

Inter-Society Color Council *News*

Number 337

May/June 1992

IN THIS ISSUE

Banquet Slide Request	1
Williamsburgh Conference - Meeting Report	1
Obituary: Kenneth L. Kelly	3
Thank You Membership!	3
Corrections to Computation of Hue Difference	4
University Corner - Williamsburgh Conference	4
New Members	5
New From NIST	6
NIST Studies of Pressed Powder	6
News From Member Bodies	
Human Factors Society Annual Meeting	6
ASPRS Correction	7
ASTM Activity News	7
In This Issue Of Color Research & Application	
June 1992	8
Make A Nomination For The Godlove Award	9
1992 Calendar of Events	10
Long Range Calendar	11
Application For Membership	13

MEMBERSHIP REQUEST FOR SLIDES

As most ISCC members are by now aware, the AIC will be having their 25th anniversary this year, at a meeting held jointly with the ISCC in Princeton, NJ. A special feature of the meeting will be a Silver Jubilee Banquet at which the main speaker will be Gunnar Tonquist who was actively involved in the discussions which led to the founding of the AIC in 1967 and has participated in many AIC meetings since then. Gunnar's talk will put the Silver Jubilee in the perspective of Color history. Gunnar would also like to show slides of some of the many people who have participated in the AIC meetings over the years. He would like to borrow slides from the numerous amateur photographers who have attended meetings. Anyone who has suitable slides and who is willing to lend them should send them or give them to Gunnar, duly labeled with photographer and year, by the evening before the banquet at the latest, so that he can make a selection to include with his talk.

Alan R. Robertson, President AIC

Meeting Report

ISCC/TAGA 1992

WILLIAMSBURG CONFERENCE ON COMPARISON OF COLOR IMAGES PRESENTED IN DIFFERENT MEDIA

The Inter-Society Color Council (ISCC) and the Technical Association of the Graphic Arts (TAGA) co-sponsored a topical meeting on the Comparison of Color Images Presented in Different Media (That are intended to simulate each other or another image) in Colonial Williamsburg, Virginia on February 23-26, 1992. The conference was chaired by Milton Pearson of the RIT Research Corporation and was dedicated to the memory of Richard S. Hunter who made innumerable contributions to the field of appearance measurement — so important in attempting to match images presented in different media. Fifteen invited and contributed presentations were made over the two and one-half days of the meeting. The proceedings of this conference consisting of full-length papers on each of the presentations will be published as volume 2 of the 1992 TAGA proceedings and therefore be available in the archival literature.

Monday morning's session consisted of 3 presentations. The first presentation, "Techniques for Reproducing Images in Different Media: Advantages and Disadvantages of Current Methods," was given by Anthony Johnson of Crosfield Electronics Ltd. This presentation provided a review of current techniques used in the graphic arts industries for reproducing images such as photographic transparencies. Mike Stokes, Rochester Institute of Technology, next presented "Colorimetrically Quantified Visual Tolerances for Pictorial Images," by M. Stokes, M.D. Fairchild, and R.S. Berns. In this work, CRT images were manipulated using various meaningful transfer functions along colorimetric dimensions of CIELAB lightness, chroma, and hue angle. Two-alternative forced choice experiments were performed to determine how much the color of various images could be changed before the difference became perceptible. The results showed perceptibility tolerances were substantially larger for pictorial images than for simple patches. Paula J. Alessi and Thomas E.

Madden of Eastman Kodak Company wrapped up the session with their presentation on "State-of-the-Art Hardcopy/Softcopy Image Matching Techniques." Two types of hardcopy images, back-illuminated transparencies and reflection prints, both viewed with D50 simulators were matched to a CRT display with a D50 white point. The different displays were also equated for luminance level and surround conditions. The presentation outlined the techniques used to produce accurate colorimetric matches between the various displays. Monday afternoon was open for attendees to visit the sites of Colonial Williamsburg.

The meeting reconvened Monday evening with two presentations. Robert W.G. Hunt, City University, London, presented "Appearance Modelling," an overview of the mathematical formulation of his color appearance model. This model begins with the tristimulus values of a stimulus along with information about factors such as the color and luminance level of the adapting stimulus, the surround, and the background and can be used to calculate appearance metrics such as lightness, brightness, chroma, colorfulness, and hue. In the second presentation of the evening Mark D. Fairchild, Rochester Institute of Technology, discussed one aspect of color appearance modeling, "Chromatic Adaptation to Image Displays." A series of experiments was discussed that made measurements of the chromatic, spatial, and temporal properties of both sensory and cognitive mechanisms of chromatic adaptation.

Tuesday morning began with Robert P. Mason discussing "The Influence of Surface Properties on Image Interpretation." This talk provided a useful summary of the relationships between the diffuse reflection or emission of image displays that carry the image information and surface reflection that carries no information about the image and can be considered noise. These relationships are of critical importance when one is trying to correlate instrumental and visual evaluations of images presented in various media. Next, Warren L. Rhodes of Chromatech led a panel discussion titled "Device Independent Color — Achievable? Desirable?" The members of the panel were Mark Fairchild, Robert Hunt, Anthony Johnson, James McElearney, Ricardo Motta, and Maureen Stone. The discussion consisted of the members of the panel commenting on questions raised from by the conference participants. These questions spanned a range of topics from cognitive aspects of cross media reproduction, to gamut mapping to simply is device independent color desirable and achievable. The morning session wrapped up with Karl J. Heuberger, E.M.P.A., Switzerland, presenting "Color Transformations and Lookup Tables." Six mathematical models and a low-density lookup table were compared for accuracy of transformation from CIE tristimulus values to a CMY color space for printed material. The results showed that a "cellular" form of the Neugebauer equations provided the most accurate transformation while the matrix equations produced poor results and the lookup table produced poor-to-acceptable results.

The Tuesday afternoon session also had 3 presentations. Robert R. Buckley, Xerox Corporation, discussed "Color Data Interchange: Technology and Standards." This presentation was

a review of current procedures for data compression to allow efficient storage and transmission of color images. Modern techniques are all traceable to the techniques developed for encoding color television broadcasts several decades ago. It is also interesting how image coding techniques closely mimic the coding that is known to occur in the human visual system (i.e., high bandwidth achromatic channel and two low-bandwidth opponent chromatic channels). Michael H. Brill of Science Applications International Corporation gave a presentation on the "Trade-Offs in VDU Monitor Calibration." The assumptions that are often made when calibrating color CRT displays were discussed along with an analysis of the number of measurements required for calibration as a function of the number of assumptions made. Colorimetric calibration that is sufficiently accurate for practical applications can be made with very few measurements using a physics-based model of the CRT that includes terms for gain, offset, and the power relationship between electron-gun voltage and phosphor luminance. David L. Spooner, Dupont, wrapped up the day with a talk on "Measurement of the Transfer Function of Hardcopy Color Reproduction systems: A Metric for Comparison." Techniques were described whereby spectrophotometers mounted on automated xy positioning systems were used to perform exhaustive measurements of printed proof sheets. Between 7,000 and 15,000 colors were measured in order to generate reliable transformations between CMYK values and colorimetric coordinates.

