Alex Ushakoff, Jr., has been elected President of Center for Communications, Inc., 43 Lovett St., Beverly, Mass. 01915. Thomas E. Wilber has been elected Vice-President and Treasurer. Mr. Ushakoff is presently a professor of Scientific Communication at Boston University and a member of the faculty at North Shore Community College in Beverly, Mass., where he teaches Engineering and Instrumentation. He has been a consultant in educational technology to many organizations, including the United Nations. He has produced films for a number of government agencies and various international firms. Mr. Wilber was formerly Director of Management Communications for Indian Head, Inc., New York.

Center for Communications, Inc., was formed to produce nontheatrical films and other visual communications, emphasizing a systems approach to communications problems in science and technology. The firm is an expansion of Ushakoff enterprises, founded in 1952 by Mr. Ushakoff. The firm will continue to plan and produec motion pictures, technical exhibits, training programs, conferences, seminars and other audio-visual communications including those requiring closed-circuit television.

Frank J. Haney has been appointed General Manager of the Sunnyvale Division of Visual Electronics Corp., 356 W. 40 St., New York, N.Y. He was formerly Manager, Audio/Video Systems at ABC-TV's network engineering department. While with ABC he designed the first long-distance (New York to Washington) remote control of studio equipment using pulse-code-modulation techniques over data telephone lines. Prior to his affiliation with ABC he was project engineer, network engineering staff, at CBS-TV, where he designed studio facilities for the network's overseas stations. In his new post he will have overall responsibility for the development and manufacture of video-tape recorders and related electronic equipment at Visual's newly expanded Sunnyvale, Calif. plant.

Peter C. Goldmark, President and Director of Research of CBS Laboratories, received an honorary Doctor of Science degree from Fairfield University at commencement exercises held June 9. The degree was awarded for "personal achievements and contributions to communications, entertainment, scientific invention and innovation." Dr. Goldmark is a native of Budapest, Hungary. He studied at the Universities of Berlin and Vienna and was granted a Ph.D. degree by the University of Vienna.

books reviewed

Acoustics and Vibrational Physics

By R. W. B. Stephens and A. E. Bate. Published (1966) by St. Martin's Press, 175 Fifth Ave., New York, N.Y. 10010. 818 + xiii pp., including index. Illus. Diagrams. Tables. 6 by 9 in. Price $22.50.

This book, encyclopedic in scope, provides a broad-scale text and reference work on sound and the applications of acoustics. The authors state that the text is intended for the use of both graduate and undergraduate students as well as acoustical, mechanical and communication engineers and technicians.

The first part of the book covers the early history of sound and music, fundamentals of periodic motion and wave propagation. In this part of the text there are many subjects which cannot be found in the conventional book on acoustics.

Mechanical vibrations of strings, torsional vibrations and vibrations of plates, and the reflection, refraction, absorption diffraction, scattering interference and Doppler effect relating to sound waves are considered quite thoroughly.

The section on physiological acoustics is not completely up to date. For example, the artificial larynx described in this book has been replaced by a different type operating on the outside of the throat. Also, some important sources on physiological acoustics are omitted.

In the chapter on wave analysis and synthesis the pertinent aspects are treated in an exceedingly abbreviated manner. Only 19 pages are used to cover the field of sound reproduction, and only two pages are devoted to stereophonic sound. Surely, sound, which is a major channel for the mass dissemination of information, deserves more than this meager treatment. A brief consideration of musical instruments appears in this chapter.

The chapter on acoustical measuring instruments covers also the subjects of microphones and loudspeakers; here, again, the treatment is encyclopedic. The subjects of noise, architectural acoustics, sound absorption, reverberation, anechoic rooms, and testing the quality of rooms are treated in an excellent manner.

The book also includes a chapter on mechanical and acoustical analogies. The treatment of ultrasonics, shock waves and waveguide propagation is quite complete for a textbook of this scope; and the classical treatment of velocity potential and wave propagation is excellent. The subject of nonlinearity in wave phenomena is a fine presentation of this complex subject.

There is an Appendix of 196 pages covering 53 major subjects in encyclopedic mathematical form. Practically all of the elements of acoustics and vibrational physics are included.

