



A new ABC Beginners Library series of technical books has been introduced by Howard W. Sams & Co., 4300 W. 62 St., Indianapolis, Ind. 46206. The new five-book sets are: *ABC's of Electricity/Electronics*, *ABC's of Computers & Semiconductors* and *ABC's of Communications*. Each set provides an adequate background for the beginner or student. The books are illustrated with a number of drawings and photographs. Each set is priced at \$9.95.

**Photographic-Career Information for Guidance Counselors** is an 8-page pamphlet (AT-6) available from Consumer Markets Div., Eastman Kodak Co., Rochester, N.Y. 14650. The pamphlet contains a bibliography of photo-career publications and also contains a list of schools, universities, libraries and museums which have available prints of *Cameras and Careers*, a 28-min, 16mm sound and color motion picture designed for young people from the 8th grade up who are interested in learning about career opportunities in the photographic field. The film was produced by Eastman Kodak Co. in cooperation

with the National Vocational Guidance Association. Although the film touches on the well-known vocations in news and portrait photography, it concentrates on the less familiar, but numerous and challenging, photographic opportunities in business, science, industry and fashion.

**Maintaining Modern TV Transmitter Performance**, by D. W. Sargent, reprinted from *Broadcast News*, Vol. 133, April 1967, is available upon request from RCA Broadcast and Television Equipment, Building 15-5, Camden, N.J. The illustrated brochure covers transmitter characteristics, both visual and aural; test procedures, visual and audio; and test equipment used to get maximum efficiency and bandwidth for the best color and monochrome picture quality. Twenty-five illustrations include photographs of equipment, TV transmitter performance curves and diagrams.

**Thermoelectric and Thermomagnetic Effects and Applications**, by T. C. Harman and J. M. Honig, contains an explanation of fundamentals pertaining to thermoelectric and thermomagnetic effects in metals, semi-metals or semiconductors subjected to electric, magnetic, and temperature fields. After presenting phenomenological descriptions within the framework of irreversible thermodynamics and evaluating the atomistic parameters with the aid of transport theory, the authors make a correlation between the general

formulations based on irreversible thermodynamics and the detailed description of transport phenomena based on transport theory. The last quarter of the book is devoted to applications centering on devices that function as energy converters. Published by McGraw-Hill Book Co., 330 W. 42 St., New York, N.Y. 10036, the book contains 370 pages, plus index, and 92 illustrations. It is priced at \$17.50.

**Digital Logic and Computer Operations**, by Robert C. Baron and Albert T. Piccirilli, describes the basic design concepts common to all modern computer systems by means of text, specific demonstrations, and problems. Starting with a general introduction to the computer field, the authors progress through Boolean algebra, computer logic, storage, arithmetic, input/output, and control elements. They then explain computer organization and close with an introduction to programming. Published by McGraw-Hill Book Co., 330 W. 42 St., New York, N.Y. 10036, the book contains 321 pages, plus index, and 155 illustrations. It is priced at \$13.50.

**Gear Design and Application**, edited by Nicholas P. Chironis, Senior Associate Editor of *Product Engineering*, contains data based on material published by 90 leading gear experts in *Product Engineering* and elsewhere. The data have been arranged so as to present a detailed coverage of the specialized areas of gear design and application. The book contains 372 pages plus



Reviewed by the SMPTE Advisory Committee on Special Effects in Motion Pictures: Herbert Meyer, Chairman, Russell Brown, Thomas G. Fisher, Jack Froehlich, Max Hankins, Ub Iwerks, Ivan Martin, Bob Matthey, Frederic L. Ponedel, John Roche, J. Edward Stenbridge, Edward Stones, Virgil Summers.

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(Some Methods for Producing Mechanical Special Effects)

Frank P. Clark

## CONTENTS

The Development of Special Effects  
The Application of Special Effects  
Atmospheric Effects  
Special-Effects Props  
Optical Effects  
Sound Effects

Miscellaneous Effects  
Shooting  
Pyrotechnics  
Sources of Special Effects (Appendix)  
Index  
Bibliography

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12. Mirror shutter added to original variable shutter?	No	Yes	No	No
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15. Is there "shutter bar flicker" during operation?	No	Yes	Yes	Yes
16. Can it be readily adapted to VTR system (flickerless)?	Yes	?	?	?
17. How many cameras in constant use (as of Jan. 2, 1968)?	10	1	?	?
18. How many companies constantly use the BNCR— with 100% satisfaction? Name some!	65	?	?	?

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index and is illustrated. Published by McGraw-Hill Book Co., 330 W. 42 St., New York, N.Y. 10036, it is priced at \$10.00.

**The 1967-1968 Membership Directory of the National Audio-Visual Association** is available from NAVA headquarters, 3150 Spring St., Fairfax, Va. 22030. The 39-page directory lists audio-visual dealers by state and town with information about the type of services offered. The directory also lists manufacturers, producers and trade publications and other relevant information.

**The 1968 Science, Technology and General Dictionary Catalog No. 3** is available from Associated Technical Services, Inc., Dictionary and Book Div., 855 Bloomfield Ave., Glen Ridge, N.J. 07028. The price is \$1.00. The catalog is designed as a reference to and source of some 987 currently available dictionaries in 39 languages. Countries represented include the Soviet Union, China, Japan, Hungary, Czechoslovakia, Germany, France, and many others. Practically every field of science and technology is covered.

