



Inter-Society
Color Council
Newsletter

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44th ANNUAL MEETING

The 44th Annual Meeting of the Inter-Society Color Council will be held at the Statler-Hilton Hotel, New York, New York, on Monday and Tuesday, April 14 and 15, 1975.

On Monday, April 14, open meetings of the ISCC Problems Subcommittees will be held, in both morning and afternoon sessions. As in the past, members and friends of the Council are urged to attend.

The annual business meeting of the Council will be held on Tuesday morning, April 15, and will include the presentation of reports by Chairmen of Member-body Delegations as well as by Officers and Standing Committee Chairmen.

Ms. Ruth M. Johnston, Chairman of the Problems Committee, and Mr. Franc Grum, Problems Committee Coordinator for Color Science Problems, have arranged a symposium for the afternoon meeting on Tuesday, April 15, dealing with recent activities of the Problems Committee. Among the speakers will be Mr. Calvin S. McCamy talking on color problems in the photography-printing area (Problems 31 and 32), Col. Robert C. Sproull talking on color matching problems in dentistry (Problem 35), and Mr. Rolf Kuehni talking on color differences (Problem 34); others will be announced. Ms. Johnston will preside at the symposium and present opening remarks.

The reception and banquet of the Council will be held on Tuesday evening, April 15. During the banquet, the Godlove Award will be presented to Dr. Vincent C. Vesce, Allied Chemical Corp. (retired) and an Honorary Member of the Council. Mr. Max Saltzman will present the Award Citation. The banquet speaker will be Dr. David L. MacAdam, Eastman Kodak Company, who will present his Optical Society of America Ives Medal Address "Color Essays" with demonstrations.

A final program and registration form will be sent to the membership in March. Preregistration and the advance purchase of banquet tickets is urged.

MEETINGS OF PROBLEMS SUBCOMMITTEES MONDAY, APRIL 14

- 9 A.M.
- Problem 10 Color Aptitude Test: Bonnie Swenholt, Chairman
- Problem 18 Colorimetry of Fluorescent Materials: Per Stensby, Chairman
- Problem 22 (&24) Procedures and Material Standards for Accurate Color Measurement: Dr. Ellen Campbell Carter, Chairman
- Problem 25 Dyes Section, Determination of the Strength of Colorants: Dr. Charles Garland, Chairman
- Problem 25 Pigments Section, Determination of the Strength of Colorants: Joyce Davenport, Chairman
- Problem 33 Human Response to Color: Alexander F. Styne, Chairman

- 2 P.M.
- Problem 25 Pigmented Fibers Section, Determination of the Strength of Colorants: Richard Bache, Chairman
- Problem 27 Indices of Metamerism: Ralph Besnoy, Chairman
- Problem 30 Color in the Building Industry: Milo D. Folley, Chairman
- Problem 32 Color Problems in Photography and Printing: Calvin S. McCamy, Chairman
- Problem 34 Color Difference Problems: Rolf Kuehni, Chairman
- Problem 35 Color of Living Tissue: Dr. Robert C. Sproull, Chairman
- New Problems

TUESDAY AFTERNOON APRIL 15

HEART OF THE ISCC: PROBLEMS SUBCOMMITTEES

- 2:00 P.M. "Brief History and Description": Ruth M. Johnston, Chairman, Problems Committee
- 2:30 P.M. "Color Problems in Photography and Printing": Calvin S. McCamy, Problem Coordinator, Color in Photography and the Graphic Arts and Chairman of Problem 32
- 3:00 P.M. "Color Matching Problems in Dentistry": Dr. Robert C. Sproull, Chairman of Problem 35
- 3:30 P.M. "Color Difference Formulas and Industrial Small Color Difference Problems": Rolf Kuehni, Chairman of Problem 34
- 4:00 P.M. "Problems in Dye Strength Evaluation": Dr. Charles E. Garland, Chairman of Problem 25, Dyes Division
- 4:15 P.M. "Plans for Verifying the Color Aptitude Test": Bonnie Swenholt, Chairman, Problem 10
- 4:30 P.M. "Color in the Building Industry - Needs and Trends": Milo Folley, Chairman, Problem 30
- Evening Banquet Speaker - "Color Essays": Dr. David L. MacAdam

NEWS ABOUT PROBLEMS SUBCOMMITTEES

Group for Colorants and Colored Materials

Color Aptitude Test (Problem 10, Bonnie Swenholt, Chairman)

Note that this subcommittee has a new chairman, Ms. Bonnie Swenholt of Eastman Kodak.

Determination of the Strength of Colorants: Pigments Section, (Problem 25, Joyce Davenport, Chairman)

Note that this subcommittee has a new chairman. Ms. Davenport, who works for De Soto Paint Company, brings a practical knowledge of the use of pigments in plastics and paints to the Subcommittee's activities.

Determination of the Strength of Colorants: Pigmented Fibers Section, (Problem 25, Richard Bache, Chairman)

Note that this is a new section in this subcommittee, formed for the study of the special case of the behavior of pigments incorporated into fibers by the melt-spinning process. Dick Bache, who works for Sandoz, has a wealth of experience in this area. It is hoped that all members and guests interested in the behavior of pigments in fibers such as polypropylene, polyester, polyamides, etc., will join in the work of this section of the subcommittee.

Color and Appearance Matching of Living Tissue, (Problem 35, Dr. Robert C. Sproull, Chairman)

Dr. Sproull will present a discussion of problems in dentistry at the afternoon meeting.

Group for Pictorial Reproduction of Color

Color Problems in Photography and Printing (Problem 32, Calvin S. McCamy, Chairman)

Subcommittee for Problems 31 and 32 have been combined into one Subcommittee and given the new title as given above. Cal McCamy, member of numerous national and international committees and organizations in the areas of photography, sensitometry, etc., brings outstanding knowledge and experience to the problems of pictorial representation.

Group for Color Science and Measurement

Procedures and Material Standards for Accurate Color Measurement (Problem 22, Dr. Ellen Campbell Carter, Chairman)

Note that the chairman, Dr. Ellen Campbell Carter, has changed her name through marriage. Best wishes are extended to her. She will continue her excellent leadership of this subcommittee. She has organized the work into three areas: (1) Guide to Material Standards, (2) Documentary Standards, (3) General Color Measurement.

Indices of Metamerism (Problem 27, Ralph Besnoy, Chairman)

Note that this subcommittee has a new Chairman, Ralph Besnoy of ICI. Ralph brings an extensive background of industrial experience. Let us get this important committee moving by attending and supporting Ralph.

RMJ

Group for Art and Design

Human Response to Color (Problem 33, Alexander F. Styne, Chairman)

A panel of three distinguished members, Faber Birren, Robert Spiegel, and Raymond Spilman will express their views to open the discussion to the entire committee. Dr. JoAnn S. Kinney will moderate the discussion.

AFS

ISCC AND THE MUNSELL COLOR FOUNDATION

The aims and purposes of the ISCC and of the Munsell Color Foundation are very similar: to further the scientific and practical advancement of color knowledge, in particular knowledge relating to standardization, nomenclature, and specification of color; and to promote the practical application of these results to color problems arising in science, art, and industry.

As pointed out in the history of the Foundation, which follows this item in the *Newsletter*, the ISCC Board of Directors for many years nominated one trustee to serve on the Foundation's seven-member Board of Trustees. To reaffirm their community of interest and cooperation, the ISCC and the Foundation have recently re-established this custom.

In addition, at its last annual meeting the Foundation's Board of Trustees increased its membership from seven to nine. S. Leonard Davidson was nominated as Trustee by the ISCC Board of Directors. He, with Richard S. Hunter and Roland E. Derby, the immediate past president and president of the ISCC, were elected to serve on the Foundation's Board of Trustees along with the other members named in the Munsell Color Foundation history that follows. It is anticipated that this informal contact will continue.

The Munsell Color Foundation is set up for the primary purpose of using its funds, subject to limitations imposed by the Internal Revenue Service, to further the aims and purposes set forth above. These purposes parallel those of the ISCC very closely and so foster the close cooperation between the two bodies. In addition, the Munsell Color Foundation, under its IRS classification, may acquire by gift, donation, contribution, or otherwise, property and assets of every kind; and give, contribute, or otherwise dispose of property so acquired so long as any restrictions imposed on the gifts are consistent with the purposes of the Foundation. Contributions to the Foundation are tax deductible.

It is hoped that this announcement will lead to a better understanding and appreciation of the reaffirmed community of interest of ISCC and the Foundation, thus gaining for the Foundation full cooperation in adding to its present limited resources.

Since the aims and purposes of the Foundation are so similar to those of the Inter-Society Color Council, the ISCC strongly encourages and endorses contributions to the Munsell Color Foundation.

