books reviewed

Liquid Crystal Devices

Ed. Thomas Kallard. Published (1973) by Optosonic Press, Box 883, Ansonia Sta., New York, NY 10023. 366 + xxiv pp. incl. List of Patents; Inventor Index; Patent Holder Index; Bibliography. Diagrams. 8½ by 11 in. Paperbound. Price $15.

It would seem difficult to connect the term "liquid crystal" with the subjects of motion pictures or television. Yet these liquid crystal devices are beginning to be applied to display systems — and display arrangements are the end product of motion pictures and television.

Liquid crystals are fluid but have internal arrangements like crystals over certain temperature ranges in that the molecules, of a rod-like structure, can be made to align themselves in parallel array on the application of an electric or magnetic field. By placing the liquid crystal in a cell with transparent electrodes, its optical properties (including some of color) can be strongly changed upon applying voltage across the electrodes, with, at least in some cases, the use of very little power. This has obvious potentialities for displays with mobile subject matter.

Already solid crystals that, like gallium arsenide, show a bright red electroluminescence upon electric voltage application, are being used extensively as low power-consuming indicators of various sorts, especially for numerical displays in pocket computers and, also, instead of hands in all-electronic watches. The liquid crystals are somewhat different, but suggest applications of a similar nature. It is clear that the development of this field can have a significant potential in completely changing the display portion of a television set, assuming, of course, that insurmountable problems are not encountered.

An extensive survey of the field (as a part of a series of general examinations of fields under current study — holography, acousto-optic devices, etc.) has been prepared by the publisher. This book appears as Volume 7 in the series; it is a continuation of Volume 2 on the same subject of liquid crystals.

The treatment consists of four relatively brief papers, a substantial digest of each of some 150 United States and foreign patents, listed chronologically with index of inventors and patent holders; a bibliography of about 1100 entries from world-wide sources, cross-referenced with author index; and a two-part catchword title index — the first part for the patents, the second for the papers in the bibliography. Added to this is an "announcements" section of five commercially available sources of materials, components, devices and services.

It can be seen that there is an extensive effort being made in the development of this art. The list shows 46 holders to whom patents have been assigned. One of the firms holds as many as 44 patents. The ideas described in the patents range over a wide variety of applications, and at this point some of these may seem a bit "far out," but this is of course typical of many patent descriptions.

A note of caution appears in a patent for a wrist watch with liquid crystal face, namely, "The life of the liquid crystal is relatively limited — very much less than normally contemplated for a wrist watch, for example ... The problem is solved ... by integrating ... the face with the four alpha-numeric characters ... with the (replaceable) battery." This life problem (not mentioned otherwise) would of course require solution if the potential of liquid crystals as outlined in the whole book is to have a serious future. Another problem that looms up and would need solution is the speed of response (rather low) of the liquid crystal.

A work of this kind is not expected to be written for easy reading by the casual reader. It uses relatively unfamiliar terms and concepts current in varied fields such as optics, chemistry and others. It is, however, apparently designed as an effective handbook for the technologist who would

like to be prepared for possible changes in the art, to the extent that can be foreseen from the present trend of knowledge. It can also be useful to the prospective inventor who would like to keep in touch with the current art so that he can keep his mind alert and yet not run into duplication of ideas. The whole trend in this field is one of extensive effort to explore its realistic possibilities. — *Pierre Mertz*, Consultant, 66 Leamington St., Lido, Long Beach, NY 11561

Perception of Displayed Information

Ed. by Lucien M. Biberman. Published (1973) by Plenum Publishing Corp., 227 W. 17 St., New York, NY 10011. 345 + xvi pp. Illus. Diagrams. 6 by 9 in. Price $25.

The evaluation of reproduced image quality has for a long time been an elusive subject. It occupied the attention of optical designers and still photographers; later that of motion-picture photographers and, more recently, that of television engineers. All have striven to express the quality, as far as possible, by one number, which could then indicate the ranking of any given image reproduction. The Editor, Mr. Biberman, asked six authors to prepare a discussion of the subject in relation to general displayed information, but more particularly to motion pictures and television, with the emphasis on television.