This book covers more subjects in the field of acoustics and vibrational physics than any other single book of which the reviewer is aware. The major part of the text is excellent. There are, however, as stated above, omissions in references and some rather meager treatments of some subjects. — *Harry F. Olson*, RCA Laboratories, Princeton, N.J. 08540.

Edit. Note: Dr. Olson is the author of *Music, Physics and Engineering* (Dover Publications, Inc., New York, 1967, 460 pp. illus., paperbound, $2.75). This book is the second edition, revised and enlarged, of *Musical Engineering* (McGraw-Hill Book Co., New York, 1952).

The Reproduction of Colour (2nd Ed.)

By R. W. G. Hunt. Published (1967) by John Wiley and Sons, Inc., 605 Third Ave., New York, N.Y. 10016 500 pp. incl. Appendixes, Index, Illus., Diagrams. 6 by 8½ in. Price $16.00.

Color is a most important subject these days, in all walks of life, and color reproduction is of great importance in such fields as paintings, film projection, television, and magazine printing. The Foreword (by W. D. Wright) to this work notes that "a book on the reproduction of color requires a broad outlook on the part of the author," also that it "demands a very wide and deep understanding of the facts of color mixture and color perception" and that the author "is very well qualified to give a balanced and comprehensive account of the subject." The second edition has been made necessary by the "tremendous advances in the subject."

The book is divided into four parts. The first covers fundamentals of tricolor vision and colorimetry, additive and subtractive methods, light sources, and assessment of the final result. The second part covers color photography by subtractive methods, including quantitative colorimetry, masking methods, color negatives, and the chemistry of color photography. The third part covers color television, including discussions of standard signals and the use of color film. The fourth part covers color printing, including a variety of "automatic" systems. Three appendixes are also included.

The subjects are generally well covered, with full references to the literature for more complete discussions. The work is up to date enough to include information on the new CIE standard illuminants D_{5500} to D_{7500}.

The reader will be dismayed to find that the elaborate multiple-variable colorimetric equations, when used for film (for example), cover principally the securing of objective exactness in the positive film itself, rather than in the projected image as seen and interpreted by the viewer. This is, of course, far short of what is necessary in the art, and it is a current thorny problem in color television. The projection lamp and color adaptation effects on the part of the viewer are largely dealt with in only roughly qualitative fashion; the Foreword notes: "However much we may regret that the requirements of a color reproduction cannot be expressed in precise colorimetric terms, we have to recognize that engineering concepts alone are not enough." Thus the

shortcomings are really more in the current state of the art than in the treatment.

Any engineer dealing with visual perceptions that involve color needs to be well grounded in the color phenomena and color reproduction and ought to have available for consultation this book or similar works. — *Pierre Mertz*, Consultant, 66 Leamington St., Lido Beach, LI., N.Y. 11561.

Engineering and the Liberal Arts: A Technologists Guide to History, Literature, Philosophy, Art and Music

By Samuel C. Florman. Published (1968) by McGraw-Hill Book Co., 330 W. 42 St., New York, N.Y. 10036. 278 pp. incl. indexes. 6 by 9 in. Price $8.95.

One of the most alarming trends in modern education is the widening gap between the scientific and technological disciplines and the humanities. The intent of *Engineering and the Liberal Arts*, according to the author's Preface, is "(1) to advocate the cause of liberal education for engineers; (2) to explore some of the ways in which engineering is related to the liberal arts, thereby providing natural bridges of interest and concern between the 'two cultures'; (3) to give the average engineer a quick 'refresher' by reviewing in broad outline the nature and content of the liberal arts; and (4) to induce the engineer to journey deep into the world of liberal arts and to recommend some of the likeliest paths for him to take."

The book takes on added significance in view of the author's career in engineering and construction. (He is co-owner and General Manager of Kreisler-Borg Construction Co.) The book displays the erudition of an author who has a deep love for the arts.

The style is deceptively simple and easy to read, and the author's involvement with his subject matter comes through with all the charm of a conversation with a man of letters. With all that, an astonishing amount of information is presented in a compact but easily assimilated fashion.