The conference came to a close after the Wednesday morning session. R.S. Fisch and T.H. Brackley of 3M Company co-authored a presentation titled "Study of Colorimetric Changes that Occur in Transparent Color Images Reproduced by Ink on Paper." The authors could not be present at the conference, therefore this work was presented by Anthony Johnson. A series of colorimetric data was collected by reproducing Ektachrome transparencies on three different systems with various levels of original color luminance, toner in the black ink, black ink densities and gray component replacement. The results were expressed in terms of CIELAB lightness, chroma, and hue angle. It was clear from the data that the different scanner systems were producing substantially different output colorimetry for the same input. The final formal presentation was by J.A. Stephen Viggiano and Jeffrey Wang of the RIT Research Corporation on "A Comparison of Algorithms for Mapping Color Between Media of Differing Luminance Ranges." Original images such as photographic transparencies often have a larger luminance range than reproductions such as printed matter. This requires a technique for reducing the luminance range in the image while preserving the best possible appearance. The recommended technique was to reduce the luminance range using CIELAB L^* while compressing chroma, C^* , by a factor midway between unity and the L^* ratio of the two media and keeping hue angle constant. Warren L. Rhodes summarized the meeting with a review of the presentations and Milton Pearson, the meeting organizer, officially closed what was certainly a successful Williamsburg conference.

Mark D. Fairchild

OBITUARY: KENNETH L. KELLY

Kenneth L(ow) Kelly, 81, a retired physicist of the National Bureau of Standards (NBS) died suddenly on Monday, December 30, 1991, at his home in Southern Pines, North Carolina.

Mr. Kelly was a research colorist who worked closely with Dr. Deane B. Judd at NBS. Together they published the ISCC-NBS *Method of Designating Colors and a Dictionary of Color Names*, NBS Circular 553, Nov. 1, 1955. Kelly later published *A universal Color Language*, *Color Engineering* v 3, p 2-7 March-April 1965. After Judd's death in 1972, Kelly was responsible for the publication of NBS Special Publication 440, (1976) *COLOR - UNIVERSAL LANGUAGE AND DICTIONARY OF NAMES*; this publication included the Circular (158 pages) and the Universal Language (19 pages) with 10 color plates, and a color photograph of the Munsell Color Solid on the soft cover. Nearly 20,000 copies were sold and distributed at a price of \$3.25. His most recent scientific contributions were two book reviews in *Color Research and Application*. His review of *Color in Our Daily Lives*, by Deane B. Judd is in volume 2 (1977), page 98. The review of *Chroma Cosmos 5000* by Japan Color Research Institute is in volume 6 (1981), page 59.

Born in Baltimore, Maryland, November 19, 1910, Kelly obtained a B.S. in physics from Johns Hopkins University in 1934 and an M.Sc. from Philadelphia College of Pharmacy in 1935. Early in his career, Kelly worked

for his father who was Director of the American Pharmaceutical Association. He came to NBS in 1936 as a Research Associate for this Association. One of his early papers was entitled *Instructions for Determining the Color Names for Drugs and Chemicals*, published as a Bulletin of the National Formulary Commission of the American Pharmaceutical Association, vol 8, 339 (1940).

In 1943, Kelly joined the NBS staff as a research chemist. From 1948, until his retirement he was employed as a physicist, first in the Photometry and Colorimetry Section of the Metrology Division and later in the Sensory Environmental Section of the Center for Building Technology.

Kelly was a charter member of the Color Marketing Group formed about 1962 and a member body of the Inter-Society Color Council (ISCC) since 1965. He was awarded a life membership in the Group in 1967 and served as a director in 1969. He was also a member of the American Association for the Advancement of Science, the Optical Society of America, and an honorary member of ISCC. He was a lifetime member of the Saint Andrew's (Scottish) Society of Washington, DC. He was very proud of his Scotch heritage. He wrote a book, *The McIver Family of North Carolina*, that included the history of his Scottish ancestors and many of the McIver and

Kelly cousins who have lived and who still live in North Carolina. The 285-page volume was published in 1964 by McIver Art and Publications, Inc., Washington, DC.

Kelly was a collector of firearms, an expert rifleman, and a member of the National Rifle Association. He was also a devout churchman and served as an elder in Bradley Hills Presbyterian Church, Bethesda, Maryland.

Kenneth is survived by his wife, Helen Whelchel. They were married July 15, 1956 in Union Presbyterian Church, Cameron, North Carolina. Everyone who met Kenneth marveled at his ability to surmount a major life-long physical handicap. Those of us who had the privilege of working with him admired his genial, always pleasant personality. He was an inspiration to many another handicapped person.

Harry K. Hammond III
(Retired NBS)

(Editor's Note: *COLOR-UNIVERSAL LANGUAGE AND DICTIONARY OF NAMES* has long been out of print, but black and white photocopies can be obtained from the National Technical Information Service, Springfield, Virginia, Order No. PB 265225, price \$26 + \$3 postage and handling. 703-487-4650.)

THANKS FOR THE RECOMMENDATION!

The ISCC membership is always growing, but we don't always know how new members learn about the benefits of ISCC membership.

The membership application now allows new members to tell us what person, publication, or event made them aware of ISCC. Therefore, we can now thank 31 existing members of ISCC for recruiting 67 new members. If you find your ISCC membership beneficial, please spread the word to colleagues who may also have an interest in color. (And if you don't find the ISCC beneficial, please contact a Board member with your

concerns and contributions!)

Although we know that ISCC members are a selfless, self-sacrificing bunch, there is a reward for members who help bring new members into the fold. Individual membership dues are waived for one year for members who add five or more new members to the ISCC rolls. The ISCC depends on the ideas and contributions of new and existing members to remain the leading professional organization to advance the knowledge of color.

Ann Campbell Laidlaw, ISCC Membership Secretary



CORRECTION In the previous issue of ISCC News, (336) there were a number of errors in the article on "Computation of Hue Difference, ΔH^* " which should be noted. We are reprinting the article in its entirety, with corrections.

Editor

COMPUTATION OF HUE DIFFERENCE, ΔH^*

At the meeting of ASTM Subcommittee E12.02 on Spectrophotometry and Colorimetry, this item was included on the agenda. Robert Sève recently published an article on this topic. He proposed a more straightforward means of calculating ΔH^* and keeping track of its sign, positive or negative. ASTM E12.02 desires to call Sève's proposal to the attention of individuals who compute ΔH^* and to obtain their views on the preferred equation for its computation.

In CIE Publication 15.2, *Colorimetry*, 2nd edition, 1986, the defining equation for hue difference is given. Using CIELAB and omitting the subscripts *ab*, the equation is:

$$\Delta H^* = [(\Delta E^*)^2 - (\Delta L^*)^2 - (\Delta C^*)^2]^{1/2} \quad (1)$$

One might ask if there is a way to compute ΔH^* directly rather than as a component difference of ΔE^* ? The answer is Yes, the CIE also gives the equation

$$\Delta H^* = C^* \Delta h (\pi/180) \quad (2)$$

where *h* is the hue angle. This equation is to be used for small color differences away from the achromatic axis.

