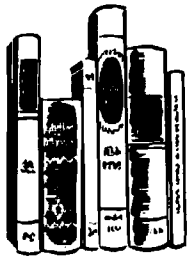

# books reviewed

## Form and Space Vision

By Yves Le Grand (Translated by Michel Millodot and Gordon G. Heath). Published (1968) by Indiana University Press, 10th and Morton Sts., Bloomington Ind. 47401. 367 + xvi pp. Diagrams. 6 by 9 in. Price $17.50.

In 1946 there appeared the first volume of a series of three on *Physiological Optics*, by Yves Le Grand. It covered dioptrics of the eye, and it has gone through several editions. The second volume, which appeared in 1948, discusses light and color. The third volume was published in 1956, with the title *L'espace Visuel. Form and Space Vision* is a translation of this last volume, with some revision and updating by Professor Le Grand.

The author divides the subject into two major parts. The first, "Facts and Theories," is a fairly extensive discussion of the functional characteristics of the eye, and of theories regarding this functioning. The second part is called "Applications." It contains discussions of how the eye carries out visual tasks.

The first part is by far the larger. It treats of eye aberrations, vision of a point of light, vision of details, perception of forms, the visual field and its various blind areas, and movements of the eye and the observation of motions in the viewed field. From there the author goes on to discuss binocular vision and the perception of space, and also the structural construction of the paired eyes, nerve fibers and their interconnection between the two eyes, and the brain cells and their spatial relationship with respect to the retinal fields of view. Topics discussed include fusion of the images seen by the two eyes, even when these are physically different, and the stereoscopic perception of distance that results from this physical difference. It is interesting to note that in spite of all the work done on this subject the phenomena are still mysterious — as are most of the phenomena associated with the operation of the brain.

The second part deals with vision through the atmosphere and through water; visual tasks; illumination and fatigue and various examples of binocular vision through instruments. Among these topics the matter of visual fatigue has attracted much interest because of its widespread relevance to our daily experience. It is extraordinary how difficult (if not almost impossible) it has been found to be to establish a measurable evaluation of it. This conclusion has of course been observed in those studies that concern the viewing for long periods of time of both motion pictures and television, and also of various visual industrial tasks.

The book closes with a voluminous double list of references, one specific and numbered, and the other, even more extensive, of general material. There are also two indexes, one by subjects, the other by authors.

In the preface to the group of the three volumes, published in the first volume, Charles Fabry noted that the "author and publisher had had the ambition to produce a book which would be at the same time *science* and *teaching*," equally useful to professionals and to the daily oral teaching of students. In their preface to this third volume, the translators refer to "this long task which has been completed b cause we remain convinced that Professor Le Grand's uniquely comprehensive views of *L'Espace Visuel* belong in the English literature of physiological optics." Both prefaces refer to the work as a descendant of the classical *Physiological Optics* of Helmholtz. The reader will obviously find much in this work that he has seen before elsewhere. This is inevitable in a comprehensive work, but he will be grateful that the items have been collected. Familiarity with them is extremely important to all workers who deal with phenomena of visual perception and who find it desirable to be acquainted with the mechanism and details of those phenomena. *Pierre Mertz*, Consultant, 66 Leamington St., Lido Beach, L.I., N.Y. 11561.

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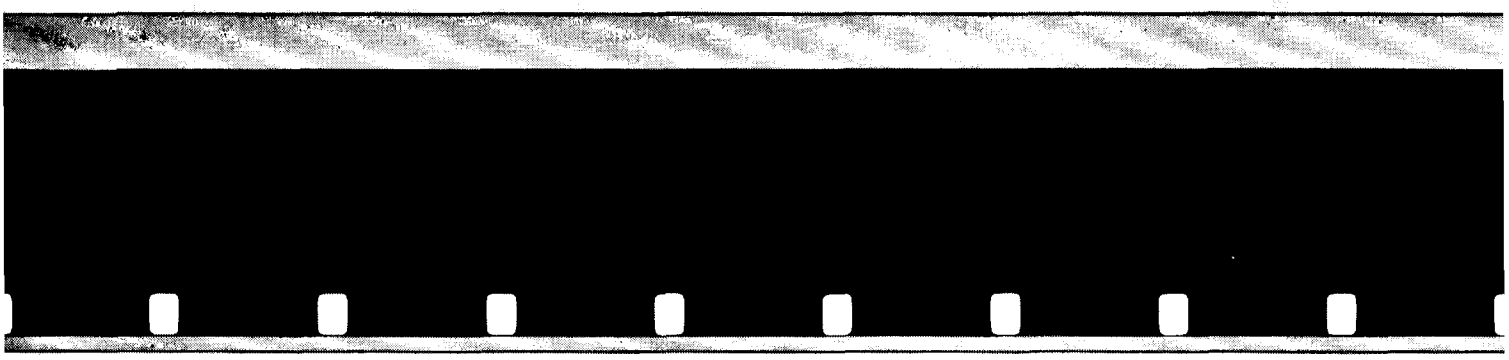