In Chapter 2, "The Bridge to History: The History of Technology," a list of landmarks in the history of Technology, beginning with circa 4000 B.C. ("Irrigation works control flooding of the Nile . . .") and extending through 1945 A.D. ("The start of the Atomic Age . . .") gives the reader (within the brief compass of six pages) an exciting overall view of the historic process.

The book discusses literature, philosophy, fine arts and music with warmth, authority and appreciation. Under "Recommended Reading" (in the Chapter "The Bridge to Philosophy") the author gives brief and illuminating comments on a number of books. For example: "Three splendid books by outstanding men of science who are interested in the broad outlook are Sir Charles Sherrington, *Man and His Nature* (Mentor Books MT554); J. Z. Young, *Doubt and Certainty in Science* (Galaxy Books 34); and J. Robert Oppenheimer, *Science and the Common Understanding* (Simon & Schuster 1954). If only there were engineers who could write like these scientists!"

Although written especially for engineers this is a book that can be enjoyed by anyone. — *Edit.*

ASTM Manual on Quality Control of Materials

Special Technical Publication 15C prepared by ASTM Committee E-11. Published (1951, reprint 1967) by American Society for Testing and Materials, 1916 Race St., Philadelphia, Pa. 19103. i-xiv + 1–136. Paperbound. 6 by 9 in. Price $3.00 plus handling and shipping.

A new printing of this highly recommendable little book is now available, and it is worth while to consider its many merits. Before enumerating these, a few words about the evolution of the book may be in order. Before reaching its current status, as noted above, it was published under the present title for the first time in January 1951 and Parts 1 and 2 "represent a revision of the main section and supplement A of the ASTM Manual on Presentation of Data (1933), which it replaces," as stated in the Foreword. Other parts of the book go back to the year 1935, so it represents many years of accumulated experience and knowledge and has the prestige of being a pioneer in its field. Since 1951 it has gone through 11 printings, the last one dated September 1967. Since its original printing it has undergone three complete revisions with new material added as necessary. Also the Appendix was expanded for inclusion of titles of related publications and books on Quality Control and Statistics. This eleventh printing was made, apparently, almost entirely from the plates of the seventh printing of July 1960, with which it seems to be identical.

This book certainly supports the statement in the Preface that over the years it "has become a standard of reference over wide areas in both industrial and academic fields." In this respect it is of interest to note that as long ago as 1950 the Color Committee of the SMPTE, in its Report on Color Sensitometry which subsequently became the basis for all our current sensitometrical practices, recommended then in the report's last chapter, Statistical Aspects of Color Sensitometry, the use of the *ASTM Manual on Presentation of Data*, the precursor of the book here under consideration.

What then are the merits of this book in conjunction with our daily work of sensitometry and quality control? The answer is that, obviously, we have to collect, day after day, a huge amount of data in the form of densitometrical measurements; then we have to relate the data in a meaningful way to the established standard values for our processes, in order to detect in good time all deviations and abnormal trends, then to trace and eliminate all possible causes for process failure. The great merit of the *ASTM Manual on Quality Control of Materials* is that it presents, in a most precise and concise way, the strictures for data gathering and presentation, without which it is extremely difficult to extract the information essential for the correct maintenance of a process.

Experience has shown that the mind cannot comprehend a vast amount of numerical information, presented to the observer in the form of tables or tabulated values. If, however, these values are converted into points on a graph or any other convenient graphical representation, it becomes extremely easy to see, at a glance, their mutual relation, meaning, order and significance. Graphical and statistical evaluation of the accumulated sensitometrical data is the final step, indispensible for the ultimate control of the color photographic process as well as for black-and-white.

Graphical and statistical evaluation of accumulated data is precisely what we can learn in an excellent way from the *ASTM Manual on Quality Control of Materials*. Its three main parts are titled: Presentation of Data; Presenting ± Limits of Uncertainty of an Observed Average; and Control Chart Method of Analysis and Presentation of Data. These titles speak for themselves and need little comment. Control charts have become extremely important as a means of color quality control, and establishing of control limits has become indispensible.