In his recent Note in *Color Res. Appl.* Vol 16 (3), 217-218 (June, 1991), Sève derives and proposes the use of the precursor to eq. (2), which the CIE did not publish:

$$\Delta H^* = 2(C_1^* C_2^*)^{1/2} \sin(\Delta h/2) \quad (3)$$

Equation (3) reduces to eq. (2) for C_1^* approximately equal to C_2^* and Δh small.

Note that eqs. (2) and (3) automatically preserve the correct sign of ΔH^* whereas it is lost when eq. (1) is used; it must be restored by following Note 4 in CIE 15.2. Sève gives two numerical examples of the use of eq. (3).

Billmeyer computed the results with all three equations. He found that the differences in the results are negligible - no more than 1 in the fourth decimal place.

Do any ISCC readers compute ΔH^* ? ASTM Committee E12.02 on Appearance would like to know whether you use eq. (1) or (2), and whether you would find eq. (3) useful. Please send your comments to the ISCC editor. His address is on the back page of the News.

If there is strong support for eq. (3) ASTM will ask USNC/CIE to request that it be added to Publication 15.2. ASTM is a Member Body of ISCC and a Constituent Society of USNC, and so it would be quite appropriate to make such a request.

Fred W. Billmeyer, Jr.
Harry K. Hammond III

UNIVERSITY CORNER

Editors Note: We welcome items of interest from ALL educational institutions, for this column!

INTER•I•TESTING



The ISCC/TAGA
1992 Williamsburg
Conference

Wow! What an experience! The Williamsburg Conference is a one-of-a-kind event! The weather was much nicer in Williamsburg than in Rochester, the food was excellent and the historic attractions and scenic grounds were a treat. But these were just icing on the cake! The ISCC/TAGA conference was educational and entertaining.

As an Imaging Science Ph.D. candidate at the Rochester Institute of Technology with a dissertation addressing appearance models in cross-media applications, this conference was very appropriate. This was the first time I had the privilege of participating in the Williamsburg conference. However, I have been to the ISCC meetings held in Cleveland and New York and was therefore acquainted with several of the participants and much of the procedure.

Since I am just beginning my work concerning cross-media image comparison, my hope for the conference was to walk away with an understanding of the current knowledge and concerns. The focus of the talks was on comparing images presented in different media. The information exchange of the talks gave a good scope of the present technology for cross-media image comparison.

My background education (BS Imaging Science, MS Color Science at RIT) and my work with the Munsell Color Science Laboratory, MCSL, has kept me well up-to-date on the current technologies. This was not a great surprise to me but it was nice to reaffirm that our work at MCSL is very current and active. The recognition of the quality of education I have received was more pronounced by a first-year color

student, Tim Kohler, who also came along with the MCSL group. Tim had just completed one of the introductory courses in color for which I was the teaching assistant. During the second day of the conference, Tim leaned over and said to me, "I know this stuff - we just learned it!" I have to admit - I felt proud!

Aside from the technology, there were many different viewpoints and interests concerning the cross-media topic. The conference overall was very interactive throughout the talks and during the breaks. From this student's viewpoint, the interaction between and with the participants and the conflicts of interest were the heart of the conference.

One of the most interesting aspects of the Williamsburg conference was the struggle to get over some of the bureaucratic boundaries of industry and the desire to overcome these barriers for knowledge's sake. The conflict between barriers and desires is not going to get any easier. The competition between companies trying to stay ahead of the game by keeping

technology secret is quite understandable. Companies do not seem to be appropriately protected by patent laws. However, I can see that the advancement of the technology is becoming stagnant by companies feeling that in order to stay afloat, they can not share information.

In my opinion, one of two things will happen. Companies will continue to hold onto information, barely stay afloat and technology will advance at a snail's pace. Or, a few companies will expose virtually all information resulting in a technological explosion in which the companies who share knowledge will quickly advance but most other companies will fail or become product suppliers. As a student these issues impact my current work and will greatly influence my career options when I finish my degree. The clearly visible conflict which arose at the Williamsburg conference is opening my eyes to the issues that control science which are not scientific.

Despite the constraining holds of management, the knowledge and science surrounding the conference

topic is expanding. It was an inspiration to see that there is some really good work being done, especially in the areas of psychophysics and experimental design.

The panel discussion "Device Independent Color-Achievable? Desirable?" was a new segment of the conference. Unfortunately, the discussion really didn't get rolling until the allotted time was gone. It did become evident that there were some very strong opinions and interests for device independent color. Some felt device independence was essential and some thought it to be unachievable and, therefore, unnecessary. From an academic view, device independence seems very desirable and relatively achievable. The debate showed that from an industrial standpoint, this may not be so.

I am glad I was able to participate in this conference. Two thumbs up to Milt and his crew for pulling together this event.

Amy D. North - R.I.T.

NEW MEMBERS

We are pleased to list the latest members to the ISCC. Welcome!

Dr. Harold Boll
Kodak Electronic Prints Systems
164 Lexington Road
Billerica MA 01890
USA

Mr. Mark Gorzynski
Tektronix Inc.
M/S 50-662
PO Box 500
Beaverton OR 97077
USA

Mr. Naoya Katoh
RIT
496 Kimball Drive
Rochester NY 14623
USA

Ms. Catherine Lambrecht
Laurel Industries
280 Laurel Avenue
Highland Park IL 60035
USA

Mr. Floyd Moss
Diehls Interiors
145 Travalini Court
El Sobrante CA 94803
USA

Ms. Robin K. Patrick
BASF
26701 Telegraph
PO Box 5009
Southfield MI
48086-5009
USA

Mr. Mark E. Ulrich
MacBeth Div Kollmorgen
InstrumentCorp
PO Box 230
Newburgh NY 12551-0230
USA

Mr. Eric Walowit
EWA
7555 Rosewood Drive
Springboro OH 45066
USA

ATTENTION ISCC MEMBERS:

Information Request for Membership Directory
If, since the last Directory was published, you have changed or added to your name, address, telephone or fax number, please *mail* your changes immediately (no telephone calls please) to:

Membership Secretary: Ms Ann Laidlaw, c/o SheLyn, Inc., 1108 Grecale Street, Greensboro, NC 27408-8725

The following were extracted from *NIST Update*. *NIST Update* is a guide to activities at the National Institute of Standards and Technology.

NIST STUDIES OF PRESSED POWDER REFLECTANCE FACTOR REPRODUCIBILITY

NIST The Spectrophotometry Group of the Radiometric Physics Division is currently collecting data on the 45/0 reflectance factor reproducibility of polytetrafluoroethylene (PTFE) powder pressed in ten laboratories. NIST has endeavored to eliminate all the variables except those of pressing by

supplying the powder, the press and the holders for the pressed powder to be returned to NIST. They are now in the process of making the 45/0 reflectance factor measurements and analyzing the data. A preliminary report is expected at the ISCC and ASTM meetings in Princeton in June (See Calendar).

