Inter-Society Color Council *News*

Number 293 NOVEMBER-DECEMBER 1984

WILLIAMSBURG CONFERENCE

"Color: Then and Now" is the theme of the Williamsburg Conference on February 10-13, 1985. Speakers will encompass an overview history of color in art and science. Please plan to attend. Details have been included in the previous Newsletter and are also available from Mrs. Bonnie K. Swenholt, 5717 Gulick Drive, Honeoye, NY 14471.

BOARD OF DIRECTORS

The next Board of Directors meeting will be held at the Williamsburg Lodge on Saturday, February 9 from 8:00 p.m. until 10:00 p.m. and on Sunday, February 10 until the meeting is adjourned. All Standing Committee Chairmen should mail reports to President, Joyce Davenport with a copy to President-Elect Allan Rodrigues no later than six weeks prior to the Board meeting.

ANNOUNCEMENT OF NOMINEES FOR ELECTION OF DIRECTORS, 1984

At the Board of Directors Meeting on November 3, 1984, the Chairman of the Nominating Committee, Louis A. Graham, reported on the nominees to stand for election as directors for the years 1985 to 1988. Of those nominated, three are to be elected. The following nominees were presented to the Board, and approved:

David A. Engdahl, IMG
Mark D. Gottsegen, AEA, Pr 37
Jack J. Hsia, ASTM
Justin J. Rennilson, IMG
Edward J. Rinalducci, APA
Wolfgang Walter, IES, IMG

The return date for receipt of ballots mailed to delegation chairmen and voting delegates will be February 1, 1985, with results of the election reported to the Directors at their next meeting on February 10, 1985.

Please plan to exercise your privilege of voting in this important election. Thank you.

Therese R. Commerford

S. LEONARD DAVIDSON

S. Leonard Davidson, treasurer of the ISCC from 1974 to 1980, died suddenly at his home on Saturday, November 10, 1984. He was 66 years old, and had retired on disability from NL Industries only in the spring of 1983.

Lennie – as he was known to all his friends – and I grew up as near neighbors in southern California, though we did not know one another until many years later. We went to rival high schools, he to Fairfax and I to Hollywood, at about the same time. Lennie then went to the University of California at Los Angeles, to obtain a B.S. degree in chemistry, and our paths diverged. He joined the National Lead Company in San Francisco in 1943, and became their chief chemist at that location a year later. He transferred to National Lead's Perth Amboy, New Jersey, plant in 1951 as chief of paint development. In 1967 he transferred to NL's Hightstown, New Jersey, laboratory as a senior chemist and color consultant. At the time of his retirement he was a regulatory affairs specialist.

Lennie was always interested in professional society work. In his 50-year career in the coatings industry he was president of the Golden Gate Society of Paint Technology in 1950, of the New York Society in 1965, and of the parent Federation of Societies for Paint Technology in 1970-1971. From the New York Society he received the Kienle and PaVaC awards, and from the Federation, the Bruning Award in 1969 for his contributions to the science of color in the coatings industry.

In the ISCC, Lennie was a Director in 1970-1972, and as noted above, Treasurer from 1974 to 1980. His long-standing position as treasurer of his church (Episcopal) provided good background for the latter position. During his tenure as treasurer, Lennie was also Chairman of the By-Laws Committee, and was responsible for establishing the Constitution – By-Laws – Standing Rules system that has served the Council so well for the last decade.

During most of his ISCC membership, Lennie was a Delegate from the Federation of Societies of Coatings Technology, and also from the American Chemical Society after it became a Member Body. He was elected an Honorary Member on his retirement as Treasurer.

Lennie was also active in the ASTM, the Color and Appearance Division of the Society of Plastics Engineers, and the Oil and Colour Chemists' Association of Great Britain, of which he was Vice President at the time of his death. He was also Treasurer of the Munsell Color Foundation for a number of years, and had the responsibility of overseeing the dissolution of The Foundation when it donated its assets to the Rochester Institute of Technology to endow the Munsell Color Science Laboratory.

I first got to know Len Davidson when he, Ruth Johnston, Max Saltzman, and I banded together in the middle 1950s to give lectures on color science at several places, including Federation meetings, an American Chemical Society national meeting, and the Eastern Analytical Symposium, among others. Lennie very much enjoyed this type of educational effort, and

for many years gave continuing-education courses for the New York Society for Coatings Technology and the SPE.

Lennie was not blessed with the good health that would have made it easy for him to support the busy career he had. A diabetic, he suffered from the heart and kidney ailments that often accompany that disease, undergoing a heart bypass operation several years ago. His illnesses showed in his inability to remain alert for long periods in meetings; many did not understand and were unsympathetic. Perhaps in defense he assumed a role described by a close mutual friend as that of "a garrulous old curmudgeon," to which I would want to add the word "lovable" as one who knew him well.