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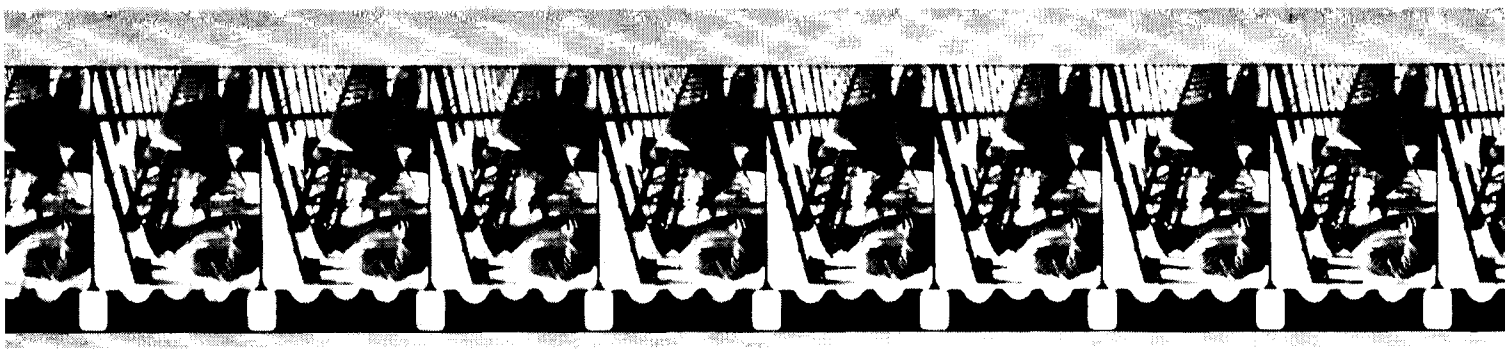

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**Projection des Images Animées, et Reproduction des Enregistrements Sonores** (I. Guide de l'Opérateur Projectioniste; II, Receuil des Illustrations et Figures) By Jean Vivié. Published (1968) by Jean Vivié, 70 Avenue des Ternes, Paris 17, France. I. 310 pp., II. 182 pp. Table of Contents, Illus., Diagrams, Tables. Paperbound 6¼ by 9½ in.

Since 1943, Mr. Vivié has organized courses for teaching motion-picture operators, particularly with the view of issuing diplomas certifying to their qualifications for this work. The present volumes represent a complete overhaul of the manuals used in these courses, partly to keep up with progress in the art, and also to cover the new preparations required for two additional higher level diplomas now being issued.

One can observe that the French lay more stress than Americans on a broad knowledge of the art, including even historical aspects, as compared with the simple practical matter of keeping the apparatus operating with first class performance. This tends to give an encyclopedic character to the work, whi h in itself is generally all to the good and adds interest to the non-specialist reader. However, because of the large volume of material and the modest bulk of the book, the descriptions have to be quite condensed. References to equipments are usually given only to the inventor's name and the date, and only occasionally to the country, which inconveniences student seeking more information. With the exception of the material on testing, the text is presented separately in one volume and the illustrations in the other. Such an arrangement has certain advantages, but it also has disadvantages, principally a tendency towards weakened correlation between text and figures.