A reproducibility study was conducted some years ago on the 6

degree/hemispherical reflectance factor of PTFE. The results of this investigation were published as "Laboratory intercomparison study of pressed PTFE powder reflectance standards", V. R. Weidner, J.J. Hsia and B. Adams. *Applied Optics* 45, 2225-2230, July 15, 1985. The data in this report are not intended to be used as reference data for the absolute reflectance factor of pressed PTFE powder. For this purpose use the data published in "Reflectance Properties of Pressed PTFE Powder", V. R. Weidner and J. J. Hsia, *J. Opt. Soc. Am.* 71, 856-861 (1981).

Harry K. Hammond, III

WORKSHOP CALLED FOR NEW LIGHTING PRODUCTS PROGRAM

Lighting experts, manufacturers, and others interested in the development of technical requirements for a program to evaluate and accredit laboratories that test lighting products and systems are invited to a public workshop May 14, 1992 at the Crystal City Marriott Hotel, Arlington, VA. The new energy efficiency of electric lighting products accreditation program was established under the NIST National Voluntary Laboratory Accreditation Program (NVLAP) at the request of the National Electrical Manufacturers association. Laboratories will be accredited to test such products as indoor and outdoor luminaries, lamps, ballasts, and systems using test methods and performance criteria developed by standards organizations.

For information and registration, contact Lawrence S. Galowin, Room A146, Bldg. 411, NIST, Gaithersburg, MD 20899.

Telephone 301 975-4016; FAX 301 926 2884.

NEWS FROM MEMBER BODIES

HUMAN FACTORS SOCIETY PLANS FOR 36TH ANNUAL MEETING



Santa Monica, CA - The Human Factors Society, an ISCC Member Body, is finalizing the technical program for its 1992 Annual Meeting, which will be held October 12-16 at the Westin Peachtree Plaza Hotel in Atlanta. Among the festivities to be held include the Annual Awards Banquet, which will take place on Wednesday evening, October 14, and which will honor the recipients of nine Society awards for distinguished research and service in the field.

The meeting, whose theme is "Innovations for Interactions," will feature more than 100 technical sessions on a broad range of ergonomics-related topics, including aerospace systems, aging, biomechanics, communications, computer systems, consumer products, education, forensics, organizational design/management, safety, system development, test and evaluation, training, transportation, and visual performance. Hands-on workshops geared toward professionals at all levels will be offered on Monday, October 12, and Friday, October 16.

Exhibits are invited, and registration and housing information, along with a preliminary program, will be available in early August. Contact the Human Factors Society, P.O. Box 1369, Santa Monica, CA 90406-1369; 310 394-1811; FAX 310 394-2410.

The Human Factors Society is a multidisciplinary professional organization of almost 5000 persons in the United States and throughout the world. Its members include psychologists, engineers, designers, and scientists, all of whom have a common interest in designing systems and equipment to be safe and effective for the people who operate and maintain them.

Editors Note: We are reprinting this article in its entirety because of omissions which occurred in the previous (336) issue.

THE AMERICAN SOCIETY FOR PHOTOGRAMMETRY AND REMOTE SENSING

ASPRS

The
Ameri-
can
Soci-

ety for Photogrammetry and Remote Sensing (ASPRS), founded in 1934, has given increasing service to the scientific community and to the nation through development of photogrammetry, remote sensing and geographic information systems. The ASPRS defines photogrammetry and remote sensing as "the art, science, and technology of obtaining reliable information about physical objects and the environment, through the process of recording, measuring, and interpreting imagery and digital representations of energy patterns derived from non-contact sensor systems." Within this definition, photogrammetry includes the acquisition of imagery from conventional photographic systems, as well as from sensors using other portions of the electromagnetic spectrum. Both the quantitative (metric) and qualitative (interpretive) aspects of image analysis are included. Thus, modern photogrammetry is considered to embrace all the elements of image acquisition, mensuration, and interpretation. A new development is the great increase of interest in geographic information systems (GIS), for which a new division was established in November 1988.

The aims of the ASPRS are (1) to advance scientific knowledge in the various disciplines of photogrammetry and remote sensing (including but not limited to aerial surveying and mapping, photointerpretation, and spatial information management); (2) to provide a means for disseminating information on photogrammetry and its related sciences; (3) to encourage the exchange of ideas; (4) to stimulate student interest; (5) to improve

standards; and (6) to uphold ethical principles. Publications of the Society include the journal, *Photogrammetric Engineering & Remote Sensing* (published monthly and containing the Society Newsletter), and the basic manuals of the science—the *Manual of Photogrammetry*, the *Manual of Remote Sensing*, and the *Multilingual Dictionary of Remote Sensing and Photogrammetry*. In addition, the Society publishes *Technical Paper Volumes* from technical meetings, *Proceedings from workshops and symposia*, a complete index to the *Journal*, and indexes to the *Technical Paper Volumes*. The Society also disseminates information through its local and national meetings, including the *Annual and Fall Conventions*. The organization of ASPRS now includes five technical divisions: *Remote Sensing Applications*, *Primary Data Acquisition*, *Professional Practice*, *Photogrammetric Applications*, and *Geographic Information Systems*.

Much of remote sensing interacts with color technology. For example, multispectral cameras and scanners acquire information from multiple spectral bands. Besides being important to the design of the camera and scanning devices themselves, color technology enters into the rendering of the spectral bands into easily interpreted hardcopy and video images. [Whenever we see vegetation as red in a color photograph coded from a multi-band image including infrared, we are seeing a choice that was made in color-coding the infrared components.] Machine-vision aspects of color enter into remote sensing through the automatic classification of multispectral imagery according to such parameters as vegetation type, vegetation health, and geological composition of the terrain.

These applications are discussed at some length in the *Manual of Remote Sensing*. The agricultural applications are also the subject of a biennial ASPRS workshop on *Color Aerial Photography and Videography in the Plant Sciences*. The next of these workshops will be held in 1993. Information can be obtained from the Society headquarters (address: 5410 Grosvenor Lane, Suite 210, Bethesda, MD 20814-2160; telephone 301-493-0290).

Michael H. Brill
Science Applications International Corp.
1710 Goodridge Dr., 1-11-1
McLean, VA 22102

ASTM ACTIVITY NEWS

ASTM

The
March
issue of
ASTM

Standardization News reported some interesting statistics on membership and technical committee activity. As of December 31, 1991, there were 2,110 organizational memberships and 29,171 individual memberships.

There were 132 technical committees, of which E-12 on Appearance is one, having a total of 2,063 subcommittees. Membership outside the United States totaled 4,127, spread over 91 countries: Five members from Canada, also two from India and one each from Germany, Italy and The Netherlands. Other committees have even more international flavor. For example Committee E-17 on Pavement Management Technologies. This committee is considering an international experiment to compare and harmonize skid resistance and texture measurement. The objective is to compare the many different pavement friction measurement methods used in countries around the world and to make recommendations for harmonizing them.