Lennie is survived by his wife Edyth; two sons, Charles and John; a daughter, Susan; and three grandchildren. The Davidson home was at 42 Kemp Avenue, Fair Haven, New Jersey 07701. Services were held at the Holy Communion Episcopal Church in Fair Haven on November 13.

Fred W. Billmeyer, Jr.

STANDING RULE CHANGE

The Munsell Color Foundation Inc. is no longer in existence. At its April 7, 1984 meeting the Board of Directors voted to delete Standing Rule SRIII – Special Trustee Munsell Color Foundation Inc. Newsletter publication of this proceeding is the only action required.

T. G. Webber, By-Laws

SUPPLEMENT TO THE ANNUAL REPORT OF PROJECT COMMITTEE 27: INDICES OF METAMERISM

At our Annual Meeting in Detroit in April 1984, Mr. Yuan Chen of the People's Republic of China made a presentation to us of a paper which he had prepared based upon his work of the previous six months.

This paper has subsequently become the centerpiece of discussion within the Committee as far as the preparation of samples for our new visual experiment is concerned.

Therefore, several members of the Committee felt that publication of an abstract of the paper was warranted in order to disseminate the concepts of the paper to the membership. Accordingly, we are herewith offering an abstract of Mr. Chen's paper as a supplement to our Annual Report to the Council.

Hugh S. Fairman
Chairman, Project Committee 27

Experimental Determination of Degree of Metamerism

Yuan Chen, Fred W. Billmeyer, Jr., and Roy S. Berns

ABSTRACT

Four experiments were described for determining the degree of metamerism:

In this experiment a condition is created in which the CIE definition of metamerism is strictly upheld, that is, the standard and test samples are perceived as an exact match under one light source. A light booth with two compartments is used, each illuminated by a different source. Conveniently, one source might be a CIE D65 simulator and the other CIE Source A. The booth or the visual field must be arranged so that the observer sees only one compartment at a time.

Samples are prepared with constant lightness and specified chromaticity for illuminant A, selected to give a reasonable spread of color differences from one designated the standard, regardless of their chromaticities under D65. Thus the sample preparation is easy since it is not necessary to prepare metamers.

In the daylight compartment of the booth, the experiment director places two specimens of the standard sample. He informs the observer that one is the standard and the other is the test sample. Since both are really the standard, they should be seen as a match by the observer. In the Source A compartment, the standard and the test sample are displayed. The observer judges the "degree of metamerism" between them assuming that they are the two in the daylight compartment and that they really match there.

What the observer is really judging is the degree of mismatch of the test pair. We suggest category scaling as the easiest way to make this judgment. The various test samples are compared to the standard sample in random order.

Experiments 2 and 3.

These experiments were designed to be modifications of Experiment 1 to adjust the sizes of the degrees of mismatch as experience is gained, to introduce different colors throughout color space, and to compare each sample to every other one, rather than just to the standard, in order to obtain a complete data matrix for more sophisticated data analyses.

Experiment 4.

With the experience gained from the first experiments, it should be possible to design a reasonable experiment using real metamers in a straightforward way. The problem of preparing such metamers was then considered. We outlined a linear-combination method for generating the spectral reflectance data for sets of metamers, following Wyszecki and Stiles, *Color Science,* 2nd ed., Wiley, New York, 1982, p. 188. A set of such data for 16 metamers around a standard, matching under D65 and mismatching under A by specified amounts and directions, was calculated by way of example. The challenge of matching these spectral curves by computer formulation methods was left to the experts.

A copy of the written report, 14 pp., is on file with the chairman of Committee 27.

Yuan Chen, per FWB.
Permanent address:
Xian Institute of Optics and Precision Mechanics
Xian, People's Republic of China

MID-YEAR REPORT OF ACTIVITIES OF ISCC PROJECT COMMITTEE NO. 32, IMAGE TECHNOLOGY

A mid-year meeting of ISCC problem committee #32 was held on Saturday October 13th at the Rochester Institute of Technology (R.I.T.) campus. Ten committee members were in attendance. They were LeRoy DeMarsh of Eastman Kodak, Joy Turner Luke of Studio 231, Richard Juday of NASA, Milt Pearson of R.I.T., Frank O'Donnell of Diconix, Rob Buckley of Xerox, Gary Meyer of Cornell University, Roy Berns of R.I.T., Paul McManus of Tektronix, and Paula Alessi of Eastman Kodak. A sincere thanks goes out to all of the above who chose to give up their Saturday for this worthy cause.