**Electronic tools for maintenance of cable plants** are illustrated and described in an 8-page brochure (Bulletin DC-178) available from Delcon Div., Hewlett-Packard Co., 333 Logue Ave., Mountain View, Calif. 94040. The fault-locating instruments are used to measure length and locate

opens; map the course and find the depth of buried cable and pipes of all types; pinpoint insulation breaks and other grounds; and locate shorts, crosses, splits and other faults in communication and power cables.

**Three models of Hycam high-speed rotating-prism cameras** are illustrated and described in a brochure (Form Hy-467) available from Red Lake Laboratories Inc., 2971 Corvin Dr., Kifer Industrial Park, Santa Clara, Calif. 95051. The cameras are available in film capacities of 100, 400, and 200 ft with speeds ranging from 10 to 44,000 pictures/s. The brochure shows general interchangeability of optical and film-transport elements between the three models, and provides time vs. speed curves, operating details, and engineering specifications.

**Various types of lamps, light sources, power supplies, etc.**, are described in an up-dated 6-page Product Reference Guide (Publication No. 901-1) available from PEK, Inc., 825 East Evelyn Ave., Sunnyvale, Calif. Information is presented on the firm's mercury and xenon short arc and flashlamps, mercury capillary lamps, power supplies, pulse generators and lamp housings as well as electronic systems designed for lamp-oriented applications.

**Model 4009 Differential DC Operational Amplifier (Opamp)** is illustrated and described in a 3-page folder available from

Opamp Labs, 172 S. Alta Vista Blvd., Los Angeles, Calif. 90036. External circuitry is shown schematically and component values indicated for various applications.

**Ball Brothers Mark 81 Video Signal Multiplexer** and the Miratel Division MC-19 Color Monitor are illustrated and described in data sheets available from Ball Brothers Research Corp., P.O. Box 1062, Boulder, Colo. 80302. The Mark 81 is designed to add EIA television synchronization pulses to the output of video sweeping oscillators. The MC-19 color monitors are available in various models.

**Reeves Sound Studios Rate Manual No. 6** is available from Reeves Sound Studios, 304 E. 44 St., New York, N.Y. 10017. The manual shows price reductions on a number of items including video-tape spot duplicates, evaluated tape stock, electronic editing with three machines, and film program transfers to video tape. Rates for Color Videofilm, Reeves' video tape-to-film transfers, are included.

**Four bulletins**, covering a variety of applications of Sony EV-200 and PV-120U Videocorders, are available from Sony Industrial Division, 516 W. Florence Ave., Inglewood, Calif. 90301. The bulletins are: APB 101, "Sony Studies the Sea," which describes the installation at the University of Rhode Island's School of



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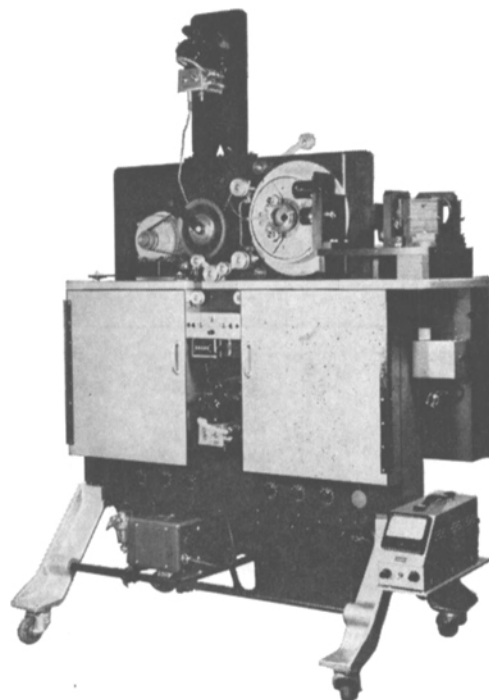
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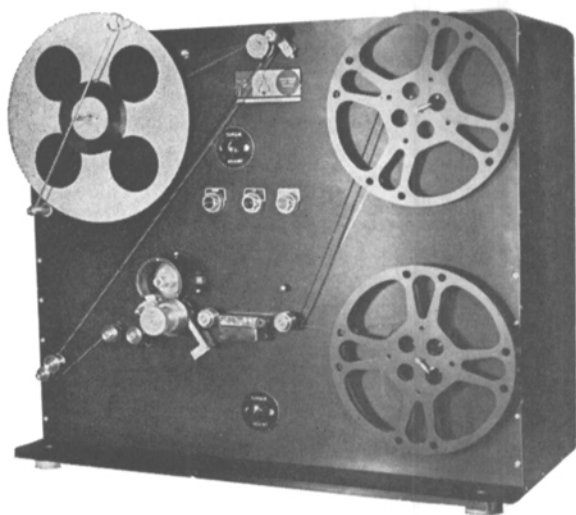
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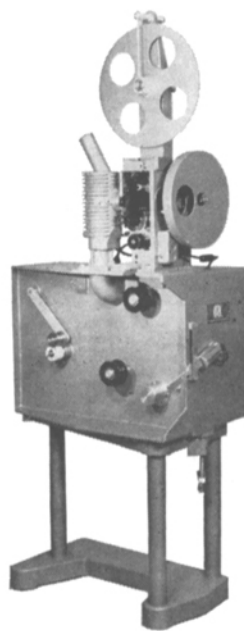


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Oceanography; APB 102, "Sony Communicates With the Communicators," which describes an in-plant communication system at Xerox Corp.; APB 103, "A Stitch in Time," which describes how a Sony Videocorder is used to control needle production at Torrington Co.; and APB 104, "Medium as Mentor," which shows how educators in small towns use up-to-date teaching methods with a Sony closed-circuit system.