The great merit of this manual is the wealth of information given in so small a space. This book, in only 136 pages, teaches us in a most efficient manner the complete language of statistics and provides us with all the mathematical and graphical tools we may need, in order to make the best use of the collected data, i.e. the measured densities on our test strips. For this reason, the book should be in every technical library and laboratory — wherever data must be evaluated on a continuity base. The methods this book describes are of an all-encompassing nature and application to color sensitometry is but one of an immense number of possible applications. Graphical representation of the results of chemical analyses on conveniently laid-out control charts can afford another convenient means of process control of the motion-picture photographic process.

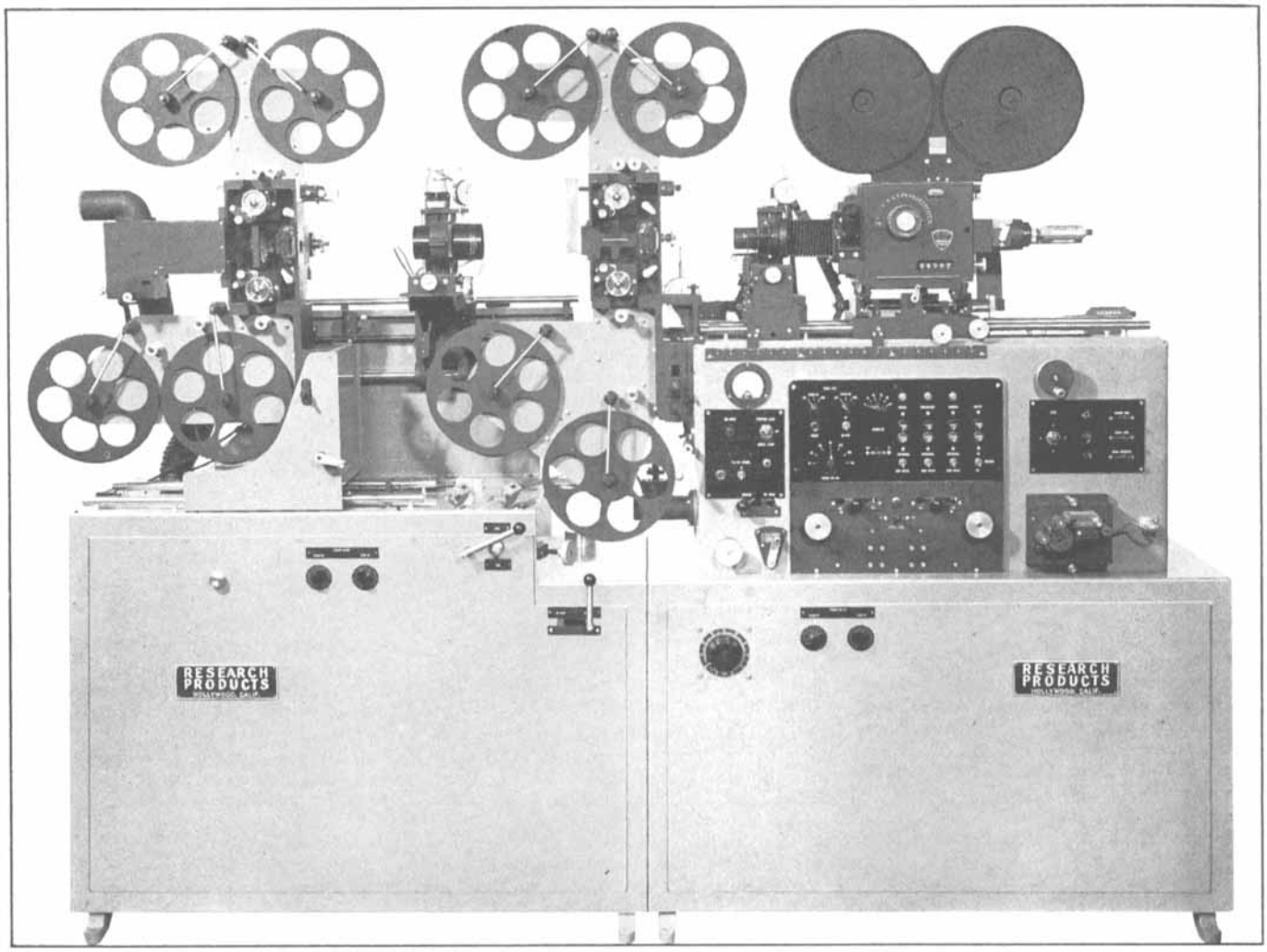
The book is well prepared in its organization, language and mathematical treatment. An ample number of examples and illustrations provide great help for easy understanding. However, some command of algebra and elements of calculus will make it easier to reap all the benefits this book is capable of providing. All in all: a most recommendable book: — *Pablo Weinschenk-Tabernero*, 98-17 Horace Harding Expressway, Flushing, N.Y. 11368