The general descriptive material covers cinematography and sound films, first broadly and then in terms of mechanisms. The intermittent system is given extensive treatment in a study of the various devices that have been invented for it, together with the various shutter arrangements, framing adjustments, extra high-speed pulldown, etc. Continuous projection with smoothly moving film is also discussed (although the Kudar rotating prism system with adjustable lengthened optical path within the glass is not mentioned). The various light sources, optical systems and screens, and their performance in terms of screen luminance are described. The advent of sound with films is then taken up, with all its ramifications, in terms of mechanisms used in conjunction with the film, its required electronics, room acoustics, etc. The matter of special projections is given a chapter by itself. It covers such things as extra wide projection angles — up to completely around the hall — continuous projection of film loops, extremely inclined angle projections, anaglyphs, holograms and polarized 3-dimensional projection, elaborate stereophonic effects, and automatic projector programing.

The author has brought the special systems up to date by including television projection. A brief historical review of television is given in an early chapter (which inexplicably omits any mention of Ives, although the 1927 demonstrations showed the best television of the time and included both long-haul wire and radio transmissions). The modern television projection systems include high-intensity cathode-ray tubes and Schmidt optics, the Eidophor, various electrooptical light modulators, and intermediate film (including thermoplastic) systems. Some of these are, of course, no longer strictly modern.

After all this descriptive and historical material the author devotes some 70 pages to the actual operation of the projection machines and routine duties of the projectionist. Of these about 24 pages cover "trouble shooting," performance specifications, and tests for both the projection and sound accompaniment.

Unfortunately, following general French usage, there is no index; but this is in part compensated for by an extensive table of contents.

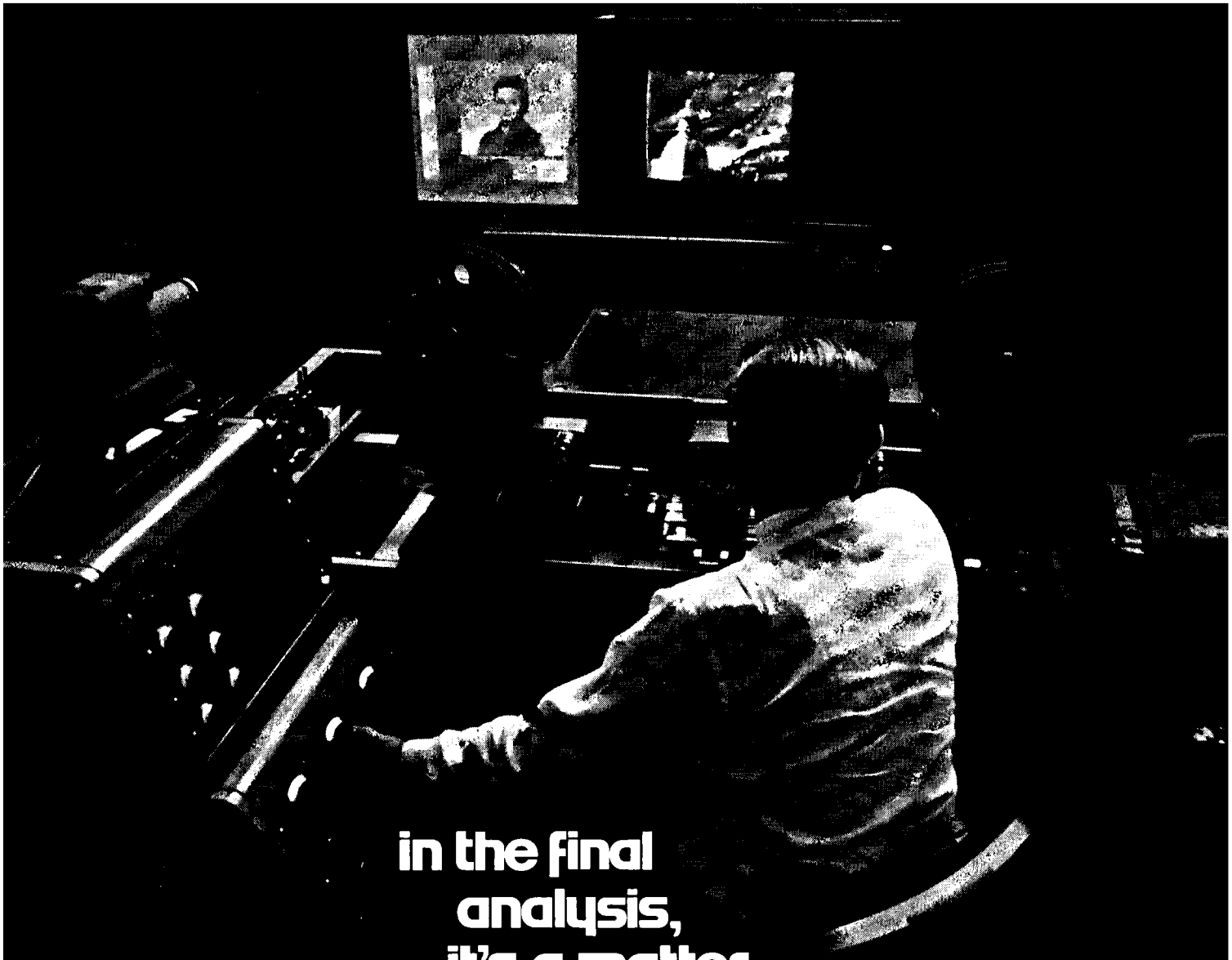
Because of the language it will be difficult for most American projectionists to make much use of this book. They would find a good deal of it most interesting extension reading beyond what is usually expected in projection manuals. However, engineers, would be less affected by the language handicap. *Pierre Mertz*, Consultant, 66 Leamington St., Lido Beach, L.I., N.Y. 11561.