**Alden graphic recording component equipment** is described in a short-form instrument catalog available from Alden Electronic and Impulse Recording Equipment Co., Instrument Div., Westboro,

Mass. 01581. The catalog also describes possible applications for the equipments including radar, sonar, ultrasonics, slow scan television, oceanography, spectrum analysis, facsimile, and others.

**An illustrated brochure** describing Amphicon large-screen television projectors is available from Amphicon Systems, Inc., 38 Oak St., Norwood, N.J. 07648. Six types of projectors for various purposes are described. Prices range from \$2,495 to \$18,500.

**The Mark IV rear-screen projector** and front screen Mark V in standard and super 8 are illustrated and described in a 4-page

brochure available from Director of Marketing, Fairchild Industrial Products, a division of Fairchild Camera and Instrument Corp., 221 Fairchild Ave., Plainview, L.I., N.Y. 11803. The brochure describes two MoviePak Cartridges: the 400-ft, 22-min MoviePak 20 and the 240-ft, 12-min MoviePak 10 for standard 8 and super 8 film.

**The Model L Magnetic Tape Recorder**, a small, general purpose instrumentation recorder designed for airborne and other adverse environment applications, is illustrated and described in a 4-page leaflet available from Kineloc Corp., 29 South Pasadena Ave., Pasadena, Calif. The Model L is used in underwater applications, such as torpedo testing and oceanographic equipment, and for airborne weapons system and subsystem evaluation programs.

**Semiconductor devices** are illustrated and described in a 16-page catalog (B-9418) available from Westinghouse Semiconductor Division, Youngwood, Pa. 15697. The catalog includes specification charts and dimensional diagrams for transistors, thyristors and rectifiers. It also describes rectifier and thyristor assemblies for a wide range of circuit applications.

**Readout**, a periodical published by Ampex Corp., 401 Broadway, Redwood City, Calif. 94063, is devoted to describing "some of the myriad applications of magnetic recordings and related technologies." In Vol. 6, No. 2 (available upon request from Ampex) the theme of "Advancing Technology in the 20th Century" is explored in illustrated articles on sound recorders, space exploration, television ("The Miraculous Time Machine"), closed-circuit TV computers, documents and home entertainment.

**A high-speed camera**, Model 162-2 Locam Intermittent Pin-Registered 16mm High-Speed Motion-Picture Camera, is illustrated and described in a data sheet (Form 162-2-767) available from Red Lake Laboratories Inc., 2971 Corvin Dr., Kifer Industrial Park, Santa Clara, Calif. 95051. The camera is one of a series of instruments and is specially designed for tactical and research applications in the aerospace industry.

**The Multilock System Synchronizer** is illustrated and described in Bulletin No. V119 available from Ampex Corp., Mail Stop 7-14, 401 Broadway, Redwood City, Calif. 94063. The system is designed for maintaining synchronous operation of two or more videotape and/or audio recorders.

**Supplement No. 1 to Mole-Richardson's Catalog K**, and a revised price list, are available from Mole-Richardson Co., 937 North Sycamore Ave., Hollywood, Calif. 90038. The 8-page supplement illustrates seven new quartz lighting fixtures, in addition to pedestals, aluminum reflector boards and other equipments.



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**The Summer Issue of NC Flasher**, a 32-page catalog of optical and instrument supplies, is available upon request from National Camera, Inc., Dept. KE, Englewood, Colo. 80110. The catalog contains illustrations and descriptions of numerous photographic supplies, including hard-to-find tools and instruments.

**Westinghouse Semiconductor Plastic Rectifiers** (Booklet SA 9892) is a 12-page illustrated booklet describing the electrical and mechanical characteristics of a family of low-priced, plastic-encapsulated rectifiers. Characteristic curves and dimensional diagrams are given and typical applications are suggested. The booklet also presents an interchangeability chart that relates the rectifiers to established industry types. A price list is included. The booklet is available upon request from Westinghouse Semiconductor Division, Youngwood, Pa.

### Clearinghouse Publications

The publications listed below are available from Clearinghouse, U.S. Department of Commerce, Springfield, Va. 22151. Unless otherwise noted each report is \$3.00 (microfiche 65 cents).

For the convenience of the reader, titles and brief descriptions of the publications have been grouped under eight categories.

#### Acoustics

AD-650 158, *Performance Evaluation of Speech Processing Device III. Diagnostic Evaluation of Speech Intelligibility*, W. D. Voiers,

77 pp. Describes the history and present status of the Diagnostic Rhyme Test (DRT) Form III and results of research relating to the validity of the DRT in various applications.

NBS MONO. 77, *Sound Insulation of Wall, Floor, and Door Construction*, R.D. Berendt and G. E. Winzer, 55 pp. Contains acoustical test results on more than 100 building constructions, including new single-figure ratings for airborne sound transmission and impact sound transmission.

#### Communications

N66-21691, *Syncom Engineering Report, Vol. I. Syncom Projects Office*, 200 pp. Syncom III was launched on August 19, 1964, and placed into a nominally synchronous equatorial (stationary) orbit over the International Date Line. The attainment of a stationary orbit, and Syncom III's performance in the televising of the 1964 Summer Olympic Games from Tokyo indicate the operational and economic feasibility of the synchronous communication satellite.

