ministry of Defence), Bovington, England

### SST-Synchro-Streak-Technik

*M. Held, D. Ludwig and P. Nikowitsch*, Messerschmitt-Bolkow-Blohm GmbH, Schrobenhausen, Germany

### High-Speed Photography in the Aeroballistic Range and Track Facilities of the Von Karman Gas Dynamics Facility

*R. E. Hendrix and P. H. Dugger*, Von Karman Gas Dynamics Facility, ARO Inc., Arnold AFS, Tenn.

### Application of Laser Light Sources in Hypersonic Ballistic Experiments

*G. I. Mishin, A. N. Mikhalev and E. N. Arutiunov*, Ioffe Institute, Leningrad, USSR

### A Streak Camera Technique to Measure Plastic Plate Velocities as a Continuum

*D. L. Paisley*, Monsanto Research Corp., Miamisburg, Ohio

### Velocity Measurements of Electrically Driven Flying Plates Using Self-Lighting

*J. W. Conant and I. A. Garcia*, Los Alamos Scientific Laboratory, Los Alamos, N.M.

### Nanosecond Hydrodynamic Diagnostics Utilizing Extremely Small Fiber Optic Probes and a Streaking Camera

*L. L. Shaw, R. R. Donaldson, J. R. Murchie and T. J. Ramos*, Lawrence Livermore Laboratory, Livermore, Calif.

## Wednesday, 4 August

### Session CA — FRAMING PHOTOGRAPHY TECHNIQUES

#### Ultrafast Photography with 10.6- $\mu$ m Radiation

*A. J. Alcock, H. A. Baldis, P. B. Corkum, J. C. Samson and W. J. Sarjeant*, National Research Council of Canada, Ottawa, Canada

#### Optical/X-Ray Framing Camera Tube

*R. Kalibjian*, Lawrence Livermore Laboratory, Livermore, Calif.

#### Single-Exposure Photography with Channel-Plate Intensifiers

*J. Hadland, K. A. F. Haynes, A. E. Huston and M. G. Wilson*, John Hadland (P.I.) Ltd., Bovington, England

#### A Simple Triple-Frame Camera

*G. H. Lunn*, Atomic Weapons Research Estab., Aldermaston, En-

gland, and *D. C. Emmony*, Loughborough University of Technology, Loughborough, England

### Universal Mirror Waiting Type Photochronograph "ZSOK-1"

*A. S. Dubovik, A. F. Balkanov, V. F. Babintsev, A. K. Semyenov, G. I. Belinskaya, V. T. Laznikov and A. X. Balygin*, Moscow, USSR

## Session CB — APPLICATIONS

### Conditions for Building up Compression Rings by Dielectric Spark Discharges in Layers of Liquid

*R. Germer*, Institut für Festkörperphysik II, Technische Universität, Berlin, Germany

### Spark-Tracing Applications in Flow Visualisation

*F. Früngel*, Impulsphysik GmbH, Hamburg, West Germany

### The Photochromic Traces Technique-Continuum Lagrangian Measurement of Fluid Mechanics Using High-Speed Photography

*R. L. Hummel*, University of Toronto, Toronto, Canada

### High-Speed Photography in an Industrial Engineering Environment

*D. H. Pimley*, GKN Group, Wolverhampton, England

### Direct Readout Devices for Streak Cameras

*J. C. Cheng, S. W. Thomas, E. K. Storm, G. R. Tripp, W. R. McLerran and L. W. Coleman*, Lawrence Livermore Laboratory, Livermore, Calif.

## Thursday, 5 August

### Session DA — LASER PLASMA DIAGNOSTICS — I

#### Picosecond X-Ray Spectral Studies

*D. T. Attwood and L. W. Coleman*, Lawrence Livermore Laboratory, Livermore, Calif.

#### Time-Resolved X-Ray Pinhole Photography

*D. T. Attwood*, Lawrence Livermore Laboratory, Livermore, Calif.