CWJ

APPLICANTS APPROVED FOR INDIVIDUAL MEMBERSHIP

- Mr. J. A. Caballero
1350 Empire Drive
Florence, Kentucky
41042
SPE. Work relates to plastic products and control and processing services. (He is also a member of the American Society of Quality Control.)
- Dr. Henry Fenichel
Physics Department
Univ. of Cincinnati
Cincinnati, Ohio 45221
Main interest in color is education. He is currently introducing a new course in the Physics Dept. called "The Physics of Light, Color and Visual Perception." (He is a member of the American Physical Society, AAAS, Sigma Xi, and American Association of Physics Teachers.)
- Dr. Hugh O. Jaynes
Dept. of Food Tech. & Science
University of Tennessee
P.O. Box 1071
Knoxville, Tennessee
37901
IFT. Teaches food color to food technology graduate students; research on natural food colorants. (Also a member of the American Dairy Science Association.)
- Mr. Donald M. Landes
De Soto, Inc.
1700 Mt. Prospect Road
Des Plaines, Illinois
60018
FSPT. Interested in the psychological effect color has on perception and the role of color temperature as it pertains to visual effects.
- Mr. James May
137 East 36th Street
New York, New York
10016
NSID. Interested in color styling for home furnishings. [He is the National Chairman for NSID, Industry and Trade Committee 1970-1972, elected to Board of Directors (N.Y. Chapter, three-year term).]
- Mr. John L. Mazzanti
c/o Northwood
Industries, Inc.
P.O. Box 319
Portage, Wis. 53901
SPE. Custom blended dry colorants for thermoplastics, injection molding, extrusion, blow molding, etc.
- Ms. Carol N. Tascher
Fashion Coordinator
Ozite Corporation
1755 Butterfield Road
Libertyville, Ill. 60048
CAUS. Interested in color development in the carpeting field and following trends in allied fields to better coordinate fashion products for the consumer. (She is also a member of the National Home Fashions League – Vice President of Illinois Chapter.)
- Mr. Bruce H. Todd
Z4P, Village Green
Budd Lake
New Jersey 07828
FSPT. Commercial tolerances of color; color instrumentation and computerization; dispersion and flocculation phenomena of color pigments.

INFORMATION ONLY – NEW DELEGATES

- SPE Delegate**
Mr. Dan A. Popielski
Monsanto Company
River Road
Addyston, Ohio 45001
SPE – Executive Committee, Color and Appearance Division. Interests in color are practical application of color, color matching, processing, correcting and effects on polymer properties.
- FSPT Delegate**
Mr. Thomas A. White
400 Groesbeck Highway
Mt. Clemens
Michigan 48043
CMG, FSPT. Works with paint products and styling services.

HISTORY OF MUNSELL COLOR FOUNDATION, 1942-1974

In 1917, just prior to the death in 1918 of Prof. A. H. Munsell, originator of the Munsell system of color notation, the A. H. Munsell Color Company was formed in Boston. In 1921 it was reorganized so that all of the stock would belong to members of the Munsell family. At that time the business of the company consisted chiefly of supplying publications, papers, charts, and school supplies that would help to illustrate and teach the principles of the Munsell Color System and its method of defining color in terms of hue, value, and chroma. The Munsell family supported the company chiefly as a memorial to A. H. Munsell.

In 1922 the company moved to New York, intending to concentrate on the educational field. But Prof. Munsell's son, young A. E. O. Munsell – persuaded by his father's friends to leave Harvard Medical School and take over the direction of the company – was more interested in science than in business or education. Under his leadership the Munsell family established and supported the Munsell Research Laboratory. It started very simply in New York, but in 1924 moved to Baltimore to be closer to the Bureau of Standards and to Johns Hopkins University. At that time most of the business relating to school supplies was turned over to a school supply company in Chicago, leaving the Munsell company to devote its primary attention to production of Munsell standard papers and charts.

Between 1923-27 much significant color research was accomplished, supported by funds of the Munsell Research Laboratory. The work was carried on under the general supervision of Irwin G. Priest, in Washington at the Bureau of Standards where he was chief of colorimetry, and in Baltimore at the Munsell laboratory. (The work done in this period is reported in two histories of the Munsell system, in the December 1940 *Journal of the Optical Society of America*, and in 1969 in *Color Engineering*.) On the basis of the work done in these years, improvements were made in the scales of the Munsell system, and, as a result, a revised atlas was published in 1929 as the Munsell **BOOK OF COLOR**.

About this time two things occurred which made it practical to measure and standardize the Munsell system. One was the invention, by Hardy and associates at M.I.T., and the production, by the General Electric Company, of a

commercially feasible recording spectrophotometer; the other was the international adoption in 1931 of what we now know as C.I.E. standards for colorimetry. It meant that Munsell samples could be measured spectrophotometrically, then transformed to C.I.E. data, and smoothed curves could be drawn on C.I.E. x,y-diagrams to represent the system.

On October 1, 1941 a General Electric color conference held in Schenectady adopted a coordinated "Munsell-Spectrophotometric System" as a G.E. Standard, and on October 13 the G.E. Standards Department proposed to the American Standards Association that industry be given the opportunity to adopt the Munsell system as an American standard, with the spectrophotometer recognized as the primary standard for measurement. The spectrophotometer, through CIE conversions, would provide a primary measurement for any suitably prepared sample, and the Munsell system would provide a psychologically scaled notation understandable in terms of visually equi-stepped scales of hue, value, and chroma. This G.E. request became the basis for what was adopted in 1942 as ASA-Z44-1942.

It was in order to remove any suspicion of commercialization from the Munsell Color Company that Alex Munsell, whose interests after 1929 had turned in other directions; arranged for the establishment of the Munsell Color Foundation, to which the Munsell family turned over their stock and, thereby, the direction of policy of the Munsell Color Company. This was done after an open and well-attended meeting at which many leaders in the color field confirmed the fact that such a move would be welcome and supported. This meeting, held February 25, 1942 in New York City, was presided by Charles G. Page; legal counsel to the Foundation from that day to this. The National Bureau of Standards and the Inter-Society Color Council each agreed to appoint a Special Trustee to serve on the original Board of Trustees. Other trustees were appointed to represent a wide variety of color interests in the scientific, industrial, and educational fields, one of them by nomination of the Optical Society of America. All served without remuneration.

The Foundation was organized in September 1942 as a non-stock, non-profit organization, its chief purpose similar to that of the ISCC: "to further the scientific and practical advancement of color knowledge and in particular knowledge relating to standardization, nomenclature, and specification of color, and to promote the practical application of these results to color problems arising in science, art, and industry." A further purpose was "to acquire by gift, donation contribution, or otherwise, property and assets of every kind; to give, contribute, or otherwise dispose of property so acquired as . . . shall further the purposes of the Foundation. . ." There was no endowment other than the stock in the company. But since business was beginning to grow it was expected that any profits, other than needed to operate the company, would revert to the Foundation to be added to any other amounts that might otherwise be contributed for use in furthering the purposes of the Foundation.

The governing board of the Foundation consisted of seven trustees. There were three special trustees: Deane B. Judd, appointed by the Director of the Bureau of Standards, Dorothy Nickerson, appointed by the Directors of the Inter-Society Color Council, and Blanche R. Bellamy, in her

capacity as Manager of the company. These special trustees elected Arthur S. Allen, Loyd A. Jones, and I. H. Godlove to serve as trustees-at-large, with A. E. O. Munsell serving as representative of the donors. Each was appointed for a 4-year term, most trustees being re-appointed for successive terms. Others who have served in the past are D. L. MacAdam (1948-52), Dean Farnsworth (1955-59), Royal Baily Farnum (1943-67), and Leon L. Winslow (1955-66). From 1942 until his death in 1972, Dr. Judd served as Foundation president, Mrs. Bellamy as secretary-treasurer, Miss Nickerson as trustee and, since 1972, as president.

Over the years the duties of the Foundation trustees have consisted chiefly of receiving reports from the Munsell Color Company and guiding its general policy. Although year by year the market for color standards and materials provided by the company grew until, by the mid-sixties, there was about a 10-fold increase in sales from the less than \$20,000 gross of 1942, it was all at a very low profit margin, with expenses kept as low as possible to enable the company to keep within its income yet supply high quality standards and materials. This meant that there still were no profits to turn over to the Foundation. However, as the business grew, many projects were encouraged within the company that would serve the general good, e.g., cooperation with committee projects that varied from ISCC Color Blindness and Color Aptitude tests to ASTM and AATC&C and other committee work concerned with development of color scales for specific tests.

In the mid-sixties the question of the future of the company had to be faced. A way had to be found to insure that Munsell materials and supplies, particularly those relating to color standards, would continue to remain available for the long-term future on a basis consistent with the integrity that had been demanded of them from the beginning, first by A. H. Munsell, then by his son A. E. O. Munsell, and, since 1942, by the Foundation in its guidance of company policy. The Foundation trustees published, about 1950, a "Statement of Policy for the Munsell Color Company – a Directive from the Trustees of the Munsell Color Foundation," a directive that would make clear and record this policy for all to see. It specified that "it is a chief task of the Munsell Color Company to issue papers that adhere as closely to the notation as is possible," that the primary standard or actual notation shall conform (until better data become available) to the hue, value, and chroma positions defined in the Newhall-Nickerson-Judd "Final Report of the OSA Subcommittee on the Spacing of the Munsell Colors" (JOSA 33, 385-418, 1943). In summary the directive made clear that "the chief tasks laid down for the Munsell Color Company are to develop and supply accurately controlled color standards at near cost and to supply literature for describing the Munsell System and its applications." Furthermore, the policy of the company was to "restrict its service work to the supply of color standards from established sets where possible and to the development of special sets of standards if needed."

In 1966 the by-laws of the Foundation were amended; all special requirements concerning designation of special members of the Board of Trustees were dropped, all trustees to serve thereafter as trustees-at-large.

Back in 1958 a new book of glossy papers had been added to the matte surface edition, the papers being pro-

duced for Munsell by Davidson & Hemmendinger, a firm that increasingly became the supplier of Munsell standard papers, although a number of regular matte surface papers and certain special scales, such as the Color Fan, were made for Munsell by the Tobey Color Card Company of St. Louis. Therefore, when it was learned that Davidson & Hemmendinger, Munsell's most important supplier, was to merge with the Kollmorgen organization as part of a new division to be devoted to problems of color and photometry, it seemed that if their staff and Munsell could work together even more closely it would solve many of Munsell's problems. With a larger group of color-trained personnel in the new division of Kollmorgen to whom the very limited Munsell staff could depend for advice and for continuity, it seemed as if inclusion of the Munsell company into the color and photometry group at Kollmorgen might take care of some of the long-term future needs that Foundation trustees were seeking to answer.