N67-25094, *Syncom Engineering Report, Vol. II. Syncom Projects Office*, 165 pp. The second volume of a two-volume report on the Syncom Satellite System contains descriptions of the launch of the Syncom III satellite, its performance during the first 100 days of orbit, the televising of the 1964 Olympic Games, and the various communications tests conducted with it.

AD-656 788, *Speech Communication Index Meter: Further Applications and Improvements*, M. H. L. Hecker, 87 pp. Study concerned

with use of the Speech Communication Index Meter (SCIM) to evaluate time-varying communication systems and to predict the intelligibility of peak-clipped speech.

AD-657 172, *Effect of Off-Path Ionospheric Reflections of VLF Radio Waves*, E. E. Gossard and M. R. Paulson, 44 pp. Describes a technique for analyzing movements in the lower ionosphere.

AD-657 014, *Historical Analysis of Electromagnetic Interference Limits*, C. B. Pearlston, Jr., 49 pp. Examines the development of interference and susceptibility limits in various military specifications and indicates the technique by which the limits were derived, the rationale for such derivation, and the changes in various limits with time since their formulation. The report also discusses certain inconsistencies within the limits of the various specifications.

PB-174 987, *CRPL Exponential Reference Atmosphere*, B. R. Bean and G. D. Thayer, (1959) 73 pp. Outlines the background and development of an exponential model of atmospheric radio refractivity, the CRPL Exponential Reference Atmosphere. A set of ray tracings for the model is presented in the form of tables of refraction variables for the complete range of observed values of surface refractive index. The tables may be used for the solution of practical refraction problems involving errors in elevation angle, range errors, and similar quantities.

#### Control Systems and Instrumentation

AD-656 934, *Fluidic AC Amplifiers*, L. Moore et al., 120 pp. Discusses design

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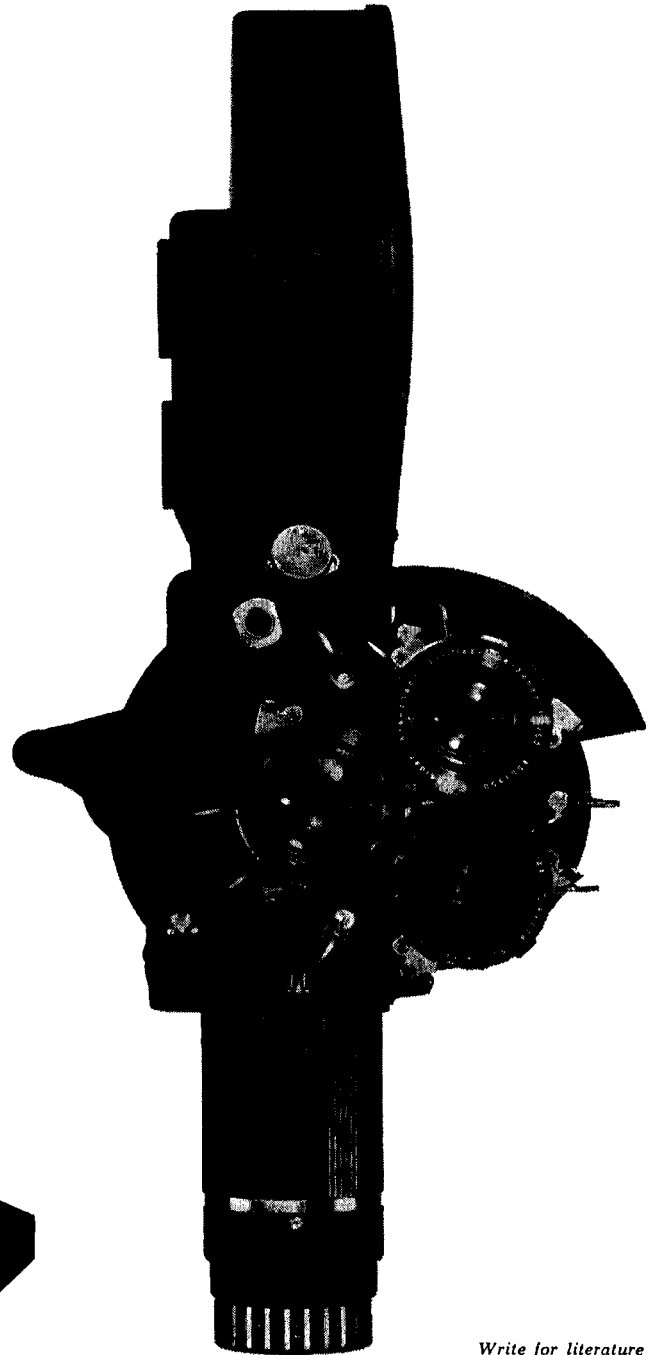
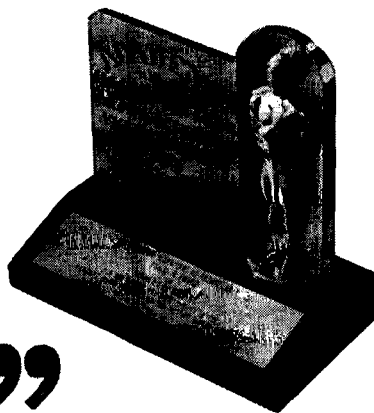
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*Write for literature*

considerations and concepts important to the successful development of tuned AC amplifiers and gives results of tests conducted to find a high-gain, narrow-band AC amplifier for use in fluidic modulated carrier systems.