Harry K. Hammond III

COLOR RESEARCH & APPLICATION

In This Issue, June 1992

This issue begins with Rolf Kuehni talking about George Seurat, the French painter. Seurat was the acknowledged leader of the neo-impressionists. He is known to have a relatively extensive scientific knowledge of his time (he died in 1891) and carefully developed a well thought-out program for his work.

In the last issue William A. Thornton began a three-part article, "Towards a More Accurate and Extensible Colorimetry." The instrumentation and visual experiments were described and the data given. Now Dr. Thornton continues the article with "Part II. Discussion." Many color scientists, Judd, Stiles, MacAdam, and Wyszecki to name a few, have described difficulties in traditional colorimetry. The errors encountered when the traditional colorimetric calculations are used to reduce visual data to tristimulus values or chromaticity or luminance as a correlate of perceived brightness are discussed in this section. Also included are topics such as the transformation of primaries and visual tests of the Grassmann proportionality and additivity assumptions. In a third section, still to come, Dr. Thornton suggests a potential solutions to the problems highlighted in this part.

When are two lights equal? This is an important question in vision research. One possible criterion of equality is to judge whether the two stimuli have equal brightness by direct comparison. A second method is to adjust the lights to produce minimum flicker, when alternating between a standard and the test. Historically determination of the spectral sensitivity of normal observers was done by flicker photometry, but then applied to specify illumination for visual tasks that did not involve temporal resolution such as acuity tasks. Recent electrophysiological and psychophysical analyses of the visual

pathway have revealed the existence of two parallel pathways, i.e., separate channels for acuity and flicker. In "Comparison of Spectral Sensitivity Using Hetero-chromatic Flicker Photometry and An Acuity Criterion," Carl Ingling, Jr., Scott S. Grigsby, and Regina C. Long assess the validity of flicker photometry for central foveal tasks in which the criterion is resolution.

Different light sources can result in the appearance of colors being very different. The color rendering index (CRI) is a method for assessing the degree to which a test illuminant renders colors similar to a reference illuminant (usually daylight). The CRI is the spectral quality index which is used by lighting engineers, interior designers, and architects to characterize particular lamps or light sources. Often the correlated color temperature and the CRI are the only spectral data supplied by the lamp manufacturer. However, lighting in many interiors consists of mixing two or more components, usually daylight and the supplementary artificial lights. Throughout the interior and as time of day changes, the character of this mixed illumination varies. In "The Color Rendering of Supplementary Artificial Lighting" J. J. Embrechts derives the general principles leading to the determination of the CRI distribution in an interior with a combination of light sources.

In the Munsell Color System value is a visually uniform scale of lightness. In the early 1940s after measuring the luminance factor of the colored chips in the 1929 Munsell Book of Color, a subcommittee of the Optical Society of America adopted a fifth order polynomial to calculate CIE Y from Munsell value. The problem arises because usually Y is known and Munsell V is desired, not the reverse, and a fifth order polynomial can not be solved algebraically. Although other methods have been proposed, in "Munsell Value as Explicit Functions of CIE Luminance Factor," Calvin S. McCamy proposes a very accurate, although not mathematically exact, solution to the

fifth order polynomial. This solution is used in the latest revision of the ASTM Standard Method of Specifying Color by the Munsell System.

In the last issue Yoshinobu Nayatani and his co-workers (Gomi, Kamei, Sobagaki, and Hashimoto) extended the Nayatani model to make it possible to estimate the Helmholtz-Kohlrausch effect on chromatic object colors with any Munsell Value. This led to the idea the the L/Y ratios for chromatic object colors are closely related to the luminance ratios for equally bright chromatic luminous colors, the so-called brightness/luminance-ratio effect. The only problems left from the previous article was a very complex computational procedure needed to derive the L/Y ratios from the colorimetric values x, y, Y of chromatic object colors. Instead it would be very convenient to have a simple multiple regression equation to predict the L/Y ratios of chromatic object colors directly from their chromaticity coordinates, x and y . In "Estimation Equations for Practical Use on Lightness-Reflectance (L/Y) Ratios in the Whole Chromaticity Gamut," Yoshinobu Nayatani, Masamori Ihara, Hiroaki Sobagaki, and Kenjiro Hashimoto present such equations and discuss the shape of contour lines on constant B/L ratios.

The Industrial Notes section includes "A Contribution To the Study of Color of Fabrics" by T. Z. N. Sokkar, M. A. Kabeel, W. A. Ramadan, and A. A. Hanza. In this article Dr. Sokkar and his coauthors predict the color of absorbing-scattering substrates taking into account the effect of optical anisotropy of fibers and definite values of the indices of refraction in the visible spectral region. They discuss five main fibers - cotton, polyester, nylon, acrylic, and wool. The spectral curves for dyed nylon fibers are calculated theoretically and compared to those measured experimentally.

THE 1993 ISCC GODLOVE AWARD

The Godlove Award is the most prestigious award bestowed by the Inter-Society Color Council to honor long-term contributions in the field of color. The Godlove Award was established in 1955 in memory of Dr. I. H. Godlove and is presented biannually, in odd numbered years, with the next award scheduled for presentation at the 1993 Inter-Society Color Council Annual Meeting.

Nominations for the 1993 Godlove Award are now being solicited.

Candidates will be judged by their contribution to any field of interest related to color whether or not it is represented by an Inter-Society Color Council Member-Body. The candidate's contribution may be direct, it may be in the active practical stimulation of the application of color, or it may be an outstanding dissemination of knowledge of color by writing or lecturing, based on original contributions by the nominee. Candidates need not have been active in the affairs of the Inter-Society Color Council but they must either be a current or former member of the ISCC. All candidates must have at least five (5) years of experience in their particular field of color.

A Godlove Award Nomination Form is enclosed with this mailing of the ISCC Newsletter. The past and present membership of the ISCC boasts a number of individuals deserving of such recognition but such an award requires *your* participation in the process. Please take the time to consider and to nominate a worthy candidate for this honor.

Feel free to copy the enclosed nomination form, if necessary. Requests for additional nomination forms may be directed to:

Michael H. Brill
Godlove Award Committee Chairman
Science Applications International Corporation
1710 Goodridge Drive, 1-11-1
McLean, Virginia 22102
703 734 4027
FAX: 703 821 3576
E-mail: bsa@mcl.saic.com

CALENDAR

Please send information on Member Body and other organization meetings involving color with dates, places, and information source to:

Harry K. Hammond, III
 BYK-Gardner, Inc.
 2435 Linden Lane
 Silver Spring, MD 20910
 (301) 495-7150 FAX (301) 585-4067

1992

IS&T IMAGING '92, May 10-15

The Society for Imaging Science & Technology 45th Annual Conference, The Meadowlands Sheraton, East Rutherford, New Jersey. Information: (703) 642-9090.