#### Image Converter Camera Optical Measurements in Laser Fusion Research

*T. Leonard, G. Charatis, M. Gredell and J. Ash*, KMS Fusion, Inc., Ann Arbor, Mich.

#### Image Converter Cameras for Laser and Laser Plasma Diagnostics

*G. I. Bryukhnevitch, A. M. Prokhorov, Yu. N. Seryuchenko, B. M. Stepanov, V. I. Chevokin and M. Ya. Schelev*, Lebedev Physical Institute, Moscow, USSR

#### Traitement Automatique des Données Acquises Lors des Interactions Laser-Matière

*J. P. Tenaud, J. Y. LeGall and J. Farrenc*, Commissariat à l'Energie Atomique, Limeil, France, and *G. Jeanfrancois*, Thomson — CSF, Malakoff, France

### Session DB — APPLICATIONS — EROSION AND PARTICLE ANALYSIS

#### The Erosion of Metals by Solid Particles — A Study Using High-Speed Photography

*I. M. Hutchings*, Cavendish Laboratory, Cambridge, England

#### Hypervelocity Impact in Glass and Rock Targets — Some Characteristic Phenomena

*E. Schneider*, Ernst-Mach-Institut, Freiburg, West Germany

#### Impact of Microparticles on Brittle Solids

*M. M. Chaudhri, C. G. Knight and M. V. Swain*, Cavendish Laboratory, Cambridge, England

#### High-Speed Photography for Investigating the Penetration of a Water Jet into Water Surface

*S. Lin and T. G. Dugdale*, Concordia University, Montreal, Canada

# Hunt Cine Processing

# BREAKTHROUGH



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Philip A. Hunt Company (Canada) Ltd., Toronto

Streak Photography to Measure Filament Velocity During Spinning

*A. W. Towne and I. Brazinsky*, Celanese Research Co., Summit, N.J.

Study of Combustion Phenomena by Combined Deflection Mapping and Speckle Superposition Techniques

*G. Da Costa*, Universidad Simon Bolivar, Caracas, Venezuela

**Session DC — LASER PLASMA DIAGNOSTICS — II**

Shadowgraph and Interferometry Experiments With a 10-ps Light Source at Various Wavelengths

*E. A. McLean, R. H. Lehmberg, J. M. McMahon, B. H. Ripin, J. A. Stamper and S. E. Bodner*, U.S. Naval Research Laboratory, Washington, D.C.

Application of a Synchronized Ultrashort Nd:glass Laser Pulse to the Diagnosis of CO<sub>2</sub> Laser Produced Plasmas

*R. Fedosejevs, I. V. Tomov, N. H. Burnett and M. C. Richardson*, National Research Council of Canada, Ottawa, Canada

Photographic Study of Rapid Events by Picosecond Techniques

*K. Vollrath and M. Hugenschmidt*, German-French Research Institute, Saint Louis, France

Ultraviolet Photography of Laser Produced Plasmas with Picosecond Pulses

*D. T. Attwood*, Lawrence Livermore Laboratory, Livermore, Calif.

Picosecond Microphotography of Laser Irradiated Solid Targets

*S. Ariga*, University of British Columbia, Vancouver, Canada, and *R. Sigel*, Max-Planck-Institut für Plasmaphysik, Garching, West Germany

Optical Investigation on the Interaction of High-Energy CO<sub>2</sub>-Laser Pulses with Liquid and Solid Targets

*M. Hugenschmidt and K. Vollrath*, German-French Research Institute, Saint Louis, France

**Session DD — APPLICATIONS — TRANSPARENT MEDIA ANALYSIS**

A Study of Fuel Pulverization by Nozzles of High-Speed Diesels

*V. M. Ginzburg, E. V. Moroz and B. M. Stepanov*, Moscow, USSR

High-Speed Photographic Study on the Condensation of Bubbles in the Subcooled Liquid