Photographic Science Symposium: Paris 1965

Ed. by Prof. J. Pouradier, Published (1967) by Focal Press Ltd., 20 East 46 St., New York, N.Y. 10011; and 31 Fitzroy Square, London, W.1, England. 590 + 23 pp. indexes. 7 by 9½ in. Price $44.00.

This book is the third in a series of Focal Press reports on International Congresses of Photographic Science. It is printed in the language of a paper as given at the congress (English, French or German) and contains 11 introductory lectures occupying 204 pages, summaries of 122 papers, and transcripts of the ensuing discussions. It is indexed in English, French and German.

The lectures are authoritative summaries of the following subjects: nonsilver light-sensitive inorganic systems; silver halide structure; macromolecular light sensitive



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systems; chemical constitution and configuration of spectral sensitizers; spectral sensitization models; latent image processes; ways of investigating latent images; nonsilver photographic systems; photographic development; spatial frequency filtering in photographic imaging; and quantum phenomena in image formation.

All but seven of the summaries treat various aspects of silver halide science (aside from the generally applicable papers on image quality). Congress Session topics were: Structure and Properties of Light-Sensitive Crystals (20 papers); Photographic Gelatin (6); Spectral Sensitization (15); Light-Induced Processes (32); Processing (20) and Image Structure (29). About one-third of the papers are now published in full in various journals to which reference is given. Nonetheless, the summaries are generally complete enough so one can understand how conclusions were reached.

This impressive book is very well done and probably most photographic libraries should get it. For some readers, ease of use will be affected by language considerations since, for the reports of the invited lectures, 42 pages are in English, 80 in French and 82 in German; and for the summaries of the contributed papers, the distribution among the three languages is about even. — *E. F. Haugh*, E. I. du Pont de Nemours & Co., Photo Products Dept., Wilmington, Del. 19893.

CATV System Engineering (2nd Ed.)

By William A. Rheinfelder. Published (1967) by Tab Books, Thurmont, Md. 21788. Graphs. Diagrams, Tables. 5½ by 8½ in. 256 pp. Price $12.95.

Community antenna television (CATV) is an industry which is growing at a significant rate. The principal components used in this field, particularly the amplifiers, are also being improved at a rapid rate. The progress has been so great in the last two years or so as to call for a second edition of this work, to record the new engineering capabilities in the art.

The author has presented the work for the use of the practical engineer who has to set up the system and make it work, and to do this with a modest supply of testing equipment. Therefore, he has simplified the treatment as much as possible. He discusses use of the equipment as it is bought from the manufacturer, with very little if any discussion of its internal functioning. This procedure promotes simplicity but it does, occasionally, tend to frustrate an inquisitive and imaginative reader.

The major part of the book is devoted to a detailed and thorough study of the alignment of the signal levels over a CATV system in a way that is reasonably sensible and economical. It is necessary to keep the lower levels high enough to overcome the noise, and the higher levels low enough to keep down cross-modulation. The author says (possibly oversimplifying): "This is the only requirement of importance, and all other system specifications must be directly related to this basic standard." At the lower end the noise presents no serious problem (although others in the field might think his 40-dB signal-to-noise-ratio a little low for "flawless performance") but at the upper end a simple significant measurement of acceptable cross-modulation is very difficult. The author admits that the test he suggests is "nearly meaningless," although he holds forth a promise of something better for the near future. The net figure to be used must therefore be rather subjective. There is another condition of great importance to good transmission; this is avoidance of reflections, and the author covers this very sensibly.

A variety of appendixes give a number of interesting applicable items of information, and a glossary of terms is helpful in view of the jargon that has developed in the art. On page 230 the author shows a "balun," which the glossary could with advantage have indicated as a balanced to unbalanced circuit converter. — *Pierre Mertz*, Consultant, 66 Leamington St., Lido Beach, L.I., N.Y. 11561.