N67-27618, *Fluid Amplifier State-of-the-Art Report, Vol. II-A* (Bibliography), M. J. Osborn, 310 pp. Bibliography restricted to pure fluid (no-moving-part) devices and supporting technology. Report updates (as an addendum) the Volume II report and cites 550 references of which 477 are abstracted. Also available: N64-31700—Same Title, Vol. II, Oct. 64, 124 pp.

N67-18157, *Development of an All Dielectric Infrared Beamsplitter Operating in the 50 to 30 Micron Region*, P. L. Heinrich et al., 166 pp. Describes the design and fabrication of the beamsplitter and suggests the development of an unsupported (substrateless) beamsplitter as a promising extension of the work to yield a great increase in system performance. Such a system could operate up to at least 50 microns and eliminate the need for path-length compensating elements, with a resultant decrease in system weight.

N67-33039, *Command Processors*, D. E. Jamison, 33 pp. Discusses equipment that is used to perform command processing by GSFC for satellite control.

#### Data Processing

PB-175 666, *Final Report on a Study of the Remote Use of Computers*, G. O. Collins, Jr., 108 pp. Study is divided into three phases: Phase 1 is a survey of more than 200 com-

puter installations using the central processor capability through remote terminals. Techniques of the survey are described and the response data are summarized. Phase 2 is an in-depth study of four computer systems selected from those surveyed. Phase 3 is devoted to analysis of data and information collected on remote computer systems with emphasis on time-shared systems. Current state-of-the-art is presented with recommendations for areas where further work needs to be done and where standardization is needed or desirable. Although this report is intended to be self-sufficient in reporting on the work of the entire project, the separate (interim) reports covering Phase 1 and Phase 2 of the project are available from the Clearinghouse:

PB-175 664, *A Study of the Remote Use of Computers, (Phase 1)*, 70 pp;

PB-175 665, *A Study of the Remote Use of Computers, (Phase 2)*, 204 pp.

AD-656 041, *Some Aspects of Pattern Recognition by Computer*, A. Guzman-Arenas, 127 pp. Describes several programs, written in the language CONVERT, for the analysis of scenes that are transformed into symbolic descriptions of points and lines or surfaces in order to recognize, differentiate, and identify desired objects or classes of objects in the scenes. Examples are given in each case.

AD-655 842, *The Visual Image Processor*, J. K. Russell, 129 pp. Describes an electronic computer which operates on two-dimensional visual images. Decisions made in the systems planning, all electronic circuitry

used, and tests used to measure performance are described in detail.

#### Information Technology

PB-175 618, *The Copyright Law as it Relates to National Information Systems and National Programs*, The Committee on Scientific and Technical Information, 82 pp. The problems of copyright protection in relation to the development of national information networks have been analyzed and published in a report by an ad hoc task group organized by COSATI, a committee of the Federal Council for Science and Technology. The report represents the view of several informed persons associated with Federal agencies and it's intended as background for the formulation of public policies in this vital area. Some of the problem areas examined in the report are: (1) ready access to copyrighted material, (2) making computer "input" an infringement, and (3) exemptions for nonprofit users.

PB-174 700, *Mammax, Machine-Made and Machine Aided Index*, S. Juhasz (Ed.), 153 pp. Presents in one volume a combination of machine-aided and machine-made indexes, such as Authors' Index, Keyword, KWOC, WADEX, and Formula Index, of the 18 members participating in a working group on "Computer Aided Indexing" which was organized during the Annual Meetings of the National Federation of Science Abstracting and Indexing Services.

AD-653 726, *Technical Writing: A Key to Computerized Information Retrieval*, S. O. Jones, 24 pp. Explores the use of meaningful titles, standardization of citations, and several other areas involved in information retrieval systems from the viewpoint of the information specialist.

PB-175 518, *Experimental Studies of Relevance Judgments: Final Report, Vol. I, Project Summary*, 125 pp. Empirical information on human relevance assessment has been defined in a project conducted by the System Development Corporation. The work, which was supported by the National Science Foundation, was conducted over a two-year period and involved fifteen individual studies.

Evidence was discovered suggesting that relevance judgments are influenced by the following factors: (1) the skills and attitudes of the particular judges used, (2) the documents and document sets used, (3) the particular information requirement statements, (4) the instructions and setting in which the judgments take place, (5) the concepts and definitions of relevance employed in the judgments, and (6) the type of rating scale or other medium used to express the judgments. These findings cast doubt on the wisdom of treating relevance scores as stable criteria for system or subsystem evaluation in those instances where the six sources of variation just cited have not been recognized and properly controlled.

PB-175 517, *Experimental Studies of Relevance Judgments: Final Report, Vol. II, Description of Individual Studies*, 131 pp.