AATCC SPRING MEETING, May 12-14

American Association of Textile Chemists and Colorists, AATCC Technical Center, Research Triangle Park, North Carolina. Information: Jerry Tew, (919) 549-8141.

SID '92, May 17-22

Society for Information Display International Symposium Seminar and Exhibition, Haynes Convention Center, Boston, Massachusetts. Information: Paul M. Alt, (914) 945-2437.

CORM '92, May 19-20

CORM '92: Array Radiometry Spectrophotometry and Colorimetry, Sheraton Greenbelt Hotel, New Carrollton, Maryland. Information: Dianna G. Jones, (407) 292-3168.

CIE DIVISION 1 & 6, Jun. 18-20

Nassau Inn, Princeton, New Jersey. Information: Dr. Jack Hsia, (301) 975-2342.

ISCC - ANNUAL MEETING, Jun. 21-24

Nassau Inn, Princeton, New Jersey. Information: Dr. Allan B. J. Rodrigues, (313) 583-8245.

AIC INTERIM SYMPOSIUM, Jun. 23-24

Computer Colorant Formulation, Nassau Inn, Princeton, New Jersey. Information: Dr. Allan B. J. Rodrigues, (313) 583-8245.

ASTM COMMITTEE E-12 ON APPEARANCE, Jun. 24-26

Nassau Inn, Princeton, New Jersey. Information: Bode Buckley (215) 299-5599.

ASTM COMMITTEE D-1 ON PAINT, Jun. 28-Jul 1

Minneapolis Marriott Center City, Minneapolis, Minnesota. Information: Scott Orthey, (215) 299-5507

IESNA ANNUAL CONFERENCE, Aug. 2-6

Illuminating Engineering Society of North America, 86th Annual Conference, San Diego, California. Information: Valerie Landers, (212) 705-7269.

XVII ISPRS CONGRESS, Aug. 4-13

17th International Society of Photogrammetry and Remote Sensing Congress in conjunction with 27th International Geographic Congress and 1992 Global Change Conference, Washington Convention Center, Washington, District of Columbia. Information: Judy Peesel (301) 493-0290.

3rd International Conference on Visual Search, Aug. 24-27

University of Nottingham, Nottingham, England.

European Conference on Visual Perception, Aug. 30- Sep. 3

Information: Dave Burr, Istituto di Neurofisiologia, Via @ Zeno 51, Piza 56100, Italy.

WWDU '92, Sep. 1-4

Third International Scientific Conference - Work With Display Units, International Conference Center, Berlin, Germany. Information: Dr. Ahmet Cakir, ERGONOMIC Institute Ltd., Soldauer Platz 3, D-1000 Berlin 19, German Federal Republic.

SPE RETEC, Sep. 15-16

Society of Plastics Engineers, Color and Appearance Division/Philadelphia Section "Measuring Up To Today's Standards", Hyatt at Cherry Hill, New Jersey. Information: Gary E. Beebe, (215) 785-8285.

CMG - CONFERENCE, Sep. 20-22

Color Marketing Group International Color Directions Conference, Clarion Plaza, Orlando, Florida.

OSA - ANNUAL MEETING, Sep. 20-25

Optical Society of America Annual Meeting, Albuquerque, New Mexico. Information: Optical Society, (202) 223-8130.

ISEP, Sep. 21-22

International Symposium on Electronic Photography, Sponsored by the Society for Imaging Science and Technology and German Society of Photography, Cologne, Germany. Information: (703) 642-9090.

TRIMAGING THE FUTURE, Sep. 21-25

The Royal Photographic Society Science Committee Symposium on Imaging the Future, University of Cambridge, England. Information: Dr. M. R. Pointer, Kodak Ltd., Research Div. W-93, Harrow, Middlesex, HA1 4TY, England, tel. 44-81-427-4380 or FAX 44-81-863-4798.

AATCC - CONFERENCE AND EXHIBITION, Oct. 4-7

American Association of Textile Chemists and Colorists, Hyatt Regency, Atlanta, Georgia. Information: AATCC, (919) 549-8141.

USNC/CIE ANNUAL MEETING, Oct. 11-13

The United States National Committee of the CIE Annual Meeting, Embassy Suites Resort, Scottsdale, Arizona. Information: Dr. Ian Lewis (602) 991-9260, FAX (602) 991-0375.

FSCT, Oct. 21-23

Federation of Societies for Coatings Technology, 70th Annual Meeting and 57th Paint Industries Show, McCormick Place, Chicago, Illinois. Information: (215) 545-1507.

IS&T 8th INTERNATIONAL CONGRESS, Oct. 25-30

8th International Congress on Advances in Non-Impact Printing Technologies with Exhibit, Williamsburg Hilton, Williamsburg, Virginia. Information: (703) 642-9090.

GIS/LIS Conference, Nov. 6-12

Geographic Information Systems and Land Information Systems Conference sponsored by the American Society of Photogrammetry and Remote Sensing and several other organizations, San Jose Convention Center, San Jose, California. Information: Denise Cranwell, (301) 493-0200.

IS&T E/W SYMPOSIUM III, Nov. 8-13

The Society for Imaging Science & Technology, Maui Westin Hotel, Maui, Hawaii. Information: (703) 642-9090.

ASTM COMMITTEE D-20 ON PLASTICS, Nov. 15-19

Miami, Florida. Information: Katharine Schaff, (215) 299-5529.

OPTICON, Nov. 15-20

Optical Society of America OPTICON '92, Boston, Massachusetts. Information: Optical Society, (202) 223-8130.

AATCC FALL MEETING, Nov. 17-19

American Association of Textile Chemists and Colorists, The Doral Inn, New York City, New York. Information: Jerry Tew, (919) 549-8141.

LONG RANGE CALENDAR**1993****ASTM COMMITTEE D-1 ON PAINT, Jan. 17-20**

Crown Sterling Suites, Ft. Lauderdale South, Florida. Information: Scott Orthey, (215) 299-5507.

ASTM COMMITTEE E-12 ON APPEARANCE, Jan. 17-20

Crown Sterling Suites, Ft. Lauderdale South, Florida. Information: Bode Buckley, (215) 299-5599.

ASTM COMMITTEE D-20 ON PLASTICS, Mar. 1-4

Atlanta, Georgia. Information: Katherine Schaff, (215) 299-5529.

LUX EUROPA 1993, Apr. 4-7

Chartered Institution of Building Services Engineers, Edinburgh, Scotland. Information: CIBSE, Delta House, 222 Balham High Rd., London SW12 9BS.

TAGA ANNUAL CONFERENCE, May 2-5

Technical Association of the Graphic Arts Annual Technical Conference, Minneapolis - St. Paul, Minnesota. Information: Karen Lawrence, (716) 272-0557.

AIC-7TH CONGRESS, Jun. 14-18

International Colour Association - 7th Congress, Technical University of Budapest, Budapest, Hungary. Information: Prof. Antal Nemcsics, Technical University of Budapest, Conference Office, Building Z, Room 101/b, H-1521 Budapest, Muegyetem rkp.3-9, Hungary, Phone and FAX (36-1) 185-218.