Each author has provided a chapter on some special aspect of the problem; the Editor, in addition to his chapter, contributed introductions, postscripts, and remarks to the other chapters, to bind the treatment together. Some aspects that the Editor has chosen not to cover (presumably to avoid undue length to the book) are, for television, the problems from interconnecting links between camera and receiver (except for noise). And, more generally, the matter of color in its influence on quality (the word does not even appear in the index). Presumably because of the Editor's connection with defense analyses, and similar connections for some of the other authors, a fair share of the point of view on quality appraisal bears on military applications of image presentation.

Among the various factors studied on the measurement of image quality itself are the old theoretical Rayleigh criterion of point or line separation, the line grating type of resolving power test chart, the acutance criterion, the Strehl criterion on the proportion of light diverted outside a central beam core, the Linfoot correlation between light in image elements and the same elements in the original subject, the modulation transfer function, the results of noise or granularity, the search time for specific targets, the influence of the tone rendering and contrast range, the effects of the television raster and line interlace, and the influence of a superposed spot wobble.

External influences on the appraisal of image quality are discussed in succeeding chapters. These involve the subjective character of observer appraisals, the specific interrelations between noise, contrast and modulation, various effects of the television camera as disclosed by psychophysical experiments (including some infrared experiments), a detailed discussion of results of the line-raster process, and the problems of extraneous patterns generated via the raster (a phenomenon here called "aliasing").

As has been the case with previous authors delving into the subject of image quality, one somewhat gets the impression of looking for the pot of gold at the rainbow's end. There are many variables involved and it is not likely that a factor can be singled out as an index of image quality — hence the result is almost bound to be indecisive. At the close of the book the Editor senses the situation and quotes a reference, "The user may be forgiven for expecting a simple answer to his question 'How good is this system or this photograph?' but in truth the questions are not simple and there are no answers." In other words the rainbow has no pot of gold at the end. The Editor notes that the question might be modified to "Good for what purpose?" to give a definite answer. For example, the purpose of a reconnaissance image (to which the authors show some sensitivity as noted earlier) is quite different from that of a broadcast television play or a motion-picture projection. It is in this sense that the reader will consider the problem.

The book will be of interest to students and users of the art who would like a good background on the assessing of image reproduction defects and the appraising of technical picture quality. It gives an extensive historical background, and comes down to the very recent work, with over 200 references. The treatment is in general very readable — even if the pot of gold is not found. — *Pierre Mertz*, Consultant, 66 Leamington St., Lido, Long Beach, L.I., NY 11561.

Holography: State of the Art Review — 1971-72

Ed. Thomas Kallard. Published (1972) by Optosonic Press, 155 W. 68 St., New York, NY 10023. 23 by 28 cm. Paperbound. Price $17.50. (This review has been reprinted from the April 1973 issue of the *Journal of the Optical Society of America* by permission of the Editor.)

This is the third volume in an ongoing series covering patents and publications relating to holography. The first two volumes were reviewed in this Journal (59, 1006 (1969) and 60, 1424 (1970)). The first contained 21 condensed patents, the second 63, and the present volume 300. Clearly the ideas born in the mid and late sixties are now appearing as patents. These patents are all condensed, in that much of the verbiage has been omitted, making them quite easy to read.

In keeping with the format established by the earlier volumes, this one contains a bibliography with over 1400 entries, including papers, books and conference proceedings. In addition, unlike the earlier volumes, this one contains a complete list of patents in chronological order based on issue date and an alphabetically arranged inventor index. Further, there is an author index following the bibliography, listing the authors in alphabetical order with

Professional Services

numbers referenced to the numbered entry in the bibliography. To find all of the articles published by a particular author during the period covered (which is not clear, but approximately 1970 through mid-1972), merely look up the author, whether or not he is the principal author, and read off the entries under his name is very convenient. Using the inventor index is also convenient.

An extremely interesting feature of this book is the catchword title index for both the patents and articles. Following alphabetical listings of catchwords such as "medical applications," "high-speed holography," "real-time holography," and so on are the references to either the patent number or the bibliography number.