AD-657 558, *Flow of Scientific and Technical Information: The Results of a Recent Major Investigation*, A. F. Goodman, 60 pp. A major investigation to determine how scientists and engineers acquire information has recently been completed by the Douglas Missile and Space Systems Division of

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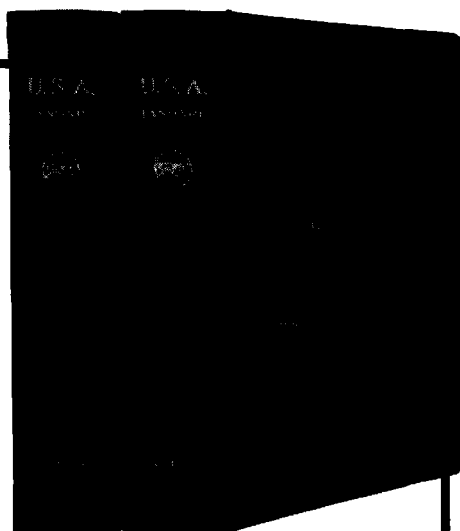
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Douglas Aircraft. The investigation characterizes the scientific and technical information needs of 1,500 scientists and engineers from 73 companies, 8 research institutes, and 2 universities, and the flow of scientific and technical information (flow process) inherent in satisfying these needs.

N67-31477, *The Channels of Technology Acquisition in Commercial Firms, and the NASA Dissemination Program*, J. S. Gilmore et al., 146 pp. Describes the technology-acquiring process by which commercial firms get externally generated technological information. Based on these findings, it suggests how government-developed technology might better be communicated to industrial firms through the communication channels they customarily use.

PB-175 568, *The Process of Professional Information Exchange Among Science Information Specialists*, G. E. Rowland et al., 89 pp. Results of an extensive nationwide survey conducted to define the process of professional information exchange among science information specialists and to identify their requirements.

PB-175 552, *Extracting the Basic Structure of Scientific Literature*, H. P. Van Cott and A. Zavala, 59 pp. Studies to determine the feasibility of using factor analysis as a tool for extracting the latent structure of the periodical literature of a science.

AD-656 340, *Effectiveness of Information Retrieval Methods*, J. A. Swets, 52 pp. Results of some fifty different retrieval methods applied in three experimental retrieval systems are subjected to the analysis suggested by statistical decision theory. The analysis validates a previously proposed measure of effectiveness and demonstrates its several desirable properties.

PB-174 837, *Scientific Information Exchange at an Inter-Disciplinary Behavioral Science Convention*, W. J. Paisley and E. B. Parker, 86 pp.

N66-34085, *Guide to the Processing, Storage, and Retrieval of Bibliographic Information at the NASA Scientific and Technical Information Facility*, W. T. Brandhorst and P. F. Eckert, 158 pp.

N67-27296, *Cumulative Index to NASA Tech. Brief, 1963-1966*, 257 pp. paper copy \$1.00 (microfiche 65 cents). Main section is arranged in five categories: Electrical (including Electronic); Physical Sciences (Energy Sources); Materials (including Chemistry); Life Sciences; and Mechanics.

AD-658 081, *Automated Literature Processing Handling and Analysis System—First Generation*, 508 pp. Summary of the development and characteristics of the first generation of the Automated Literature Processing, Handling and Analysis (ALPHA-1) System currently used by the Library Branch of the Redstone Scientific Information Center (RSIC). Report includes descriptions of the computer technology of ALPHA-1 and of the use of this automatic library technique in RSIC.

AD-656 789, *Research on Intelligent Question-Answering System*, C. C. Green and B. Raphael, 52 pp. Describes progress toward an "intelligent question-answering system" that can accept facts, retrieve items from memory, and perform logical deductions necessary to answer questions. Report gives examples of the performance of two systems on typical problems and describes

plans for extending the capabilities of one system.

AD-657 575, *An Experimental Chemical Information and Data System*, C. T. Van Meter et al., 220 pp. Describes an automatic system for the storage and selective retrieval of chemical compounds, primarily in terms of their molecular composition and structural characteristics.

AD-657 794, *Move the Information—A Kind of Missionary Spirit*, R. W. Swanson, 203 pp. Paper Presented at the 75th Annual Meeting, American Society of Engineering Education, Michigan State University, East Lansing, June 19-22, 1967. Report contains discussion of trends in processing information and trends in educating people.

## Optics

AD-652 237, *Study of High Energy, High Density Discharges and High Temperature Measurements as Applied to Exploding Wires*, T. Korneff, 30 pp. Exploding-wire phenomena have been found to have many new and useful optical applications. Presented in a report of investigations conducted at Temple University during the past four and one-half years are several aspects of exploding-wire phenomena, including: framing camera and Kerr-cell studies of explosions at reduced pressures, the shunting effect of copper vapor at reduced pressures, and energy considerations in the initial pre-vaporization stages of the explosion. An induction-free system for measuring the instantaneous voltage across an exploding-wire and air-gap switch was developed, as was an electric 3-color optical pyrometer capable of making surface-temperature measurements with a resolving time in the order of 0.1 microseconds.

AD-653 201, *Optical and Electrical Properties of Diamond*, A. Halperin et al., 163 pp. Describes work performed on the optical and electrical properties of diamonds; includes chapters on: Thermoluminescence and Thermally Stimulated Currents, Thermoluminescence of Semiconducting Diamonds, Photovoltaic Effects in Diamond, and Electroluminescence of Semiconducting Diamonds.

AD-652 501, *Further Research on Optical Transmission Lines*, C. B. Shaw et al., 61 pp. Presents results of research on the basic phenomena underlying the operation of thin-film dielectric structures as electromagnetic waveguides at optical frequencies. Includes computation of dispersion curves for dominant odd and even modes of dielectric waveguides of finite rectangular cross section.