At that time the seven trustees of the Foundation were Judd, (appointed 1942), Bellamy (1942), Nickerson (1942), Munsell (1942), Macbeth (1963), Billmeyer (1965), Granville (1965). Since Norman Macbeth, a Foundation trustee since 1963, was chairman of the board at Kollmorgen, with a close interest in the color and photometry division into which the Macbeth Corporation already had been merged, it was a simple matter to raise the question informally with him regarding the possibility and desirability of having the activities of the Munsell Color Company become a part of this new color and photometry division of Kollmorgen. As a consequence, a proposal for acquisition of the Munsell Color Company by Kollmorgen was submitted to the Foundation board of trustees at its May 1968 meeting. On October 18, 1968 public announcement was made of an agreement in principle between the Foundation and Kollmorgen for sale of the company stock and for obligations to be assumed by Kollmorgen that would insure that the tradition of integrity of Munsell products would be continued. In December 1969 the trustees finally approved the terms of purchase, and on or about March 2, 1970 the agreement was signed, and a check for \$235,000, the purchase price, was received, an amount in excess of the fair market value of the stock and in excess of the book value of the assets of the company. Meanwhile, in 1969, A. E. O. Munsell who had joined in approving the Foundation's sale of the company to Kollmorgen, resigned as trustee. In his place Carl E. Foss, president of the Munsell Color Company at that time, was selected to serve as trustee.

In 1968, in contemplation of the sale of the stock to Kollmorgen, a committee had been appointed by the Foundation trustees to investigate and establish guidelines for the future conduct of the Foundation and use of its money. As a consequence, the Foundation charter was amended to eliminate its duty to hold the Munsell Color Company stock and to insure that its charter was in compliance with then applicable Internal Revenue code law. After receipt of payment for sale of the company stock, the Foundation in 1970 distributed \$18,878 under grants relating to research and promotion in the color sciences, among them grants to Cleveland State University, Rensselaer Polytechnic Institute, and the National Bureau of Standards.

In June 1970 the Foundation was declared exempt from federal income tax under Section 501(c)(3) of the Internal

Revenue Code. However, the Internal Revenue Service took the position that the exemption did not apply to the entire 1970 calendar year, and the Foundation — under protest — was forced to file and pay a federal income tax for 1970 (chiefly capital gains on sale of the stock) in the sum of \$66,404.27. While its protest and claim for refund was in process, the Foundation income was considerably restricted. Nevertheless modest grants were made 1971-74 to Cleveland State University, Rensselaer Polytechnic Institute, Illuminating Engineering Research Institute, Library of Congress, and Fogg Art Museum of Harvard University. In 1973 the tax case was decided in favor of the Foundation, and in 1974 an appeal by the government was dismissed. After deducting research contributions 1970-74, legal and auditing expenses connected with the sale of the company and the resulting tax case, and modest expenses required for general operations, the current assets of the Foundation, in today's depreciated market, total about \$170,000, a sum not large enough to support a truly viable color Foundation. It therefore became necessary to look about for a way to plan for the financial as well as the research future of the Foundation.

In 1973 Miss Nickerson was elected to succeed Dr. Judd as Foundation president. It was her feeling that the money either should be completely spent on some worthy color project and the Foundation dissolved, or some way would have to be found to increase available funds in order to operate as a viable Foundation, useful to the color field. The majority of trustees voted to continue the Foundation, on the basis that small amounts — even a few thousand, sometimes even a few hundred dollars — could be very helpful in support of useful projects.

During the 1972-74 period the Inter-Society Color Council had a committee at work on its by-laws. While it is tax exempt on its own income, donors of gifts to the ISCC receive no deduction for those gifts. On the other hand, gifts made to the Munsell Color Foundation are deductible by the donors. Since the primary aims and purposes of the two organizations are very similar, it seemed that it might make the work of the ISCC by-laws committee easier and cause considerably less expense to the ISCC, to work out a method for close cooperation with the Munsell Color Foundation by which the Council would recommend and encourage contributions to the Munsell Color Foundation for color research and educational projects consistent with the purposes of the Foundation. Such an arrangement would provide a satisfactory future course for both the ISCC and the Munsell Color Foundation. A joint committee representing the ISCC and the Foundation, appointed in 1972, has therefore worked out a simple and inexpensive method for maintaining close cooperation in future between the two groups. The Foundation in effect will become an organization available for restricted gifts designed to further color research and education, when such gifts are within the Foundation's declared purposes. To make this possible the by-laws of the Foundation have been changed to provide that one of its trustees shall be officially nominated by the board of directors of the ISCC and that the membership of its board also shall be increased from 7 to 9 members.

Today, 1974-5 the Munsell board of trustees consists of nine members, three newly appointed members having been chosen to provide close representation of the ISCC, S.

Leonard Davidson, officially nominated by the ISCC board of directors as special trustee, Roland E. Derby, ISCC president, and Richard S. Hunter, immediate past-president. As a matter of fact all other current Foundation trustees are, and have been for many years, active ISCC members, several of them past presidents. Today the Foundation board of trustees consists of: Dorothy Nickerson, serving since 1942, present 4-year term ends 1975; Norman Macbeth, 1963-1975; Blanche R. Bellamy, 1942-76; Richard S. Hunter, 1974-76; Fred W. Billmeyer, Jr., 1965-77; Carl E. Foss, 1969-77; Walter C. Granville, 1965-77 (resignation received 1974); Roland E. Derby, 1974-78; S. Leonard Davidson, 1974-78.

The way is now clear for close ISCC and Munsell Color Foundation cooperation. Gifts and bequests are solicited that will increase the total funds available for use in color research and educational projects, either general or specific, that come within the scope of the Foundation charter and meet IRS requirements for a tax exempt organization Code Sec. 501(c)(3).

For prior items concerning the early establishment of the Foundation and the ISCC relation to it, see ISCC *Newsletters* 40, 41, 42, 44, 47, 51, 79, and 145.

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COLOR SOCIETIES ENDORSE NEW JOURNAL "COLOR RESEARCH AND APPLICATION"

The Inter-Society Color Council, the Colour Group (Great Britain), and the Canadian Society for Color announce that Wiley-Interscience, a division of John Wiley and Sons, Inc., will publish a journal titled COLOR RESEARCH AND APPLICATION, reporting on the science, technology, and application of color in business, art, design, education, and industry. The three above-named societies endorse the journal, and urge their members, as well as all those interested in any aspect of color, to cooperate with them in insuring its success through subscription, advertising, and the submission of manuscripts.

The Editor-in-Chief of COLOR RESEARCH AND APPLICATION will be Dr. Fred W. Billmeyer, Jr. (Department of Chemistry, Rensselaer Polytechnic Institute, Troy, New York 12181), who will appoint Associate Editors and an Editorial Board of international scope, to be announced later. The journal will be published beginning in the first calendar quarter of 1976, and the initial subscription price for individual members of all cooperating societies (including member bodies of the ISCC) will be at the special rate of fifteen (\$15.00) dollars per year. Institutions and non-members will be charged thirty-five (\$35.00) dollars. An additional charge for postage will be added for subscribers outside the United States. The subscription rate will cover a 48-page journal, of 8¼ by 11¼ inch dimensions, issued quarterly.

COLOR RESEARCH AND APPLICATION is devoted to the dissemination of knowledge concerning all branches of the science, technology, and practical application of color in business, art, design, education, and industry. Its scope is commensurate with the aims and purposes of the Inter-Society Color Council, the Colour Group (Great

Britain), and the Canadian Society for Color.

The following six types of papers will be considered for publication. All papers will be subject to review by referees selected from the Editorial Board or the outside.

- *Articles* may be either technical papers based on original research, or descriptive papers, for example from the fields of art or design. The material must not have been previously published, and purely promotional articles will not be accepted. The publication of symposia, such as those sponsored by the ISCC, will be encouraged.

- *Notes* are concise accounts of studies of smaller scope but which reflect the same quality and originality as articles. The distinction between the two is one of length: note manuscripts should not exceed a length of four double-spaced typewritten pages, plus no more than two figures and one table.

- *Correspondence* may be brief disclosures of new concepts of unusual significance, or important comments on the work of others. Publication of correspondence will be as rapid as possible.

- *Reports* are reviews, state-of-the-art surveys, or expanded papers based on work published elsewhere in highly condensed form. The publication of reports from ISCC Problems Subcommittees will be encouraged.

- *Meeting Reports*

- *Book Reviews*

In addition, special features of a continuing nature will include a Colour Bibliography, meeting notices, and other newsworthy items.

The Inter-Society Color Council wishes it known that the objectives of COLOR RESEARCH AND APPLICATION will complement — and not compete with — those of the journals of its member-bodies.

Advertising for COLOR RESEARCH AND APPLICATION will be handled by the Manufacturers Council for Color and Appearance, and inquiries regarding advertising should be directed to Mr. Charles G. Leete (CGL Associates, 9416 Gamba Court, Vienna, Virginia 22180). Inquiries regarding editorial matters should be sent to the Editor-in-Chief (address above), and applications for subscriptions to John Wiley and Sons (605 Third Avenue, New York, New York 10016).