Optical and Photographic Reconnaissance Systems

By Niels Jensen. Published (1968) by John Wiley & Sons, Inc., 605 Third Ave., New York, N.Y. 10016. 211 + xi pp. Illus. Diagrams. 6 by 9 in. Price $13.95.

The book is intended for persons qualified by training in a related field, such as, motion pictures or television, who need information on the particular specialty of reconnaissance systems.

The author conceived the idea for the book when he found that he had to comb widely scattered sources to develop a working knowledge of the subject. He says, "Most of the information was there — just hard to get at. Hopefully this book will make it simpler."

The central problem to which the book addresses itself is that of evaluating the probability of detection of an object. Detection systems, factors affecting detection, techniques for expressing and improving the probability of detection and other tools of the trade are accorded their due weight as matters related to the central problem. The directness of this approach gives the book clarity and authority. For example, in developing the concept of the Modulation Transfer Function, the author resists the temptation to enlarge on the significance of the theorems but points out that the MTF does not, in itself, tell the whole story. The author's use of mathematics is rigorous, though restrained, and consistently limited to that which discussion of the problem requires. Units are consistent.

Representative topics are: atmospheric optics, including an excellent treatment of scattering mechanisms; infrared radiometry, image motion, sensors, photographic systems; and image tube systems.

The author has succeeded in locating a good many references to basic work in relevant subjects as, for example, *Contrast Thresholds of the Human Eye*. However, it is interesting to note that he, like many others, has failed to recognize that the source of the Kell factor is research work by a man named Kell.

The book provides much detailed information. Illustrations and typography are of the high level that one associates with the particular publisher's product. Highly visible captions and subject headings make text passages easily identifiable. — *Bernard D. Plakun*, Barnes Engineering Co., 30 Commerce Rd., Stamford, Conn. 06902.

Handbook of Military Infrared Technology

Ed. William L. Wolfe. Sponsored by Office of Naval Research. Published (1965) by Supt. of Documents, U.S. Printing Office, Washington, D.C., 20402. 881 + xxii pp., Illus. Tables. 6¼ by 9¼ in. Price $3.75.

A major publication has made a quiet entrance into a field in which it must inevitably be identified as a classic. Parallel in scope and concept to the M.I.T. Radiation Laboratory series of texts on microwave and radar, the *Handbook of Military Infrared Technology* provides a correspondingly detailed, authoritative and comprehensive summary of its particular subject.

ARPA, via the Office of Naval Research, contracted with the University of Michigan to supervise the writing. William L. Wolfe of the University's staff has been accorded the distinction of individual listing as Editor. He points out in the Preface that hundreds of people have helped. The individuals and companies that he identifies for credit constitute an impressive roster of outstanding firms and talent in the infrared industry.

The formal publication date (1965) warrants some comment. So far as is known, the book was not available for general distribution until late in 1967. — *Bernard D. Plakun*, Barnes Engineering Co., 30 Commerce Rd., Stamford, Conn. 06902.

New Ways to Diagnose Electronic Troubles

By Jack Darr. Published (1968) by Tab Books, Blue Ridge Summit, Pa. 17214. 288 pp. Illus. Diagrams. Paperbound. 5½ by 8½ in. Price $3.95.

This book offers an effective approach to a common vocational teaching situation, that of attracting and holding a trainee's interest. The author is qualified by years of successful practical experience to present his subject with easy assurance, and with simple style and language. By way of contrast, one is led to surmise that academic training in pedagogy, no matter how intensive, would not have been as good a qualification.

Using a pleasant narrative style and a conversational tone, the author breaks his subject down into small manageable concepts. Going to the bench with his reader, he shows him how to look for trouble clues and to interpret what he sees. Again and again he brings him to the point of realizing that, "There's almost always a plain, simple clue, staring you right in the face, if you'll look for it." The approach is probably too informal for conventional classroom use, but is well suited for individual home study. — *Bernard D. Plakun*, Barnes Engineering Co., 30 Commerce Rd., Stamford, Conn. 06902.

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