## Display Systems Engineering

Ed. H. R. Luxenberg and Rudolph L. Kuehn. Published (1968) by McGraw-Hill Book Co., 330 W. 42 St., New York, N.Y. 10036. 444 + xvi pp. Illus. Diagrams. 6 by 9 in. Price $16.50.

In the preface to this work the editors state, "During the past decade a new interdisciplinary field — information display systems — has arisen. The increasingly complex man-machine interactions of modern computer-based information systems have given a forced impetus to integrating previously unrelated pools of knowledge. In all such processes, some cross fertilization takes place resulting in an expansion of new concepts and techniques. . . . We have based our approach upon our experiences in the development of modern display systems as well as the presentation of many tutorial courses in the field." The discussions on the various subjects have been written by specialists in their respective fields.

The first six chapters comprise a review of the major disciplines which are merged into the broad art. They cover first a general introduction to display systems, including data organization and display, the contributions of the communications and data processing arts, and the structure of display arrangements. The second chapter covers system design and formats, including objectives, response times, size, and clutter reduction. Third, a general introduction to photometry is presented, including color vision, the use of photocells, and microphotometry. Visual experience and colorimetry are treated in the fourth chapter. This even includes very brief (and mostly old) discussions on theories of color vision and color blindness, the Bezold-Brücke effect, and Benham's top. It treats colorimetry, the Munsell classification, and the standard illuminants on the basis of the 1931 standards. Chapter five treats image analysis, including problems of resolving power and



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sharpness, spatial frequency response, scanning systems and signal channel frequency bandwidth. Finally, chapter six covers optics, including a fairly extensive discussion of large-audience viewing, oblique viewing, resolving power, and projection problems that also include effective use of light flux and relay lens systems.

The next three chapters treat problems of actual display systems. Chapter seven covers recording media, and includes silver halide (with two paragraphs on color film) and nonsilver halide materials, and photography of cathode-ray tube displays. It also goes into a discussion on image quality and contrast. Chapter eight covers cathode-ray devices, not only the simple tubes, but those with multiple guns, optical ports, symbol generators, etc., as well as the television color tubes. Chapter nine covers film-based projection systems, with a rather extensive discussion of front- and rear-projection screens. The reader will miss discussion of the new beautifully legible ticker tape projection with yellow characters on a deep purple ground.

All this might seem ambitious enough, but the editors do not wish the book to go out of date soon, and so have included, in the last two chapters, such potential display devices as electroluminescent devices, lasers and holography. These discussions must obviously be elementary. The reader might however appreciate a brief outline on how population inversion is obtained in laser energy states. One can wonder if this could not really be short and elementary, and eliminate some of the "black magic" atmosphere in the description. Also in the holography description could not the sketches possibly be clearer if the general beam layout were kept, as nearly as feasible, the same instead of being changed from figure to figure?