JAPAN'S EARLY CONTACT WITH MUNSELL

From Genro Kawakami of the Japan Color Research Institute (JCRI) a letter of February 5, 1974 to Dorothy Nickerson enclosed a reprint from the *Journal of the Illuminating Engineering Institute of Japan*, Vol. 56, No. 3, 9-14, which detailed for their members some of the early history of Japan's contact with the Munsell system. Since it is in Japanese, only the illustrations, which include a portrait of A. H. Munsell, copies of pages from his original Atlas, and references to publications and authors in English, indicated its contents to me. Mr. Kawakami's letter about the article is of enough interest that I pass it along for the information of ISCC *Newsletter* readers.

Mr. Kawakami tells us that recently he found that their Institute had a copy of the Atlas of the Munsell Color System, No. 279, autographed by A. H. Munsell. This book had been purchased in 1916 by Prof. Seishi Shimoda, pro-

fessor of the Tama Art University of Tokyo, who died January 28, 1973. He had been skeptical of the Brewster three-color system used for color education in Japan about 1915. One day, he read an article on the Munsell system in the School Arts Magazine of America. He thought it would be useful in teaching color harmony, that it was more scientific and systematic than the Brewster theory. He therefore sent a letter, enclosing \$30, to Prof. Munsell for a copy of the Munsell Atlas. This probably was the first, perhaps only, copy to Japan sent by Prof. Munsell.

In 1917 and 1918 Prof. Shimoda often contributed articles on the Munsell System to art magazines of Japan, mentioning that color education in Japan should use it instead of the Brewster theory. "But unfortunately nobody was interested in his offers, and thus he gave up the studies of color and its promotion." (Prof. Shimoda's life work was child psychology; he was famous as a translator of many publications of A. S. Neill, who founded new education methods at the Summer-Hill School in England.) Prof. Shimoda presented the Atlas to a friend, and it later came into possession of the JCRI. In 1926, Prof. Takao Miyashita of the Tokyo Technical College and Mr. Gentaro Ikeda, engineer of dyeing, introduced the Munsell system into their publications, from what source is unknown.

Studies of the Munsell system were begun in earnest in 1948 by a subcommittee of the Color Science Association of Japan, Dr. Ichiro Yamauchi, chairman, Dr. Takashi Azuma, secretary. Since then, the Munsell system has been widely used by science and industry in Japan.

Details of the above appear in the reprint from the Japanese journal sent along with Mr. Kawakami's letter.

It should be noted that the JCRI in 1963 published in a limited edition (100 copies) a very beautiful Munsell Renotation Color Book, with copies distributed to color workers throughout the world. In a preface by Prof. Riyuichi Hioko the history of the preparation of this book was summarized. It was the outcome of work started by Prof. Sanzo Wada, an artist who, after several pre-war starts, adopted after the war the OSA subcommittee report by Newhall-Nickerson-Judd (July 1943 JOSA) as a suitable basis for production of a color atlas. With the cooperation of Dr. Deane B. Judd, president of the Munsell Color Foundation, he spent nine years or more in working out the details to attain an accuracy that would satisfy them both. More regarding this work is reported in *ISCC Newsletter* No. 72, July-Aug. 1964, pp. 13-16.

DN

JAPAN COLOR RESEARCH INSTITUTE

Dr. Genro Kawakami reported that the next issue of *Acta Chromatica* will appear in May of this year. This issue will be a combined 1974-1975 issue. The contents will appear in the *Newsletter* at the first opportunity. Dr. Kawakami also sent the *Newsletter* item about the history of the Color Science Association of Japan and its latest meeting.

FOREIGN COLOR SCIENTIST SPOKE AT RECENT MEETING OF COLOR SCIENCE ASSOCIATION OF JAPAN

Dr. Miguelina Guirao is a director of the Laboratorio de Investigaciones Sensoriales in Argentina. She has been in Sapporo to study at the Hokkaido University.

The Color Science Association of Japan invited her to the 128th regular meeting held at the Japan Color Research Institute in January 17.

In Japan, organizing an association for color science was begun by Mr. I. Yamamoto and several color scientists in 1947. They persuaded all Japanese scientists, artists, and engineers interested in color to form an organization, which resulted in the founding of the Color Science Association of Japan in 1950.

The current president is Prof. H. Matsuo of the Tokyo Medical College, and the vice presidents are Prof. H. Masaki of the Japan Women's University, Prof. T. Kondo of the Osaka University of Arts, and Hon. Prof. T. Suga of the Nagoya University. Individual members number about 550 and the sponsorial members number about 36.

This Association has rendered great service to standardization of color technology and color control in Japan, for it drafted the Japanese Industrial Standard using the CIE system of color specification and the Munsell Color System. There are about 16 standards for basic color and about 9 for safety color.

The association holds an annual meeting every May for members to report the results of their research. They distribute two kinds of issues to the members. One is the Journal of the Color Science Association of Japan (Japanese) published semi-annually and the other is the *Acta Chromatica* (English) published annually. I would like you to refer the *Newsletter* No. 232 about details of the *Acta Chromatica*.

They have three branches: Kanto branch, Osaka branch, and Tokai branch. The meetings are often held at one of these locations. The meeting to which Dr. Guirao was invited was held at the Kanto branch.

Dr. Guirao visited the facilities for painting various scientific color cards and for measuring color materials. After that, Dr. Guirao presented a lecture on the relation between lightness and saturation.

MEETINGS

American Ceramic Society: Selected Titles and abstracts of presentations at the 77th Annual Meeting of the American Ceramic Society, May 6-8, 1975, Washington, D.C.

MURALS, PANELS, AND DOMES. F. Joseph Von Tury, Vontury, Inc., Metuchen, N.J.

The designer-craftsman, as a tool in industry, points out the challenges and opportunities for the large-scale producer in the making of decorated tiles, panels, mosaic murals, and textural tiles for dome coverings.

Besides traditional tools and materials, the use of new techniques, automation, and creative ingenuity offer un-

limited potentialities to exploit the versatility and attractiveness of ceramics without losing the natural color and textural qualities.

The speaker will describe production methods he uses in his workshop and in various tile plants and will show examples of his work, among them a panel from the dome of the Iranian Embassy in Washington, D.C.

He will discuss the history and renaissance of encaustic tiles and will show original decorated floor tiles from the U.S. Capitol Building, made in England over a century ago.

ARCHITECTURE AND COLOR. Waldron Faulkner, F.A.I.A., Washington, D.C.

Mr. Faulkner's talk will set forth basic current information on the science of color and its practical application to architecture, specifically in relation to ceramics.

Mr. Faulkner is the author of *Architecture and Color*.

A SESSION ON COLOR. Conducted by the A.C.S. member-delegates to the Inter-Society Color Council. Color specifications, measuring instruments, color standards and trends will be discussed. Participating:

Robert B. Bernstorff, Commercial Decal, Inc.; William G. Coulter, Fusion Ceramics Inc.; Laurence D. Gill, Pemco Products, Glidden-Durkee, Div. of S.C.M. Corp.; Paul D. Henry, O. Hommel Co.; Gordon H. Johnson, Ferro Corp.; Clarence A. Seabright, Harshaw Chemical Co., Div. of Kewanee Oil Co.; N. William Wagar, Drakenfeld Colors, Hercules Inc.; Alan J. Werner, Corning Glass Works; F. Joseph Von Tury, Vontury, Inc., Chairman.

Canadian Society for Color, 2nd Annual Conference

Time & Place. The Third Annual Conference of the Society will be held in Waterloo, May 8, 9, 10th, at the School of Optometry, University of Waterloo.

Theme. The theme of the conference will be, "Human Response to Color." The program will include a presentation by the C.B.C. on technical aspects of color television; invited papers by such leading experts as David MacAdam of Eastman Kodak, Rochester, N.Y., and Dr. R. Lakowski of the Dept. of Psychology, University of British Columbia; as well as contributed papers, demonstrations, films, color vision tests and an exhibition of work mounted by the Fine Arts Dept. of the University. The last day will be devoted to seminars and topics of interest to educationalists.

Facilities. The Conference Centre at the Student Village on the University Campus will provide excellent accommodation & meals, and is within walking distance of the School of Optometry Building.

A reception and banquet are planned as an informal part of the program. The modern campus is situated in the residential area of Waterloo, close to the Westmount Shopping Mall and easily accessible from downtown Kitchener-Waterloo.

For further information, please write to: Mrs. Leo. Dure,

c/o School of Optometry, University of Waterloo, Waterloo, Ontario, Canada N2L 3G1

A printed program and registration form for the conference will be available in the near future.

Third Symposium of the International Research Group on Colour Vision Deficiencies, Amsterdam (The Netherlands), 25th - 27th June 1975. "Research in Colour Vision Deficiency"

The main themes of this symposium will be:

1. Basic mechanisms of defective colour vision.
2. Peripheral colour vision.
3. Genetics of colour vision.

Free papers relating to other subjects will be accepted.

All papers must be read and written in good English.

Furthermore the authors are asked:

- a) to send before the 1st April 1975 two copies of a summary of at most 200 words to Prof. Dr. R. A. CRONE, Oogheekundige Kliniek, Academisch Ziekenhuis, Eerste Helmersstraat 104, Amsterdam-W, The Netherlands;
- b) to insert for their oral presentation slides with (English) text intended to render the subject more understandable for the non-English-speaking;
- c) To give to Dr. VERRIEST and before the end of the symposium the manuscript to be printed in the proceedings.

Further information on this meeting can be obtained by writing to Dr. G. Verriest, Dienst Oogheelkunde, Akademisch Ziekenhuis, De Pintelaan 135, B-9000, Ghent, Belgium.