Paula reminded everyone of why the committee decided to assemble at a time other than the annual meeting. It was felt that the 1½ or even 3 hour sessions at the annual meeting never provided enough time to really delve into the issues. Also these meetings are often times interrupted with people from other sessions wandering in to observe or people having to leave in the middle in order to attend another committee meeting. Therefore this mid-year meeting provided an informal atmosphere with no interruptions in which to get beyond defining the problems and begin designing experiments.

At the outset, LeRoy DeMarsh wanted the committee to specifically define what imaging systems would be our main concern. The unanimous consensus of the group was that all our efforts would be addressed to the two-way relationship between a video display and a hardcopy (CRT $\rightleftarrows$ hardcopy). The two main hardcopy materials of concern would be photographic and graphic arts media.

It was pointed out that this committee has done a very thorough job of compiling a colorant gamut bibliography but that is not enough. Given the definition of our imaging systems of concern and the variety of backgrounds from which our members come, it would be very valuable for this committee to compile a general video display bibliography. In fact LeRoy DeMarsh passed around an article written by A. W. S. Tarrant, S. Brown, and J. Laycock in Displays, July 1983 called "Measured and Perceived Colour on Cathode Ray Tubes" which will be our first entry. Paula agreed to compile the bibliography and issue it periodically to all members. All committee members are encouraged to send Paula any references which they feel should be included in such video display bibliography. She will keep copies of the entire bibliography and release copies of any reference to any committee member on request.

Gary Meyer mentioned that one of the stumbling blocks in his research at Cornell University was trying to properly calibrate and adjust the video display monitors. He found that more often than not, the manuals just did not contain enough information to properly set up the red, green, and blue monitors. Gary suggested that one useful task for this committee to pursue would be to recommend standardizing procedures for the proper adjustment of video display monitors. LeRoy DeMarsh mentioned that some standardizing procedures do exist. It is just a matter of knowing where to find them. Frank O'Donnell offered to coordinate an effort to find out what recommended standardizing procedures are well documented in the literature. It may be necessary for us to carry out this investigation wich some other standardizing body such as ASTM or SID. Only after we characterize what has been done, can we make an accurate assessment of how much work our committee must do in the area of recommending standard procedures for video display monitor adjustment.

Some discussion followed about whether or not our committee should also carry out some experiments to define optimum viewing conditions for video display terminals. We decided that this may be an outgrowth of any experimental work done by the committee. For the initial work we would try to define some typical or average viewing conditions for an office environment. In the future as we learn more and more about viewing conditions, we may want to coordinate our efforts with some standardizing body such as ASTM. Nick Hale, chairman of the ASTM Committee E12 on Appearance of Materials, is also a member of our committee and would be a good liaison should we decide to explore recommending optimum viewing conditions for video display terminals.

Paul McManus outlined a very important question that he feels this committee should address. How can we define the practical set of colors that a video display terminal can produce? This is not only a gamut question. It also addresses what perceptual steps define the meaningful volume that allow that gamut to be achieved. In order to determine what the breakdown of perceptual steps within the video display gamut might be, it was suggested that the MacAdam ellipse experiment be performed using video displays. Then some discussion followed as to whether the perceptual steps should be just-noticeable-differences (JND) or some larger difference increment. This issue was not resolved.

A natural extension of Paul's question was outlined by Joy Turner Luke and LeRoy DeMarsh. Can we define a mapping function that would allow us to go from the video display color space to the hardcopy color space? We'd like to be able to equate the video display gamut with its perceptual steps to the hardcopy gamut with its perceptual steps leading to the final ink-jet print or slide or reflection print. Thus the first task of this committee will be to design an experiment that may help us define what such a CRT $\rightleftarrows$ hardcopy mapping function might be.

The first question we had to answer was which way we initially wanted to define the mapping function, CRT $\rightarrow$ hardcopy or hardcopy $\rightarrow$ CRT. Suppose the starting point was some computer-generated image on a video display terminal. In order to get hardcopy it would be necessary to record the red, green, and blue information in that image by making three separation exposures and then combining those to produce the final photographic hardcopy. A photographic medium is preferred over a graphic arts material because it is easier to control. Many people were bothered by the various stages involved in going from CRT $\rightarrow$ hardcopy via the above outlined route. Gary Meyer suggested it may be easier to start from hardcopy and search for the mapping function that would take those colors to video display color space. Once that mapping function is found it may be possible to invert it to go from video

display to hardcopy color space.

Gary's proposal involved starting with a photographic slide of the Macbeth Color Checker as the hardcopy image. The tristimulus values would be calculated for those 24 colors. Then those tristimulus values could be fed into the video display terminal which would be set up according to viewing conditions that would produce the same overall visual impression as slide viewing. Do the 24 colors produced on the video display terminal match what was seen in the slide? If not, how do the tristimulus values change when a true match is achieved?