The purist may be jarred by seeing, on page 407, "a. . .media," and hope that this is not indicative of lapses elsewhere, possibly even on technical material. According to the preface, the book is designed "to be read by the practicing scientist or engineer seeking an introduction to display systems, or by the worker already skilled in one or more of the allied disciplines," and, generally, it meets this objective.—*Pierre Mertz*, Consultant, 66 Leamington St., Lido Beach, L.I., N.Y. 11561.

## High Speed Photography

By R. F. Saxe, Published (1966) by Focal Press, Inc., 20 E. 46 St., New York, N. Y. 10017. 144 pp. Illus. Diagrams. 7 by 9½ in. $15.00.

This volume serves as a broad review of current approaches and practices in high-speed photography. As such, it is particularly valuable in that it provides a somewhat philosophical analysis of equipments, techniques and goals achieved through use of this medium.

For this reason, the book not only gives the practitioner an opportunity to take a "new look" at his work, but also constitutes an interesting and well-written treatise that can be handed to the practitioner's supervisor who is not of this field with the request "read this — this is what high-speed photography is all about."

Dr. Saxe is a scientist whose personal work has been concentrated in what might be termed the more exotic end of the high-speed photographic spectrum — the realm of ultra-high-speed mechanical, optical, and electronic imaging, dissecting, and recording methods; and yet, he explains clearly and lucidly the uses and values of more conventional high-speed techniques that are primarily the province of the photographer or technician who has drifted into the field. Few in this field possess the ability to bridge the gap that often exists between these poles and also to comprehend clearly the value and importance of both types of work.

The following subjects are treated in separate chapters: High-Speed Cine Cameras; Rotating Mirror Cameras; Short-Exposure Single-Picture Devices; Light Sources; Image Dissection and Similar Techniques; Techniques for the Study of Fluid Behavior; Flash X-Rays; Electronic Techniques; and Film Analysis.

It is apparent that this subject listing closely duplicates the sessions found in an International Congress on High-Speed Photography, and is an indication of the ability of this author to cover so wide a field in a manner that is so adequate as to depth.

While Dr. Saxe points out the obvious fact that recording techniques have far outstripped our ability to cope with the mass of data obtained, I feel that a slightly brighter picture could be painted in the last chapter on film analysis. Some compact and inexpensive film measuring machines introduced within the past six or seven years radically alter this imbalance between data points buried in the film record and data points presented in a useful form. The neglect of these approaches that make it possible for almost every project engineer to have his own film assessment center on his desk is the only point on which I would find fault with this most excellent addition to the field of technical photography.—*Carlos H. Elmer*, P.O. Box 875, Scottsdale, Ariz. 85252.

## Electrical Characteristics of Transistors

By R. L. Pritchard. Published (1967) by McGraw-Hill Book Company, 330 W. 42 St., New York, N.Y. 10036. 715 + xv pp. Diagrams. 6 by 9 in. Price $19.50.

Bipolar transistors have been developed largely with two technologies: a device technology in which the primary emphasis is on relating device physics and gross electrical characteristics, and a circuits technology where the emphasis is on relating the refined electrical characteristics and the circuit characteristics. As a result, all books on the transistor have been directed to the technician or the circuit engineer with almost all of the material on either the device technology or the circuit technology and nothing, or at most very little, on the middle ground, the inter-technology that ties the two together. Thus, the middle ground, as far as documentation is concerned, has become a technical void.

The documentation of this middle ground would greatly assist in the further development and application of both discrete bipolar transistors and integrated circuits. These devices are tied together, for the bipolar transistor is and, by all present estimates, will continue for some time to be the