Oil & Colour Chemists' Association (OCCA)

The annual OCCA Technical Exhibitions have long been established as the forum for technical men in paint, printing ink, colour and allied industries to discuss their technical problems with those supplying raw materials, plant and equipment to those industries. The OCCA Twenty seventh Technical Exhibition 1975 will take place at the Empire Hall, Olympia, London W14 8XT on the following days:

Tuesday	22 April - 9.30-17.30
Wednesday	23 April - 9.30-17.30
Thursday	24 April - 9.30-17.30
Friday	25 April - 9.30-16.00

Olympia is easily accessible to those staying in hotels in the West End of London and also to visitors arriving at main line stations and air terminals. Those travelling by Underground should board the Piccadilly or District Line trains to Earls Court, from which station a special train service is provided to and from Olympia. Special arrangements for hotel accommodation for visitors have been made with various hotels, and details will be supplied upon application to the Association's Office.

Once again interpreters will be in attendance throughout the period of the Exhibition.

The charge for admission to the Exhibition, including a copy of the "Official Guide", will be £1.00 each (inclusive of Value Added Tax). Tickets and copies of the "Official Guide" are obtainable from the Association's offices by completing and returning the enclosed form, together with

the appropriate remittance. Tickets and "Official Guides" will also be available for purchase at the Exhibition Hall.

Further information is obtainable from: Oil & Colour Chemists' Association, Priory House, 967 Harrow Road, Wembley, Middlesex, England HA0 2SF.

DIE FARBE

The table of contents for the most recent issue of *Die Farbe* (Vol. 23, No. 14, September 1974) is given below.

Prof. Siegfried Rösch 75 Jahre	1
G. Verriest und H. Kandemir: Normal Spectral increment thresholds on a white background	3
A. Reule: Geometrische Betrachtungen zur Darstellung von Farbabständen nach dem AN-Farbsystem in der Vornorm DIN 6174	17
W. A. Thornton: The characterization of natural colored lights	35
G. Vogt: Aufstellung von Spektralwertfunktionen usw	51
K. Richter: Umstellung des Farbsystems DIN 6164 auf Normlichtart D65	108
W. Kühne: Metrische and dimensionale Repräsentation des psychologischen Farbraumes	131
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BOOKS NOTED

Color Separation Techniques, Miles Southworth – More information about this book can be obtained by writing to Book and Learning Systems Division, North American Publishing Company, 134 N. 13th St., Philadelphia, Pa. 19107.

REPRINTS NOTED

Carpet printing, review and analysis of its success, James May, *American Dyestuff Reporter*, November 1973. Reprints may be obtained by writing to The James May Organization, Inc., 137 East 36th Street, New York, N.Y. 10016.

PRODUCTS AND SERVICES

1975 Spring-Summer Program in Color Technology at Rensselaer

TROY, N.Y. – A spring-summer program of four intensive continuing-education courses in color technology is being offered for the eleventh consecutive year by The Rensselaer Color Measurement Laboratory at Rensselaer Polytechnic Institute. The courses are:

Coloring of Plastics, April 22 to 24. For this 3-day course cosponsored by the Plastics Institute of America, the objective is to provide direct practical aid in the solution of problems in all aspects of the coloring of plastics, ranging from the selection of colorants to quality control and encompassing both visual and instrumental methods.

Principles of Color Technology, June 23-27. This 5-day introductory course provides coverage of basic color technology for those having no previous formal education in the field. An unique feature of this course is a series of laboratory sessions providing participants with hands-on experience in the use of modern color-measuring and computing equipment.

Color Technology for Management, July 1-2. Designed specifically for management personnel, this 2-day course assists executives responsible for research, production, or marketing of colored products in reaching correct management decisions based on the principles of color technology, particularly where instrumental or computational techniques are involved.

Advances in Color Technology, July 7-11. This 5-day course provides advanced discussion and laboratory workshops on color measurement, colorimetry, color perception, color differences, turbid-medium theory, and color appearance. Attendance is limited to those with a thorough basic education in color science so that the course can begin at an advanced level and continue to the research frontiers.

Early registration for each of these courses is urged so that textbooks and special course material can be sent to registrants for advance study.

The courses are under the direction of Dr. Fred W. Billmeyer, Jr., professor of analytical chemistry at Rensselaer Polytechnic Institute. Assisting Prof. Billmeyer will be Max Saltzman, recently retired as manager of color technology, Allied Chemical Corporation, and adjunct professor of chemistry at Rensselaer. Both Prof. Billmeyer and Prof. Saltzman have published widely in the field of color science, culminating in their book, "Principles of Color Technology" which will be used as the textbook in the basic courses. Codirector with Dr. Billmeyer in the course *Coloring of Plastics* is William V. Longley, supervisor, Design Center Color Lab, Ford Motor Company, Dearborn, Michigan. Mr. Longley is widely known in the fields of automotive color technology and plastics coloring. Other outstanding authorities on color science will present guest lectures in the areas of their specialties.

The *Coloring of Plastics* is designed to give practical "how to" instruction to all those who produce or fabricate colored plastics, including resin producers, film and coated fabric producers, concentrate suppliers, and molders among others. It will help you find the answers to such questions as:

- How to select colorants
- How to put colorants into plastics economically
- How to develop dispersion
- How and why to use instruments
- How to match colors visually and with instruments
- How to avoid metamerism
- How to color molded plastic products efficiently
- How to approach quality control problems
- How to judge color differences visually and with instruments

How to set and maintain color tolerances

How to achieve consistent color control of film products.

Principles of Color Technology is intended to provide both theory and practice in the description, specification and measurement of color. It will be of particular interest to industrial personnel responsible for color matching and color control. Both theoretical concepts and practical applications of the science of color will be emphasized. Typical commercial color measurement and computation equipment will be available for use by the individuals participating in the program. Laboratory sessions will be held daily for instrumental measurements, computations, and problem-solving.

The course will be of particular value to men without advanced degrees and to men whose practical experience in the field is a substitute for a college degree. Companies maintaining or planning color control laboratories will have the opportunity of increasing their efficiency and effectiveness by using the program to train staff members in the proper use of color measuring equipment and the interpretation and application of the results of such measurements.

Color Technology for Management is a 2-day course designed to aid executives responsible for research, production or sales of colored products in reaching correct management decisions based on the principles of color technology. It will describe what can and what cannot be expected from programs of instrumental color measurement and control, and from computer color matching. Management personnel attending this course will learn how to recognize realistic programs in these areas and how to avoid highly inflated proposals not based on reality.

So that a high level of subject matter can be covered without the need to review background material, attendance in *Advances in Color Technology* is limited to applicants having two or more years experience in instrumental color measurement; or a shorter period of experience plus completion of the course, *Principles of Color Technology*, or an equivalent course elsewhere. The topics covered in this course will be: Instrumentation for Color Measurement; Data Reduction and Colorimetric Calculations; Color Perception; Color Difference Calculations and Color Spaces; Turbid-Medium Theory and Color Matching; and Geometric Aspects of Color and Appearance.

This course includes selected advanced laboratory workshops on such topics as the photometric and wavelength calibration of color-measurement spectrophotometers, the separation of fluorescence and true reflectance, the variables of perceived color, and geometric aspects of color measurement.

There is no textbook for this advanced course; instead, a manual of preprints, reprints, and bibliography is prepared each year to supplement the lecture material.

For further information on enrollment contact the Office of Continuing Studies, Color Technology Program, Rensselaer Polytechnic Institute, Troy, New York 12181, telephone: (518) 270-6442. For technical information contact The Rensselaer Color Measurement Laboratory, at the same address, telephone: (518) 270-6458.

The program for the first course, *Coloring of Plastics*, has been announced and is given below.

TUESDAY, APRIL 22

- 8:30 Registration
 9:00 Welcome and Course Philosophy
 9:15 Introduction to Color and Appearance — Lecture demonstration. Importance of illumination, object and observer. Concepts of hue, value and chroma. Demonstrations of metamerism and goniochromatism.
*Prof. F. W. Billmeyer, Jr.,
 Rensselaer Polytechnic Institute*
- 10:30 Coffee Break
 10:45 Visual Color Matching — Visual color matching techniques for optimum control and to minimize metamerism; matching and processing of metallic-pigmented plastics.
*Mr. William V. Longley
 Ford Motor Co.*
- 12:15 Lunch
 1:30 Instrumental Color Measurement — Spectrophotometry: reflectance curves and their uses. The CIE "language". Getting CIE coordinates from reflectance curves.
*Prof. F. W. Billmeyer, Jr.,
 R.P.I.*
- 3:15 Coffee Break
 3:30 Instrumental Color Matching — Instrumental vs. visual approaches. Simple instrumental aids. Computer formulation using Kubelka-Munk theory.
*Mr. Ralph Stanziola
 Applied Color Systems*
- Discussion
 5:00 ADJOURNMENT
 7:00 Open House — The Rensselaer Color Measurement Laboratory.

WEDNESDAY, APRIL 23

- 8:45 Colorants for Plastics — Selection of colorants and review of typical properties and limitations of colorants in major plastics systems.
*Mr. Thomas B. Reeve, Pigments Dept.
 E. I. du Pont de Nemours & Co.*
- Discussion
 10:30 Coffee Break
 10:45 Pigment Dispersion in Plastics — A discussion of dispersion theory and practice, with emphasis on its importance and means of achieving it in various plastics systems.
Mr. Thomas B. Reeve
- 12:15 Lunch
 1:30 Color Processing of Molded Parts — Properties of plastics as a function of color; recognizing degradation by means of color change; influence of the molding process on color.
*Mr. Daniel A. Popielski
 Monsanto Chemical Co.*
- Discussion
 3:00 Coffee Break
 3:15 Color Processing and Finishing of Film Products — Effect of processing variables on film color, Color-

ing of film by printing. Preparation and control of colorants for film and coatings.