ASTM COMMITTEE E-12 ON APPEARANCE,**Jun. 23-25**

Atlanta, Georgia Information: , Bode Buckley, (215) 299-5599.

ASTM COMMITTEE D-1 ON PAINT, Jun. 27-30

Wyndham Franklin Hotel, Philadelphia, Pennsylvania. Information: Scott Orthey, (215) 299-5507.

IESNA ANNUAL CONFERENCE, Aug. 8-12

Illuminating Engineering Society of North America, 87th Annual Conference, Houston, Texas. Information: Valerie Landers, (212) 705-7269.

AATCC - CONFERENCE AND EXHIBITION, Oct. 3-6

American Association of Textile Chemists and Colorists, Montreal, Quebec, Canada. Information: AATCC, (919) 549-8141.

ASTM COMMITTEE D-20 ON PLASTICS, Nov. 15-18

Fort Worth, Texas. Information: Katherine Schaff, (215) 299-5529.

1994**ASTM COMMITTEE D-1 ON PAINT, Jan. 23-26**

Crown Sterling Suites, Fort Lauderdale South, Florida. Information: Scott Orthey, (215) 299-5507.

ASTM COMMITTEE E-12 ON APPEARANCE, Jan. 23-26

Crown Sterling Suites, Fort Lauderdale South, Florida. Information: Bode Buckley, (215) 299-5599.

TAGA ANNUAL CONFERENCE, May 1-4

Technical Association of the Graphic Arts Annual Technical Conference, Baltimore, Maryland. Information: Karen Lawrence, (716) 272-0557.

ASTM COMMITTEE D-1 ON PAINT, Jun. 25-29

Crab Tree Valley Hotel, Raleigh, North Carolina. Information: Scott Orthey, (215) 299-5507.

ASTM COMMITTEE E-12 ON APPEARANCE, Jun. 19-23

Montreal, Canada. Information: Bode Buckley, (215) 299-5599.

IESNA ANNUAL CONFERENCE, Aug. 7-11

Illuminating Engineering Society of North America, 88th Annual Conference, Miami, Florida. Information: Valerie Landers, (212) 705-7269.

AATCC - CONFERENCE & EXHIBITION, Oct. 11-14
American Association of Textile Chemists and Colorists,
Convention Center, Charlotte, North Carolina. Information:
AATCC, (919) 549-8141.

AATCC - CONFERENCE AND EXHIBITION, Oct. 4-7
American Association of Textile Chemists and Colorists,
Philadelphia, Pennsylvania. Information: AATCC, (919)
549-8141.

1995

ASTM COMMITTEE E-12 ON APPEARANCE, Jan. 22-26
San Antonio, Texas. Information: Bode Buckley, (215) 299-
5599.

TAGA ANNUAL CONFERENCE, Apr. 2-5
Technical Association of the Graphic Arts Annual Technical
Conference, Orlando, Florida. Information: Karen Lawrence,
(716) 272-0557.

CIE, Sept.
New Delhi, India

AATCC - CONFERENCE & EXHIBITION, Oct. 8-11
American Association of Textile Chemists and Colorists,
Hyatt Regency, Atlanta, Georgia. Information: AATCC,
(919) 549-8141.

1999

TAGA ANNUAL CONFERENCE, May 2-5
Technical Association of the Graphic Arts Annual Technical
Conference, Philadelphia, Pennsylvania. Information: Karen
Lawrence, (716) 272-0557.

AATCC - CONFERENCE & EXHIBITION, Oct. 12-15
American Association of Textile Chemists and Colorists,
Convention Center, Charlotte, North Carolina. Information:
AATCC, (919) 549-8141.

1996

TAGA ANNUAL CONFERENCE, May 5-8
Technical Association of the Graphic Arts Annual Technical
Conference, St. Louis, Missouri or Dallas, Texas. Informa-
tion: Karen Lawrence, (716) 272-0557.

AATCC - CONFERENCE & EXHIBITION, Oct. 8-11
American Association of Textile Chemists and Colorists,
Opryland Hotel, Nashville, Tennessee. Information:
AATCC, (919) 549-8141.

1997

TAGA ANNUAL CONFERENCE, May 4-7
Technical Association of the Graphic Arts Annual Technical
Conference, Montreal or Quebec City, Canada. Information:
Karen Lawrence, (716) 272-0557.

AATCC - CONFERENCE & EXHIBITION, Sep. 28- Oct. 1
American Association of Textile Chemists and Colorists,
Marriott Marquis, Atlanta, Georgia. Information: AATCC,
(919) 549-8141.

1998

TAGA ANNUAL CONFERENCE, May 3-6
Technical Association of the Graphic Arts Annual Technical
Conference, Chicago, Illinois. Information: Karen Lawrence,
(716) 272-0557.

INTER-SOCIETY COLOR COUNCIL APPLICATION FOR INDIVIDUAL MEMBERSHIP

Name _____ Date _____

Dr. Mr. Ms.

Company/Affiliation _____

Street _____

City, State, Zip _____

Telephone (____) _____

Home

Fax (____) _____

Business

Signature

My chief interests in color are:

education

art

industry

science

My work relates to the following products and services:

Name other interests

My present and past business, professional or educational connections with color are: _____

My particular interests in color are: _____

I belong to the following national organizations or associations: _____

I learned about ISCC from: ISCC Newsletter Other source: _____

Please tell us the individual or organization that interested you in ISCC

ISCC dues are shown on the reverse side. Applications for membership dated prior to July 1 should be accompanied by full annual dues; those dated July 1 and later should be accompanied by 50% of annual dues. You have the option of subscribing to Color Research & Application at special membership rates. If you wish to do so, please add \$70.00 (US) or \$100.00 (overseas) to the amount of your check.

This application and remittance should be sent to

Ms. Ann C. Laidlaw, Membership Committee, c/o ShelLyn, Inc., 1108 Grecale Street, Greensboro, NC 27408

Telephone: (919) 274-1963

EXCERPT FROM THE BY-LAWS OF THE INTER-SOCIETY COLOR COUNCIL, INC.

Constitution, Article II — Aims and Purposes

The Council shall operate solely and exclusively as a non-profit organization with the aims and purposes:

- A. To stimulate and coordinate the work being done by the various members leading to the description and specification of color by these members.
- B. To promote the practical application of this work to the color problems arising in science, art, and industry, for the benefit of the public at large.
- C. To promote communications between technically oriented specialists in color and creative workers in art, design, and education, so as to facilitate more effective use of color by the public through dissemination of information about color in both scientific and artistic applications.
- D. To promote educational activities and the interchange of ideas on the subject of color and appearance among its members and the public generally.
- E. To cooperate with other organizations, both public and private, to accomplish these objectives for the direct and indirect enjoyment and benefit of the public at large.