AD-652 496, *Development of High Contrast Electroluminescent Displays*, S. V. Petertyl et al., 78 pp. Describes the work performed in development, characterization, and human-factors evaluation of high visibility electroluminescent displays to improve their readability.

AD-653 218, *Optical Interactions in Ruby Lasers*, F. C. Unterleitner and Y. C. Kiang, 70 pp. Presents the initial stages of an investigation into the efficiency of ruby lasers and the kinetics of energy-level populations generated by optical pumping, including: the calibration of absolute spectral response of photodetectors, the measurement of ground-state absorption cross sections, and the metastable-absorption cross section at selected wavelengths.

AD 650 870, *Laser Parameter Measurements Handbook* Vol. 1, H. G. Heard, 387 pp. A compendium of measurements encompassing laser technology which treats all of the significant laser measurement techniques published to date.

AD-651-22, *Broadband Laser Digital Deflector*, S. L. Everett, Jr., et al. 46 pp. Describes the design of a broadband laser beam digital deflector feasibility model which is a flexible broadband assembly permitting evaluation of numerous broadbanding techniques.

AD-651 301, *Large-Angle Deflection Technique for Laser Display*, C. E. Baker and G. R. Fournier, 83 pp. A study to develop an improved coherent light beam scanning technique for use in a real-time, projection display system using a laser light source. The report reviews the basic features of the selected approach and translates the required system performance into component parameters.

UCRL-17128, *Reflection of Polarized Light From Film-Covered Surfaces*, J. R. Mowat and R. H. Muller, 75 pp. Gives derivation of exact equations which relate the (complex) index of refraction and the thickness of a single, absorbing or transparent film on an absorbing or transparent substrate to the changes sustained by polarized light reflected by the film-covered surface. Both film and substrate are assumed to be linear, homogeneous and isotropic media.

AD-651 651, *Determining the Degree of Ambiguity in Frost Point Temperatures as Measured by an Optical Dew Point Sensor*, R. M. Peirce and R. H. Guenther, 18 pp. Outlines the theory of operation of the ML-592 (TMQ-11(v) Electronic Dew Point Sensor and discusses the procedures and results of an extensive evaluation program.

AD-651 060, *Study to Determine Design Criteria for a Stereo Fiber Optic Periscope for Aircraft Application*, H. F. Bennett et al., 45 pp. Investigation of the feasibility of substituting a fiber optics periscope system for conventional direct viewing through the windshield in high performance aircraft operation. Report identifies system components and basic problem areas requiring additional research and development.

AD-650 881, *Characteristics of a 20-kw, Liquid-Cooled Xenon Arc Searchlight*, S. B. Gibson et al., 37 pp. Development of a 20-kw, compact, xenon arc lamp whose electrodes are internally water cooled.

AD-650 203, *Multicolor Laser Display*, C. E. Baker and C. M. Alsbrook, 71 pp. Results of a one-year program to develop a multicolor laser display and to demonstrate the feasibility of using lasers to produce the primary spectral lines that, when scanned into the standard 525-line television raster, would produce a color presentation compatible with the NTSC encoded video signals.

AD-650 072, *A Vacuum Integrating Sphere for In Situ Reflectance Measurements at 77 K, From 0.5 to 10 Microns*, B. A. McCullough et al., 27 pp. Describes a modification of an integrating sphere which extends the spectral measurement range to a wavelength of 10  $\mu\text{m}$  and makes possible in situ reflectance measurements of low temperature surfaces at vacuum conditions.

AD-646 243, *Basic Structure of Infrared Glasses*, W. C. Levengood and T. S. Vong, 32 pp. A phenomenological theory, the unified glass theory, is presented and ap-

plied successfully in categorizing various vitreous systems. Systems included are non-oxide arsenic trisulfide glass, metaphosphate glasses, and barium silicate infrared systems.

AD-646 612, *Summary of the Conference on the Optical Properties of Aerosols*, Ed., E. A. Chermack, 61 pp. Summary of the conference discussion held Oct., 15-17, 1964, at Onchiota Conference Center, Sterling Forest, Tuxedo, N.Y.

AD-654 786, *A Study of Methods to Measure the Effects of a Contaminated Atmosphere on the Transmission of a High Energy Laser Beam*, R. Schlier et al., 153 pp. Describes various interactions of laser radiation and the effects of the interactions on the propagation of the beam. Experimental methods used in observing the effects are discussed.

N67-29378, *Development of a 10.6-Micron Laser Modulator*, E. Hirschmann, and T. E. Walsh, 12 pp. Describes a gallium-arsenide electro-optic modulator capable of modulating the output from a 10.6-micron laser.

N67-27273, *Electro-Optic and Magneto-Optic Modulators*, E. Hirschmann, 13 pp. Study of gallium arsenide (GaAs), gallium phosphide (GaP), and potassium tantalate niobate (KTN) crystal materials for electrooptic light modulators.

N67-33158, *Summary of the Development of Optical Waveguides and Components*, E. R. Schineller, 61 pp. Study of single-mode optical waveguide and waveguide components and application of waveguide techniques to laser systems.