*S. Kamei and M. Hirata*, The University of Tokyo, Tokyo, Japan

High-Speed Photogrammetry of Real and Ideal Reflections of Spherical Blast Waves

*J. M. Dewey and D. J. McMillin*, University of Victoria, Victoria, Canada

A Photographic Study of the Interaction of Two High-Velocity Gas Jets

*J. E. Field, L. J. Poldervaart and A. Wijnands*, E.T.H., Eindhoven, The Netherlands

High-Speed Photomicrographic Recording of 2D Shock Wave Processes in Transparent Materials

*M. E. Graham, J. D. Carlyle and T. L. Menna*, Effects Technology, Inc., Santa Barbara, Calif.

**Friday, 6 August**

**Session EA — PULSED (LASER) LIGHT SOURCES**

Enhancement of Luminous Efficiency of High-Energy Flash Tubes Using High Power Pre-Ionization

*C. Raptis, V. I. Little and S. Majumdar*, Royal Holloway College, Surrey, England

A High-Intensity Point Light Source with Adjustable Light Duration

*P. Krehl*, Ernst-Mach-Institut, Freiburg, West Germany

Generation of Sub-Picosecond Light Pulses from Dye Lasers

*M. C. Adams, D. J. Bradley, H. Mahr, I. S. Ruddock, W. Sibbett and J. Vukusic*, Imperial College of Science and Technology, London, England

Nanosecond High-Speed Photography and Micrography Combustion Spark

*H. G. Patzke*, Impulsphysik GmbH, Hamburg, West Germany

High-Speed Silhouette Photography of Small Biological Subjects

*H. E. Edgerton*, Massachusetts Institute of Technology, Cambridge, Mass., and *J. S. Wilson*, Union Carbide Corp., Parma, Ohio

**Session EB — OPTICAL DATA ANALYSIS**

Mechanical Impulse Testing Techniques via Computer Evaluation of High-Speed Film Recording

*M. F. Ranky and B. Egri*, Central Research Institute for Physics, Budapest, Hungary

Computerized Rapid Scan Spectroscopy at NWS, Crane

*C. E. Dinerman*, Naval Weapons Support Center, Crane, Ind.

Measurement of Photochromic Tracer Films Using Polly, A Film-Reading Computer

*N. Esmail*, University of Toronto, Toronto, Canada

Optical Tracking for Japanese Sounding Rockets

*T. Uyemura, S. Ohzono, Y. Yamamoto, T. Tusuno, Y. Kikusato, M. Eiraku and T. Mizunuma*, The University of Tokyo, Tokyo, Japan

Design Features of the Space Telescope

*E. B. Brown*, Perkin-Elmer Corp., Danbury, Conn.

**Session EC — POST DEADLINE PAPERS**

High-Speed Cineradiography of Projectiles

*R. E. Bracher*, Ministry of Defence, England, and *A. E. Huston*, John Hadland (P.I.) Ltd., Bovington, England

Image-Converter Camera with Microchannel Intensifier — Modular Design

*L. Diamant*, Weizmann Institute, Rehovot, Israel

Dynamic Range and Spatial Resolution of Picosecond Streak Cameras

*W. Friedman, S. Jackel and W. Seka*, University of Rochester, Rochester, N.Y., and *J. Zimmermann*, Institute of Applied Physics, University of Berne, Switzerland

De la Difficulté à Caractériser une Impulsion Laser Picoseconde à 1060 nm au Moyen des Caméras à Balayage de Fente

*N. Fleurot, J. P. Gex, J. Bardes and B. Chappet*, C.E.A. Limeil, Villeneuve-Saint-Georges, France

Computer Treatment of Images Taken with High-Speed Image Converter Camera

*V. N. Prokhorov, A. G. Sveshnikov and M. Ya. Schelev*, P. N. Lebedev Institute, *V. N. Platonov, Yu. P. Pyt'ev*, Moscow, USSR