Council Activities

The ISCC is the principal professional society on the field of color in the United States, encompassing the arts, sciences and industry, pursuant to the Aims and Purposes described above. Other national organizations with an interest in color are Member-Bodies of the Council and appoint delegations to participate in the Council's work. Individual members are the largest single group. The Annual Meeting, usually held in April, includes meetings of the Project Committees and sessions of four Interest Group: Measurement & Colorimetry; Vision & Color Appearance: Art, Design & Psychology; and Color Education. There is also a main program devoted to a specific aspect of color plus a Poster Paper session. Joint programs with one of the Council's Member-Bodies are interesting and educational.

In most years there is a separate topical Williamsburg Conference, often in February, where a single color subject is explored in depth with participants from all over the world providing state-of-the art information. Attendance at these conferences is usually smaller than at Annual Meetings, reflecting their topical nature and permitting interaction between speakers and participants.

The ISCC is the U.S. Member of the Association Internationale de la Couleur (AIC), which holds general meetings quadrennially and topical meetings annually. Color Research & Application, published bimonthly in English, is the principal international journal in this field; it is endorsed by ISCC. It reports recent research and opinions of colorists, review books and reports on national and international color meetings. Membership in ISCC permits subscription at more than a 50% discount.

The ISCC News, a bimonthly newsletter, reports the color activities of the Council, its members, Member-Bodies and international color organizations. Members receive the ISCC News at no cost. Member-Bodies and Sustaining Members receive 10 copies of the ISCC News.

Categories of Membership

	Annual Dues
<i>Individual Member.</i> Any person interested in color and desirous of participating in the activities of the Council.	\$30.00
<i>Student Member.</i> Full time students.	\$10.00
<i>Member-Body.</i> Any non-profit national organization interested in color and desirous of participating in the activities of the Council.	\$100.00
<i>Sustaining Member.</i> Any organization not eligible as a Member-Body, or any individual, interested in color and wishing to support the work of the Council. Receives 10 copies of ISCC News.	\$250.00
<i>Retired.</i> Treasurer must be notified, in writing, of retirement before dues have been billed.	\$10.00
<i>Library Subscriptions.</i> Receives all ISCC mailings, including ISCC News.	\$40.00
<i>Overseas Member.</i> A surcharge of \$20 is added to \$30 dues to cover additional mailing costs.	\$50.00

**DOES YOUR
WORK INVOLVE
COLOR
MATCHING?**

**ATTEND THE
ISCC ANNUAL MEETING
THEME: COLOR MATCHING**

**JUNE 21-24, 1992
PRINCETON, NJ**

NEWSLETTER EDITOR Michael A. Hammel

Send photo material (black and white if possible) to:

Editor, ISCC News • 98 Grand View Drive • Fairport, NY 14450 • Tel. (716) 223-1823

If at all possible, please send all other materials ON DISKETTE as follows:

MSDOS—ASCII, Q&A, Word Star, Word Perfect (5.25"—1.2 Meg, or 360K) (3.5"—1.44 Meg, or 730K).

Macintosh—Word, Macwrite, MS Works (3.5"—1.44 Meg, 800K, or 400K)

For hard copy transmission, FAX to (716) 425-2411.

Or send to: Dr. Ellen Carter • 2509 N. Utah St. • Arlington, VA 22207

Please note: the deadline for submission of material is the 1st of even numbered months.



meeting reports



contributions from members

OFFICERS 1990-1992

Position	Name	Address	Telephone	FAX
President	Mr. Hugh S. Fairman	Armorguard Products, Inc., P.O. Box 215, Andover, NJ 07821	(201) 786-6502	(201) 786-6399
President-Elect	Miss Paula Alessi	Eastman Kodak Company, Rochester, NY 14650	(716) 477-7673	(716) 477-0127
Secretary	Dr. Danny C. Rich	Applied Color Systems, P.O. Box 5800, Princeton, NJ 08540	(609) 924-2189, x208	(609) 895-7461
Treasurer	Mr. Philip Hunter	Hunterlab, 11491 Sunset Hills Rd., Reston, VA 22090	(703) 471-6870	(703) 471-4237
Past-President	Mrs. Joy T. Luke	Studio 231, Box 18, Route 1, Sperryville, VA 22740	(703) 987-8386	

LIST OF DIRECTORS

1989-1992

Dr. Norman Burningham	357 True Hickory Dr., Rochester, NY 14615	(716) 477-7466	
Mr. Richard W. Harold	Hunterlab, 11491 Sunset Hills Rd., Reston, VA 22090	(703) 471-6870	(703) 471-4237
Prof. Evelyn Stephens	69-78 182 Street, Fresh Meadows, NY 11363	(718) 969-8082	

1990-1993

Ms. Ann Laidlaw	Shelyn, Inc., 1108 Greccade St., Greensboro, NC 27408	(919) 274-1963	(919) 274-1971
Dr. Nancy Jo Howard	Phil. Coll. of Textiles & Sci., Henry Av. & Schoolhouse Lane, Phila., PA 19144	(215) 951-2888	
Dr. Romesh Kumar	American Hoechst Corporation, 129 Quidnick St., Coventry, RI 02816	(401) 823-2161	(401) 823-2700

1991-1994

Dr. Joanne M. Taylor	Tektronix, Inc., 17890 NW Deercreek Court, Portland, OR 97229-3060	(503) 627-4911	(503) 627-5502
Dr. Ellen Carter	2509 N. Utah St., Arlington, VA 22207	(703) 527-6003	
Mrs. Magenta Yglesias	JJ, Inc., 1827 23rd St. NW, Washington, DC 20008-4030	(202) 328-2120	(202) 232-5602

ISCC MEMBER-BODIES

American Association of Textile Chemists and Colorists (AATCC)	Graphic Arts Technical Foundation (GATF)
American Chemical Society (ACS)	The Human Factors Society
American College of Prosthodontists (ACP)	Illuminating Engineering Society (IES)
American Psychological Association (APA)	National Artists Equity Association (NAEA)
American Society for Testing and Materials (ASTM)	National Association of Printing Ink Manufacturers (NAPIM)
American Society of Interior Designers (ASID)	National Paint and Coatings Association, Inc. (NPCA)
American Society for Photogrammetry and Remote Sensing (ASPRS)	Optical Society of America (OSA)
The Color Association of the United States, Inc. (CAUS)	Society for Information Display (SID)
Color Marketing Group (CMG)	Society of Motion Picture and Television Engineers (SMPTE)
Detroit Colour Council (DCC)	Society of Plastics Engineers, Color & Appearance Division
Dry Color Manufacturers Association (DCMA)	Society for Imaging Science and Technology (IS&T)
Federation of Societies for Coatings Technology (FSCT)	Technical Association of the Graphic Arts (TAGA)
Gemological Institute of America (GIA)	Technical Association of the Pulp and Paper Industry (TAPPI)

SUSTAINING MEMBERS

Pantone Color Institute
Fine Arts Department, Montclair State College
Mr. Donald R. Hall, Color and Appearance Technology

Mr. Thomas J. Keane, BYK-Gardner
Ms. Isabel R. Manetti, Sharp Electronics