AD-657 116, *Scientific Report: Absorption by CO<sub>2</sub> Between 7125 and 8000 cm<sup>-1</sup> (1.25-1.40*

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microns), D. E. Burch et al., 19 pp. Transmission spectra in the 7125-8000  $\text{cm}^{-1}$ . Transmission spectra in the 7125-8000  $\text{cm}^{-1}$  region are obtained for  $\text{CO}_2$  samples with absorber thicknesses as great as  $2.18 \times 10^6$  atm  $\text{cm}_{\text{STP}}$ . Three absorption bands not observed previously are identified, and the strengths of several bands are determined. Report includes transmission spectra and a table of integrated absorbance versus wavenumber for five representative samples. Also available: AD-657 115-Scientific Report: Absorption by  $\text{CO}_2$  between 1800 and 2850  $\text{cm}^{-1}$  (3.5-5.6 microns), D. A. Gryvnak et al., 43 pp.

AD-657 629, *Scientific Report: Absorption by  $\text{H}_2\text{O}$  between 5045 to 14,485  $\text{cm}^{-1}$  (0.69-1.98 microns)*, D. E. Burch and D. A. Gryvnak, 124 pp. Presents spectra of  $\text{H}_2\text{O}$  samples at high pressures to provide data from which line strengths and band strengths can be determined, while samples at lower pressures provide information from which line widths can be found. Transmission spectra are shown along with extensive tables of transmittance, integrated absorbance, and integrated absorption coefficient.

PB-174 137, *Glass Beads for Traffic Paints*, J. G. F. Hiss, Jr. and W. M. McCarty, 29 pp. High index of refraction glass beads are field tested to determine if their cost can be justified on the basis of increased light reflectivity during the life of a pavement marking paint line. Report gives results of photometer readings and bead counts in established test areas on asphaltic and Portland cement concrete pavements.

AD-655 774, *A Bibliography of Laser Applications*, C. M. Stickley and A. Gingrande, 46 pp. Contains 644 entries from the open literature, for the period 1961 through September 1966. The entries are divided into the following major areas: mechanical measurements and standards; communications applications; radar and tracking applications; military applications; optical signal processing; interferometry and testing of optical components; applications to scientific studies; applications in chemistry; photographic applications; metalworking; and miscellaneous applications.

## Printing, Graphic Arts, Photography

AD-653 625, *Development of an Exploratory Developmental Photographic Contact and Projection Printer*, J. L. Breitboard and R. E. Morris, 58 pp. Describes a multifunction contact and projection printer capable of making 2X and 4X enlargements and of performing contact printing in a step and repeat mode. In addition, the printer provides automatic dodging, automatic exposure control, contrast control, automatic registration of the negative and multiple copies of any single negative. The printer can handle 500-ft rolls of 70mm, 5-in. and 9 $\frac{1}{4}$ -in. duplicating film, as well as 9 $\frac{3}{8}$ -in. variable contrast paper.

PB-174 544, *Commercial and Industrial Photographic Equipment in The United Kingdom*, *Industrecon Associates, Inc., London, England (Aug. 66)*, 59 pp. A Foreign Market Survey for the Business and Defense Services Administration, U. S. Department of Commerce, to help U. S. firms expand their exports.

## Space Technology

N67-26015—*NASA Special Publications, NASA, Washington, D.C., Spring 67*, 54 pp.

Catalog of reports on recent results in space exploration, detailed accounts of significant conferences and symposia, and state-of-the-art reviews in various scientific and technical fields that reflect the diverse activities of NASA. Includes bibliographies on industrial utilization of methods evolved from NASA's space program.

N67-27297, *Lunar Surface Studies, a Continuing Bibliography With Indexes, NASA*, 65 pp. A selection of annotated references to unclassified reports and journal articles introduced into the NASA Information System during the period February 1966-January 1967.

N67-32582, *Surveyor III, a Preliminary Report*, 165 pp. The Preliminary Report of the Surveyor III mission is now available from the Clearinghouse. The report contains descriptions of the spacecraft itself, the launch, and the touchdown on the Moon, and presents results of the tests performed.

N67-32720, *Lunar Orbiter I: Extended-Mission Operations*, 22 pp. Summary of the Lunar Orbiter I mission with section on: (1) Spacecraft Operation, (2) Spacecraft Performance, (3) Penumbra Eclipse, (4) Pre-extended Mission Testing, (5) Experiments, (6) Simulation Training, (7) Failures, (8) Orbit Summary, and (9) Orbit Data and Tracking Data.

N67-32334, *Lunar Orbiter I: Photography*, 127 pp. Complete description of reconstructed and reassembled photographic records from the Lunar Orbiter Mission I.

N67-31356, *A Review of the Mariner IV Results*, O. W. Nicks, paper copy 25 cents (microfiche 65 cents), 42 pp. Highlights the great volume of interpretative analysis that has been elicited by Mariner IV data and summarizes the more important engineering advances that have derived from this flight. Report also contains, in the form of quality photoengravings, a selection of Mariner IV pictures of the Martian surface as they have been "computer-enhanced" by staff members of the Jet Propulsion Lab.

N67-34884, *Flyby Measurements of the Profiles of Water Vapor, Particulate Matter, and Carbon Dioxide in the Martian Atmosphere*, A. E. Barrington et al., 15 pp.

N67-33400, *Elements of Design Review for Space Systems*, R. E. Boss and C. H. McGaffin, 62 pp. Report intended to serve as an aid for instructing technically trained personnel in the implementation and evaluation of a design review program. It describes in detail those reviews performed by the contractor with customer participation and touches lightly on the various reviews and buy-offs conducted by the customer.

AD-656 546, *The Space Programs of the Soviet Union*, F. J. Krieger, 17 pp. Brief review of Soviet space flights.

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