*Mr. Dennis W. Collier
PFD — Penn Color
Div. of Bonn Industries*

Discussion

- 4:45 ADJOURNMENT
- 6:00 Social Hour
- 7:00 Dinner — P.I.A. sponsored

THURSDAY, APRIL 24

- 9:00 **Plant Quality Control** — Sources of error in the process. Standardized terminology for color-difference description. Proper lighting conditions. Testing of personnel.
Mr. William V. Longley
- 10:15 Coffee Break
- 10:30 **Color Difference Calculations** — Color order systems, color difference formulas. Direction of color differences.
Prof. F. W. Billmeyer, Jr.
- 12:15 Lunch
- 1:30 **Color Tolerances** — Discussion of the techniques for establishing visual and instrumental production tolerances. Proper sampling and preparation of materials to be evaluated.
*Prof. Max Saltzman, Research Associate,
Dept. of Geophysics and Planetary Physics,
UCLA and
Adjunct Prof. of Color Science, R.P.I.*
- Discussion
- 3:00 ADJOURNMENT

Manufacturers Council on Color and Appearance (MCCA)

The Manufacturers Council on Color and Appearance and the National Bureau of Standards U.S. Department of Commerce will sponsor on Tuesday, May 6, 1975 the Third Annual Conference on Performance Testing of Color and Appearance Instrumentation. Participants, representing instrument manufacturers, instrument users and governmental agencies, will assemble together to learn what the current NBS-MCCA Color and Appearance Collaborative Reference Program is accomplishing, and to exchange ideas and suggestions on additions or modifications. It will provide attendees with a forum for state-of-the-art information on instrument performance, color difference spaces and computations, white reflectance and gloss standards, and testing procedures.

The meeting will be held on the grounds of NBS in Gaithersburg, Maryland (outside Washington, D.C.). Registration will be open to participants in the Collaborative Reference Program and non-participants who have interest in the program or color and appearance instrumental measurements in general.

Program information and registration materials can be obtained from Charles G. Leete, Meeting Co-ordinator, Manufacturers Council on Color and Appearance, 9416 Gamba Court, Vienna, Virginia 22180 (703) 938-4345.

Graphic Arts Research Center (GARC)

GARC has announced the availability of its new 1975 Catalog of products and services for graphic arts and reproduction photography. The 16-page, 8½ x 11 inch, self-cover catalog lists 33 products and services such as quality control tools, publications, seminars, research, testing, information, and consulting. Entries are illustrated when feasible.

Several new products have been added to those listed in 1974. Modification and improvements on products have been made with quantity discounts available for many items. New seminars are offered. A number of Research Reports have been added along with English Translations of three Russian books. The offerings are a continuation of GARC's effort to understand and answer the needs of the industry.

The catalog is being mailed to the subscribers of the Research Center Newsletter. It is also available to others free upon request.

Write for Catalog 1975, Graphic Arts Research Center, Rochester Institute of Technology, One Lomb Memorial Drive, Rochester, New York, 14623.

Graphic Arts Technical Foundation (GATF)

GATF has announced that its Technical Services Report number 19, "The Multi-Color Overlay System: A Copy Preparation Approach for the Artist", is now available.

According to Mr. Cox, director of GATF technical services and special programs use of the multi-color overlay system allows the copy preparation artist to coordinate comprehensive layouts, camera-ready copy, and printed output. This relatively new concept contradicts some of the traditional preparation rules, but can improve artist-printer-client communications.

Mr. Cox said, "The Report reviews the traditional method of copy preparation which uses black, transparent red, and amber masks for color breaks. Although the finished mechanical, when properly produced, is suitable for reproduction, it does little to show the artist or client what the final printed piece will look like in terms of color values and color relationships. This is a particular disadvantage when a mechanical is produced for something less than a carefully illustrated and colored comprehensive layout."

He continued, "To overcome this handicap, the artist can employ a copy preparation procedure known as the multi-color overlay system, which coordinates layout to camera-ready copy to printed press sheet colors. This system provides the artist and client a close color rendering of the printed piece before going to press."

Mr. Cox concluded, "The Technical Services Report describes how the system works, its advantages, and the change it requires in the photomechanical stage of the normal reproduction routine."

Technical Services Reports are automatically distributed to members of GTAF. Non-members can purchase the Report for \$3.00 per issue. For further information contact: Order Department, Graphic Arts Technical Foundation, 4615 Forbes Ave., Pittsburgh, Pa. 15213.

GATF Workshops

A series of two-day workshops on "Printing with Ultra-Violet Inks" will be offered by GATF January 6-7, March 6-7, May 22-23, July 24-25, October 2-3, and December 1-2, 1975.

Dr. Nelson R. Eldred, supervisor of GATF's Chemistry Division, will conduct the two-day programs, which will include classroom sessions on the technology of UV inks, and pressroom demonstrations in UV printing, using the Foundation's sheet-fed, Miller TP-38 press. Each workshop will be limited to 12 persons. Registration fee for GATF members is \$180.00; non-member price is \$270.00. For further information, contact the GATF Special Programs Department.

The 1975 GATF spring/summer workshop season features 15 programs scheduled for a total of 23 sessions at the Technical Center in Pittsburgh, from March through July, 1975.

GATF Workshops are unique technical update programs, combining classroom activity, demonstrations, and some hands-on training. These limited attendance, two, three, and five-day workshops are high-participation programs led by Foundation staff members and industry-recognized authorities. Extensive use of audio-visual media and practical laboratory demonstrations and exercises highlights the programs.

For additional information on the following 1975 workshops, contact the GATF Special Programs Department.

Phototypesetting Systems — Planning Equipment and Applications: May 19-21

Film and Paper Page Makeup Techniques: May 22-23

Art and Copy — Planning and Preparation: March 3-5

Image Assembly (Stripping) Methods and Systems: April 28-30; July 16-18

Advanced Black and White Halftone Techniques: March 3-4; June 2-3

Advanced Color Separation: June 9-11

Sheet-Fed Offset Press Operating: March 10-14; May 12-16; July 7-11

Web Offset Printing: May 28-30

Color Printing — Standards and Control: June 19-20

Process Quality Controls in Printing: April 9-11

Paper and Ink Problems in the Pressroom: April 1-3; July 14-16

Ink Technology: June 16-18

Printing with UltraViolet Inks: March 6-7; May 22-23; July 24-25

Industrial Training Methods and Techniques: April 30-May 2

Decision Making: The Capital Equipment Decision: June 2-4

GATF's Orientation Program, *Methods and Technology of the Graphic Communications Processes*, has also been scheduled for March 17-21; May 5-9; June 23-27; September 15-19; October 27-31; and December 8-12, 1975.

GATF UltraViolet Curing System

GATF will install an ultraviolet curing system on a two-color perfecting press in the research pressroom laboratory at its Technical Center in Pittsburgh, Pa.

In making the announcement, Bert Bassett, GATF executive director, said, "The UV system is being contributed to GATF by two member companies. Inmont Corp., New York, N. Y., is providing the hardware and Miller Printing Machinery Co., Pittsburgh, Pa., is modifying the press to receive the new equipment."

He continued, "Once installed, the system will be studied in GATF's pressroom under laboratory and regular production conditions, the results of which will be made available to GATF members.

"UV ink curing is a relatively new technology, and while growing, it is not accepted by all printers. Its place in the graphic communications industries has yet to be determined. GATF will strive to place UV ink curing in its proper perspective both technologically and economically.

"Some GATF tests will attempt to determine: (1) how the handling of substrates will differ, (2) how UV inks differ from conventional inks, (3) the compatibility of the system to other components on the printing press (plates, rollers, etc.), (4) the evaluation of quality as compared to conventional inks on a multi-color press, and (5) the handling of printing problems on press."

Mr. Bassett concluded, "Installation of the device will be completed in September at which time experimentation and testing will begin. GATF members should begin to realize the benefits of our studies this fall. Anyone having questions concerning ultraviolet ink curing systems should contact the GATF Technical Services Department."

GATF-GARC Cooperative Programs

The last issue of the *Newsletter* (November-December 1974, Number 233) announced the first in a series of cooperative programs that were being planned by GATF and GARC. Details of the conference are given below.

Color Scanner User Conference

Francis L. Cox, GATF — Conference Chairman

TUESDAY, MARCH 18, 1975

9:30 AM to First Conference Session

12:00 Noon *Session Chairman* — Francis L. Cox

Scanning Equipment and a Review of Manufacturers' Set-up Techniques

Presentations will be made by representatives from:

Printing Developments, Inc., E. Norwalk, Conn.

HCM Corporation (Hell equipment), Great Neck, N.Y.

Rutho-Graphics (Crosfield equipment), Pine Brook, N. J.

- 12:00 to Luncheon
 2:00 PM "Scanners — Past, Present, and Future:
 Frank M. Preucil, Graphic Arts Consultant,
 Chicago, Ill.
- 2:00 PM to Second Conference Session
 6:00 PM *Session Chairman* — Francis L. Cox
Pre-Scanning Considerations
 Color Duplicating and Conversion
 Robert S. Crandall, Robert Crandall
 Associates, New York, N.Y.
Selecting "Optimum" Printing Conditions
 Gary G. Field, Graphic Arts Technical
 Foundation, Pittsburgh, Pa.
Characterizing the Printing Process
 Zenon Elyjiw, Rochester Institute of
 Technology, Rochester, N. Y.
**Transparency Viewing and Optimum
 Reproduction of Color**
 Milton L. Pearson, Rochester Institute of
 Technology, Rochester, N. Y.