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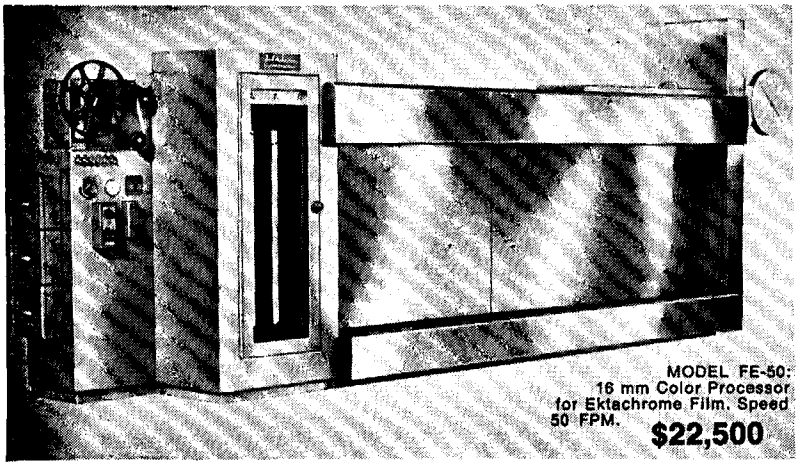

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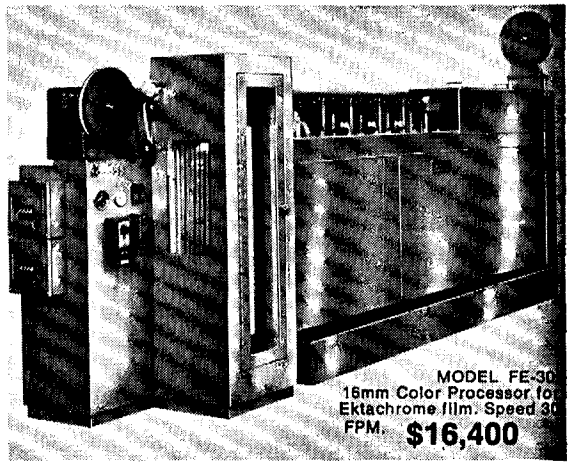

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core of most integrated circuit devices. The documentation would provide a basis for a more efficient exchange between circuit and device engineers in the application of discrete bipolar transistors and for the development of integrated circuit computer design aids which are coming into increased usage with the increasing complexity of integrated circuits. The author states that the purpose of this book is to attempt to fill this technical void. One has to agree that it is a very good start towards doing just that.

The volume opens with a brief explanation of the material and device physics of semiconductor diodes and bipolar transistors and then goes on to develop and discuss at length the transistor circuit design characteristics in terms of the physical device characteristics. Attention is given to all of the general circuit design characteristic areas, namely dc or static, ac small signal, signal transmission, switching and thermal. Where possible, these circuit design characteristics are quantitatively related to physical parameters such as lifetime, carrier density, base width, material resistivity, etc., in the form of an equation. In numerous other cases, where equations are too unwieldy or unreasonable to develop, the interrelations are given qualitatively. Of necessity, the physics presented for the main part is classical, qualitative, and basic with a content that is in keeping with a book written for a reader with a classical electrical engineering background. A deeper knowledge of physics would help but is not necessary for a reasonable understanding. The static characteristic portion is on general data sheet characteristics as well as static characteristics, parameters, and effects that modify or impose limitations on the data sheet characteristics. Examples of the latter are second breakdown, conductivity modulation and base edge crowding. The section on small signal characteristics is by far the largest. Small signal parameters and equivalent circuits are developed for the ideal and the practical transistor in the low, middle and high frequency ranges. Along with these, considerable attention is given to the effects of base resistance and capacitance, and to the general variations of the small signal parameters with frequency. The signal transmission characteristics coverage is on small signal gain, distortion and noise. It deals mainly with maximum available gain and frequency stability, the sources and mathematics of distortion, and transistor noise generators and equivalent noise models. The chapter on switching briefly describes transistor switching action and then develops and compares the switching times obtained with the classical small signal analysis of Ebers and Moll and those obtained with the stored charge analysis of Beaufoy and Sparkes. The text closes with a section on thermal effects. It presents the temperature variations of the physical parameters and in several examples relates these to the electrical circuit design parameters. It also goes into internal heating, thermal stability and heat flow analysis.

The book is a compilation of the works of many engineers and scientists from all over the world. It is well organized and referenced throughout with a surprisingly small number of misprints. The coverage of the scope of the various technical sections is fairly well balanced and generally good with the coverage especially good in the noise, thermal and small signal sections. The only drawbacks are relatively minor and stem from the overuse of examples with outmoded (alloy and grown) transistor types and the lack of a list of symbols.