I am sure that anyone who needs to do a literature search in the area of holography will find this book very helpful. — *Howard M. Smith*, Eastman Kodak Co., Research Laboratories, Rochester, NY 14650.

Guide to Locating U.S. Government Technical Information, Technology and Patents

Published (1972) by TTA Information Services Co., 4 W. 4th Ave., San Mateo, CA 94402. 86 pp. (four main sections) 8½ by 11 in. Hardcover. Ringbound. Price $15.

A major problem of getting information from the government is that of determining what is available and finding out where to go to get it. There is no single source for government publications and no single system of codifying information, so the seeker after knowledge conceivably could flounder through mazes of government agencies, departments and offices before finding any clue to helpful publications within the field of his special interest.

This *Guide* is intended to make it easier for the "seeker after knowledge" to find what he is looking for. It supplies information on government publications, including patents and reports, and how to acquire them. It offers clearly presented information as to what publications are available, where (in what agency or department) they are, and how to address a request for a specific document.

The four main sections cover general sources of information, technical information sources in individual agencies, information and data services designed to spur technology transfer and utilization, and sources of information on government-owned patents and licensing. Some patents available for domestic and foreign licensing are also listed.

The first section contains information on material available from the Government Printing Office; The Library of Congress; and the Department of Commerce. The second section contains material available from the National Technical Information Service; National Bureau of Standards; Division of Technical Information Extension (AEC); Science and Technical Information Division (NASA); Science Information Exchange; Smithsonian Institution; and Information Analysis Centers. The third section contains information available from the Technology Utilization Division (NASA); and Small Business Administration. The fourth section contains information from the Patent Office; Atomic Energy Commission; and National Aeronautics and Space Administration. — *Edit.*

current literature

The Editors present for convenient reference a list of articles dealing with subjects cognate to motion-picture engineering published in a number of selected journals. Photostatic or microfilm copies of articles in magazines that are available may be obtained from The Library of Congress, Washington, D.C., or from the New York Public Library, New York, N.Y., at prevailing rates.

American Cinematographer

Filming the Circus in a 70mm Vertical Format, *Greg Dinallo*, Vol. 54, No. 2, p. 146, Feb. 1973.

The New Panaflex Camera Makes Its Production Debut, *Herb A. Lightman*, Vol. 54, No. 5, p. 564, May 1973.

The Underwater Filming of *Treasure Galleon*, *Jack Cosgrove*, Vol. 54, No. 6, p. 710, June 1973.

Underwater Specialist, *Sam Smith*, Vol. 54, No. 6, p. 710, June 1973.

Audio Engineering Soc.

Gradient Loudspeakers, *Harry F. Olson*, Vol. 21, No. 2, p. 86, Mar. 1973.

Quadraphonic One Point Pickup Microphone, *Takeo Yamamoto*, Vol. 21, No. 4, p. 256, May 1973.

Brit. Kinemat. Sound and Television

The Community Television Experiment, *Gordon White*, Vol. 55, p. 46, Feb. 1973.

Why 200 Only? The History and Techniques of Feature Length Animated Films, *John Halas*, Vol. 55, p. 72, March 1973.

Lighting for Motion Pictures, *Freddie Young*, Vol. 55, p. 94, Apr. 1973.

Educational Television — An Exercise in Compromise, *Janos Reeves and Chris Thomson*, Vol. 55, p. 120, May 1973.

A Device for Superimposing Letters on the TV Screen, Vol. 55, p. 126, May 1973.

Educational Television at Highbury Technical College, *David Frampton and John McKenzie*, Vol. 55, p. 272, Aug. 1973.

Jour. of Broadcasting

State and Local Taxation of Commercial Broadcasting, *William Joseph Kennedy*, Vol. 17, No. 1, p. 77, Winter 1972-73

Broadcast Legal Documentation: A Four-Dimensional Guide, *Don R. Le Duc*, Vol. 17, No. 2, p. 131, Spring 1973.

Preserving TV Programs: Here Today — Gone Tomorrow, *Ruth Schwartz*, Vol. 17, No. 3, p. 287, Summer 1973.