WEDNESDAY, MARCH 19, 1975

- 9:00 AM to Third Conference Session
 12:00 Noon *Session Chairman* — Paul R. Guy, Schawk-
 graphics, Inc., Chicago, Ill.
Color Scanners in Practice
GATF Recommendations for Scanner Set-up
 Francis L. Cox, Graphic Arts Technical
 Foundation, Pittsburgh, Pa.
**An Economic Model for Evaluation of Color
 Scanning**
 Dr. Stanford H. Rosenberg, LaRoche
 College, Pittsburgh, Pa.
**Guidelines for Improved Scanner Productivity
 and Quality**
 Panel Discussion, chaired by Paul Guy
- 12:00 Noon Luncheon
 to 1:30 PM Adjourn

Program Format and Cost. The Conference will be conducted on Tuesday, March 18 from 9:30 AM to 6:00 PM, and on Wednesday, March 19, 9:00 AM to noon.

The \$150 registration fee includes, Conference participation and materials, noon luncheon on both days, and coffee breaks. Conference reservations will be confirmed upon receipt of application form or letter with registration fee requesting enrollment.

The Conference will be conducted at the Sheraton-O'Hare Motor Hotel, 6810 North Mannheim Road, Rosemont, Ill. 60018. Phone: 312/297-1234.

Macbeth Division

The name of the Macbeth Color & Photometry Division of the Kollmorgen Corporation has been changed to "Macbeth Division."

Optronic Laboratories Announces Products

The Optronic Laboratories Model 16 is designed specifically for operating the new sapphire-windowed lamp standards of spectral radiance at a constant current of 15.00 amperes dc $\pm 0.1\%$. This supply is operated from 60 Hz, 115 volt line power, and maintains its current accuracy while experiencing up to $\pm 10\%$ fluctuations in line voltage and $\pm 10\%$ variance in load voltage. The Model 16 precision Current Source incorporates a linear turn-on ramp circuit, a fail-safe, over-current shut-down circuit, a digital elapsed time meter, and a current display meter. It is ideally suited for use with Optronic Laboratories new Spectral Radiance Standards. The Model 16 is priced at \$1,195.00.

Optronic Laboratories announces the availability of tungsten ribbon-filament lamp standards with infrared transmitting sapphire windows. The new standards, designated the Model 550, are primarily designed for calibrating spectroradiometers operating over all or part of the entire 0.25 to 6.0 micrometer wavelength region. They serve as an accurate alternative to the much more costly, high temperature blackbody systems current available. Price of the Model 550 is \$775.00.

The Model 45 is designed specifically for operating the Model UV-40 deuterium lamp standards of spectral irradiance at a constant current of 500 ma. The supply is operated from a 60 Hz, 115 volt AC line and will maintain its current accuracy while experiencing $\pm 10\%$ fluctuations in line voltage and $\pm 10\%$ variance in the load voltage. The current accuracy is $\pm 0.1\%$. Price of the Model 45 is \$605.00.

Optronic Laboratories announces the availability of the Model UV-40, a 40-watt deuterium lamp calibrated for spectral irradiance over the wavelength range of 1800 to 4000 A. These new standards are designed for calibrating ultraviolet radiometers and spectroradiometers. They are extremely rich in UV radiation while emitting relatively little in the visible spectral region. Typical spectral irradiance values range from about $0.5\mu W/cm^2nm$ at 190 nm to $0.02\mu W/cm^2nm$ at 400 nm. Calibration of the new standards is based on the NBS 1973 spectral irradiance scale and on the UV spectral radiance standards. Price of the Model UV-40 is \$575.00.

Further information can be obtained by writing to: OPTRONIC LABORATORIES, INC., 7676 Fenton Street, Silver Spring, Maryland 20910.

**TEXTILE MUSEUM'S
 FIFTIETH ANNIVERSARY — 1975**

1975 marks both the fiftieth anniversary of the founding of the Textile Museum and the one hundredth anniversary of the birth of the Museum's founder, George Hewitt Myers.

We plan to commemorate these events this fall with a major exhibition on Kuba carpets which will open in late October coincidental with the Fourth Annual Convention of Rug Collectors. There has not been a major show dealing

with Kuba rugs in nearly a generation and that fact coupled with their spectacular sizes, colors and designs should make the exhibition a memorable one.

Louis W. Mackie, Chief Curator and Acting Director,
The Textile Museum, 2320 S Street, N.W., Washington, D.C.
20008.

LÜSCHER REVISITED

I have followed with great interest the pro and con remarks included in several past issues of the *ISCC Newsletter* relating to the Lüscher Color Test. Let me review them:

In No. 219 (July-August, 1972) there were two articles: "The Lüscher Color Test" by R. W. Pickford, reprinted from *British Occupational Psychology*, 1971, 45, 151-154; and "Shades of Meaning" by Angela Little, reprinted from *Color Engineering*, February, 1971.

Both articles were negatively critical of the Lüscher Test, one "deploring the lack of adequate statistical data" and the other ending "Charades, anyone?"

In No. 220 of the *ISCC Newsletter* (September-October, 1972) Faber Birren, in his article, "Biological Effects of Color", suggests that "The woods are full of references as to the biological and psychological effects of color" and hopes that "if games are to be played . . . it will not be 'blind man's buff'?"

In No. 223 (March-April, 1973), Angela Little's letter appears, her response to Faber Birren "with equanimity" that reiterates her concern that the Lüscher Test is not only "undocumented" but "dangerous".

Against this background of articles and counter-articles, I wish to speak. It is my opinion that those of us in the United States interested in color should not dismiss the possibility that the Lüscher Color Test may have considerable merit.

The promotion and popularization of the book, *The Lüscher Color Test*, Random House, 1969, by Ian Scott based on his translation of Max Lüscher's original German work, has undoubtedly discouraged the consideration of the test by a vast audience of professional persons. This is sad. Such things happen when publishers see something with great popular appeal.

But I am appalled that in the articles referred to earlier, I find no mention at all of the *long* form of the Lüscher Test.

Ian Scott is very careful in his book to describe the *long*, as opposed to the short form of the test. One is based on seventy-three color choices; the other, on eight.

I would urge any critics of the Lüscher Test first to acquaint themselves with the unabridged long form used by Lüscher and the Scotts and others in their extensive testing in Europe.

I, too, first became acquainted with the Lüscher Test by way of the Random House publication. Since my own graduate school days (University of Michigan, 1935-1937) I have been interested in the psychology of color and the possibility that color choices may communicate a great deal about personality, attitudes, affective states, even the biological basis for being.

In 1971 I went to London and was given the complete long form of the Lüscher Test by Jo Scott, wife of Ian Scott, translator-author of the Random House book. I was stunned by the accuracy and completeness of her written report, which she sent to me later. The test had taken no more than five minutes, I had never seen her, and yet she knew me very well after I selected my color preferences.

In November of 1972 Mrs. Scott came to the United States to train selected interested persons in the giving, scoring, and interpreting of the long form of the Lüscher Test, and I was one of the persons trained. I wish more members of the ISCC had such training. Perhaps, then, we could make some knowledgeable comments about the value of the Lüscher Test.

In the past two years, I have carried out several "pilot projects" on my own. I have given the long form of the Lüscher Test to well over a hundred persons, ranging in age from 4 years through 60. These include students at Southern Illinois University, Maryville College, and the Central School for the Young Years. I have found myself "testing the test" and I am ready to state now that I am convinced that this Test, properly given and interpreted, can provide us with a method which allows us to obtain with complete discretion and unobtrusively some insights into the emotional and behavioral strengths and weaknesses of persons of all ages. I have found it to be particularly amazing when given to children 4 through 8.

Obviously one of its greatest appeals is that it is far removed from the questionnaire-type inventory. Perhaps it can serve us particularly well as we attempt to understand and to help the retarded, the culturally deprived, the illiterate, the mentally ill.

I see the Lüscher not so much as definitive-diagnostic, but rather as a screening test in the area of the affective states, particularly as they relate to performance and stress, psychological and physical.

There is definitely something to it! Before we reject it, the *long* form, that is, shall we work together on it?

I welcome comments and inquiries from any interested persons.

Anita Croft
9393 Ladue Road
St. Louis, Mo. 63124

The preceding manuscript was sent to Dr. Billmeyer, who forwarded it to me. Dr. Billmeyer asked Ms. Croft several questions by correspondence, and her reply is given in the following.

Let me try to answer one or two of your certainly most appropriate questions:

First, on page seventeen of the Random House book you will find a very brief description of the "Full" Lüscher Test, as Ian Scott calls it.

Actually, I am very skeptical of any color cards or patches being used except those contained in the original test booklet. I have a small collection of other versions which I have picked up here and in Europe and the differences are appalling! Though I know of no studies of difference tolerances, I am not happy at all with anything but the originals.

In the original test booklet, seventy-three color patches

(one inch squares) are beautifully printed on seven pages of high quality paper which make up a rather elegant little booklet $5\frac{1}{2}'' \times 8''$. This is printed as a companion piece to Max Lüscher's own book in German, in Basel, Switzerland. Mrs. Scott gave me my copy of the test booklet when she trained me in the interpretation of the test.

On page one are five patches — white, grays, and black. On the next page are the eight patches used in the Random House Book. On the remaining five pages are pairs of colors, six pairs to a page. A heavy template with an opening that exposes only two of these at a time is issued with the booklet.

You are kind, indeed, to offer your measurement facilities. Do you think Munsell designations would be of value?