In total, the book is a welcome and unusual addition to the large number of books on transistors. It is probably too specialized for wide academic usage; however, it would probably be most valuable to engineers interested in the design and application of bipolar transistors as discrete devices or in integrated circuits.—*Henry D. Harmon*, Missile and Surface Radar Div., Radio Corp. of America, Moorestown, N.J. 08057.

## The Disney Version

By Richard Schickel. Published (1968) by Simon and Schuster, Rockefeller Center, 630 Fifth Ave., New York, N.Y. 10020. 384 pp. 5½ by 8½ in. Price $6.50.

This book contains a great deal of material that will be particularly useful to future biographers and students of the life and times of Walt Disney. Although the book is written in rather a pedestrian style and much of the material could be better organized, the author has blazed a particularly valuable trail for future writers to follow in that he has dealt with the Disney "legend" as a peculiarly American phenomenon, stressing the regional and sociological aspects of Disney's life and achievements, rather than attempting an in-depth psychological study of the individual.

The author states in the Foreword, "(The book) does attempt to see him coolly and objectively and within the context of our developing society. . . . I have wanted mainly to set forth a large body of previously uncollated material within a context that at least implies an attitude that is more critical of both Disney and his audience than was usually taken while he lived." The author sees Disney as a type — that of "midwestern go-getter" — and from that point of view he regards the book as ". . . a study of an aspect of American culture."

An interesting and (at least to this reviewer) previously unknown bit of information about the early Disney era is that Disney did not draw the characters that made him famous. According to the author, "Even Mickey Mouse was designed by someone else, namely Ub Iwerks, an old friend from Disney's pre-Hollywood days."

The book touches rather lightly on the development of animation techniques from the very primitive beginnings, but it is indicative of the scope and amount of information included in the book in that early animation techniques are described in some detail as well as the development of the multiplane camera.

A particularly delightful description of the ingenious methods used in the early days appears on p. 120: "His chief assistants were Ub Iwerks... and a young man named Wilfred Jackson...who liked to play the harmonica in his spare time. The picture was plotted to the tick of a metronome, which set rhythms for both Jackson...and Iwerks, who got from the metronome a sense of the rhythms he would have to use in his animations." The author

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describes (pp. 195–200) the defects of the conventional animation camera and the development of the multiplane camera. "The multiplane camera...was more easily described than built. Ub Iwerks had made a primitive model of the machine... (using, it has been said, railroad tracks with a jalopy mounted on them respectively to guide and to power the camera). ...He led the team that perfected first the vertical multiplane camera, which peered down through an iron framework fourteen feet tall, through layers of cells set in grooved shelves 'like a baker's pie wagon' according to an early description. Later Iwerks participated in the development of the horizontal multiplane..."

This is a book that is well worth reading. It includes a selected Bibliography that is not, by any means, a complete listing of the books and articles consulted, the author states. It is so packed with facts that, if anything, it suffers from a plethora of information. If the author had honed his material down to a more spare and cohesive presentation, the book might have been more readable; onthe other hand, some item of information that will complete the puzzle picture of some future researcher or biographer might have been relegated to some inaccessible card file—*Edit.*

### FET Applications Handbook

Ed. Jerome Eimbinder. Published (1967) by Tab Books, Blue Ridge Summit, Pa. 17214. 288 pp. Diagrams. 5½ by 8½ in. Price $12.95.

The first two chapters, dealing with some historical background and definition of terms, were written by the Editor, while the remaining 21 chapters include a series of articles, appearing in *EEE Magazine*, by authors from many of the major semiconductor manufacturers.

The applications are broad and range from dc through RF and then to the Photo-FET. Digital circuits and FET logic arrays are also covered in several chapters.

An advantage of a book such as this stems from overlap of subject material, which is often to the reader's benefit because of different approaches to the subject by the various authors. For example, there are five chapters — FETs in Chopper Circuits, Selecting FETs for Chopper Circuits, Junction FET Switches, Designing FET Switches and Commutating with MOS-FETs — that deal with FET in various switching applications. This is one of the longer "runs" in subject material but it does aid in thorough coverage.

This is a handy reference book for the designer and those just beginning to design with FETs.—*H. A. Wittlinger*, 14 Moores Mill-Mt. Rose Rd., Pennington, N.J. 08534.