On the 27th of this month I am to introduce the Lüscher to a group of counselors at Washington University. Perhaps some use and study of the test will be suggested by this group.

In the meantime, if you have any suggestions I will be more than pleased to have them.

Anita Croft

WHAT IS THE CURRENT "BEST" VALUE FOR K_m ?

The variety of answers given to this question by various researchers has led to requests that the National Bureau of Standards comment on the matter [1]. This apparently simple question of what is the value of the constant relating the radiometric watt to the photometric lumen is really two distinctly different questions: a scientific one and a practical one. Scientifically, the question is what value is most consistent with the fundamental definitions. The present situation may be summarized as follows. In the national standardizing laboratories the radiometric watt is realized either through 1) an electrically calibrated absolute detector or 2) a realization of the International Practical Temperature Scale and measurements on blackbodies whose temperatures are thus known. Since the candela is defined in terms of a blackbody operated at the freezing point of platinum, either a determination of the temperature of freezing platinum, T_{pt} , or a direct (or indirect) measurement of such a blackbody with an absolute detector and $V(\lambda)$ filter whose transmittance is known, will yield values for K_m . Recent values for T_{pt} are 2041.05 K [2] and 2042.85 K [3] yielding K_m values of 686.7 lm W^{-1} , and 679.4 lm W^{-1} , respectively. A value of 2045 K [4,5] ($K_m = 670.8 \text{ lm W}^{-1}$) based on work done in the 1930's is also sometimes cited. An experiment which achieved the ultimate in accuracy would resolve the scientific question. The proposed redefinition of the photometric units (see next article) could also resolve the question by legislative fiat.

However, these actions would still leave unresolved the practical question of just what value of K_m relates the present U.S. photometric units to the U.S. radiometric units. The scientific and practical questions differ because of the manner in which the photometric units were derived and maintained. NBS, in common with other national standardizing laboratories, realized a platinum point blackbody many years ago and has since maintained the photo-

metric units in banks of standard lamps. In addition to questions of possible errors in the original platinum point realizations, the unevaluated drift of these standard lamps affects the present size of the photometric unit. International intercomparisons of photometric units over the past 25 years have consistently shown a range of about 2%. It would be highly surprising if the practical U.S. K_m differed by more than 2% from the ultimate best scientific value. The Optical Radiation Section plans in the near future to directly compare the U.S. radiometric and photometric units with an uncertainty of no greater than 1%. Achievement of this uncertainty will require a careful, state-of-the-art experiment.

In the interim, what value should one use? The Optical Radiation Section has decided to use a value of 680 lm W^{-1} , and suggests that others do the same. It should be clearly recognized that this value may differ from the practical K_m obtained in the state-of-the-art experiment and/or the ultimate scientific K_m by 1-2%. As further experiments are performed, results will be announced in this newsletter and details published in the scientific literature.

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Reprinted from *Optical Radiation News*, National Bureau of Standards, No. 7, January 1975.

"REDEFINITION OF THE CANDELA AND THE LUMEN"

A paper with this title by W. R. Blevin (National Measurement Laboratory, Sidney, Australia) and Bruce Steiner (NBS) has been submitted and accepted for publication in *Metrologia*. The abstract of this paper is reproduced below.

"It is proposed 1) that the basic photometric unit be redefined so as to provide an exact numerical relationship between it and the SI unit of power, the watt, for a specified monochromatic radiation; and 2) that the unit of luminous intensity, the candela, be replaced as the basic unit by the unit of luminous flux, the lumen. It is claimed that the existing definitions are predominantly the product of early photometric practices that have been superseded. A closer link between photometry and spectroradiometry is now desirable. The proposals would enable photometric

values to be derived from spectroradiometric data by exact computation, and would remove the need for a primary standard of light. They would not alter significantly the present magnitudes of the photometric units, nor change the existing relationship between photometry and visual perception. Because the proposed redefinitions are in terms of monochromatic rather than complex radiation, however, they would provide a more convenient basis for the future adoption of new spectral weighting procedures." Preprints of the full paper may be obtained from the Optical Radiation Section at NBS. Reader reaction to the proposal is solicited.

It is expected that the proposals in this paper will be presented by NML and NBS to the Comité Consultative de Photométrie et Radiométrie (CCPR) at the next meeting of this committee in September. This is the first formal step in attempting to get these proposals adopted by all the nations that subscribe to the Treaty of the Meter.

Reprinted from *Optical Radiation News*, National Bureau of Standards, No. 7, January 1975.

ILLUMINATING ENGINEERING GROUP

The activities of the Illuminating Engineering Group of the Optical Radiation Section of NBS are directed to the application of basic photometric and colorimetric standards to practical measurement problems in visual signalling. The group develops applied measurement techniques in such areas as colorimetry of signal systems, optical properties of signal devices, and atmospheric effects on visibility and color discrimination. Specifications are produced for standards of signal colors, airport and aircraft carrier guidance lighting, and aircraft instrument and exterior lighting. In addition, the group designs and develops instruments for the measurement of visual range and evaluation of signal lighting systems, and provides technical advice and assistance to government and industry.

In the past, the group has been funded exclusively by other federal agencies. A recent evaluation of its role by the Institute of Basic Standards has resulted in partial NBS funding, the appointment of Albert Hattenburg as group leader, and the addition of an experienced photometrist, Robert Booker. Charles Douglas, who led the group before his retirement, remains with the group in a consultative capacity.

Reprinted from *Optical Radiation News*, National Bureau of Standards, No. 7, January 1975.

EDITOR'S COMMENT

Some sort of milestone has been passed in my brief tenure as editor of the *Newsletter*; I have received my first letter of complaint. The letter objected to the use of the abbreviation "Ms." When trying to sort out and settle disputes about language and usage, things are never as simple as we would like for them to be. For one thing, language, considered in isolation, is a complicated phenomenon, and, for another, people have very strong likes and dislikes about usage. We

can have these emotional reactions to usage because of our esthetic sensibilities about language itself, because the usage represents something or some way of thinking that we do not like, or some combination of the two. I know that I will sometimes be irritated by some word or phrase when I am really much more irritated by the way of thinking it represents than the usage itself. I can do nothing to change the thing itself, so I react to the language that represents it.

From the general, back to the specific, "Ms." I asked a few of the editors around town about "Ms.," and all of them replied that "Ms." is considered standard usage nowadays. With the question of usage settled, at least to my satisfaction, a further question should be asked, for if one proposes to change the usage of about two centuries (Mrs. ceased to be used for unmarried women some time in the latter part of the 18th Century), then there should be some solid advantage to be gained from the change. The advantage in using "Ms." is that it does not distinguish between married and unmarried women. Any of you who has ever had to compile a list of participants for a meeting and has, therefore, had to fret over whether a "Miss" or a "Mrs." should precede a large proportion of the names will immediately see the advantage. To speak more generally, this distinction is quite irrelevant for business and professional activities, so there is no reason why the more formal language used in these situations should preserve it. The distinction is important in social and personal activities, so the more informal language used in social activities can maintain it in these situations.

There is one more matter that I wish to bring to your attention to discuss briefly. Many of you may have noticed in the earlier part of the issue that the women on the program of the Annual Meeting are referred to as "Chairmen" rather than "Chairwomen." The use of only "Chairman" does not distinguish between men and women. Since the sexual classification of the person who presides at the meeting is irrelevant, it seems obvious to me that we are better off without another distinction without difference.

There is a distinction here that I think it very important to maintain, that is, the distinction between gender and sex. In contrast to Germanic, Slavic, and Romance languages, to name a few, English is very little burdened with gender. What little gender we have in English is more closely related to sexual differences than is gender in other languages. This, I think, leads us to blur the distinction.

Let me take another word as an example, "doctor." How should we refer to male and female holders of doctorates? Should we refer to the former as "doctor" and the latter as "doctress" or, perhaps, "doctrix"? No, when we say "doctor" we mean that the person has fulfilled some sort of educational requirement; the sexual classification of the person is irrelevant. Similarly, a chairman is someone who presides at a meeting; the gender of the word and the sex of the person are irrelevant.

I want to say one more thing about "Ms." The ISCC is not so large an organization and the *Newsletter* is not such a formal publication that we have to shoehorn everyone into the same Procrustean formula. If any of you would prefer to be referred to as "Mrs." or "Miss", I shall do my best to abide by your wishes. Just write me a note to let me know.

COMMITTEE ON PUBLICATIONS

William Benson, Chairman
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Send *Newsletter* Items to Editor:
Dr. William Benson
618 Constitution Ave., N.E.
Washington, D.C. 20002

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(301)921-2983

Mr. William D. Schaeffer
Research Director
Graphic Arts Technical Foundation
4615 Forbes Avenue
Pittsburgh, Pennsylvania 15213
(412)621-6941

NOTES

1. The Council promotes color education by its association with the Cooper-Hewitt Museum. It recommends that intended gifts of historical significance, past or present, related to the artistic or scientific usage of color be brought to the attention of Christian Rohlifing, Cooper-Hewitt Museum, 9 East 90th Street, New York, New York 10028.
2. The Council re-affirms its community of interest and cooperation with the Munsell Color Foundation, a tax exempt organization set up to acquire and use its funds to further aims and purposes very similar to those of the ISCC: to further the scientific and practical advancement of color knowledge relating to standardization, nomenclature and specification of color, and to promote the practical application of these results to color problems arising in science, art and industry. The Council recommends and encourages contributions for the advancement of these purposes to the Munsell Color Foundation. For information, write S.L. Davidson, NL Industries, P.O. Box 700, Hightstown, N.J. 08520.