After five hours of discussion, the meeting had to come to a close. An experiment was outlined but not in great detail. Therefore Paula asked that everyone submit to her a more detailed description of what they felt the experiment should be. She would compile all the responses and define the experiment in the form of a proposal. Such a proposal is necessary because we'd like this research to be supported by an organization such as Tektronix and be carried out at R.I.T. Paul McManus offered to check on the feasibility of Tektronix loaning a 60Hz non-interlaced video display device to R.I.T. A formal proposal from ISCC problem committee #32 indicating the value of such research would aid Paul in making this request of his management.

Paula J. Alessi

NEWS OF MEMBERS

Remarks on Presentation of Macbeth Award to Ruth Johnston-Feller

I first met Ruth Johnston-Feller in the early '50's at a meeting of the Optical Society of America. I had been asked by our sales manager to see if I could talk with "that young lady from PPG who thinks she can measure color" and to see what I could do to dissuade her from continuing this foolish effort. Obviously and happily I failed to do so, for Ruth went on in her persistence and determination to apply color science and color technology to the day-to-day problems of running a first-class paint operation. In spite of equipment which would be considered primitive by today's standard, she attacked the fundamental problems, that of sampling, panel preparation, panel repeatability and reproducibility, and measurement errors in a series of papers, many of which are still valid today and none of which have been surpassed by anyone working since. She established at PPG the first instrumental color control system for paint production and operated it successfully with the then quite simple equipment. After leaving PPG, she then went to work for Davidson and Hemmendinger, subsequently part of the Kollmorgen Corporation, where her superb grasp of the principles and practices of the use of color technology in industry were put to great use. Although nominally responsible for teaching and advising clients in the operation of the equipment which they bought, she contiinued, as she has so often said, to "teach people how to make paint." This she did well, and then after her change of job to the Ciba-Geigy Company in charge of their color technology operation in connection with pigments, she continued her teaching, taking a slightly different direction from all other courses then being given, including those of Professor Billmeyer and myself at RPI. Her course was specifically directed towards color and the behavior of colorants in which she elucidated her ideas on the appropriate ways to use the science of color in the practical evaluation of coloring materials in industry. During this time she continued to write, was active in many technical committees, including a long period in charge of the problems subcommittees of the Inter-Society Color Council, which she not only reorganized the format but provided inspired leadership to the chairmen of many of the committees so that the productivity of these committees increased during her tenure. Additionally, she was the chairman of the Inter-Society Color Council delegation from the Federation of Societies for Coating Technology, as well as being an active member of the Publication Committee of the Journal of Coatings Technology. It was during this time that she wrote her chapter on colorimetry for Patton's "Pigments Handbook." This superb 60-page article, necessarily condensed because of space requirements, remains the single best discussion on the application of colorimetry to practical utilization of pigments. Unfortunately, it is buried inside an expensive three-volume treatise on pigments which, while well worth the investment for anyone concerned with pigments, puts it out of reach of most individuals who are interested in the application of color measurement to the practical use in industry of such measurements. This is one of the great losses we suffer when something is published in what I consider an insufficiently publicized manner. It would be of great service to the colorant-using industry if this chapter could be reprinted in a more easily available form. Ruth Johnston-Feller's many contributions cannot be summarized in such a brief time, but it is quite clear to anyone who has had any experience with her that her contributions in teaching, writing, participation in committees concerned with problems of color in industry, have been the equal of any single individual in our recent times. In addition to her work in industry, she has, in collaboration with her husband Dr. Robert Feller, made significant contributions to the study of the use of colorants in art, as well as the evaluation of the effect of fading on the appearance of materials which are used quite differently in artistic painting as compared with industrial application. For all of these reasons, and many which I have not mentioned, it is with great pleasure that I learned of her selection as the winner of the Macbeth Award for 1984.

Max Saltzman

Swenholt Bridge Champs

Bonnie and John Swenholt tied with Dr. Katharine Smith – Carol Hoover in the International Fund Game throughout ACBL territory. Bonnie and John had their 72.9% game at the Geneseo Duplicate Bridge Club in Geneseo, New York. Both are now retired from work with the Eastman Kodak Company. Bonnie is currently serving as Arrangements Chairman for the ISCC and has been an active member of the Council for many years. They have other hobbies – golf, fishing, gardening and hiking – and they are both certified club directors.

NEWS OF MEMBER BODIES

Detroit Colour Council

The DCC Color Difference Committee is making good progress toward establishing a test method for measured color difference of automotive parts. Three general categories of parts are being considered, all essentially opaque and non-fluorescent: 1) high gloss, mainly metallic paints; 2) low gloss pigmented, such as plastics and vinyls; 3) textiles, such as fabrics, carpet and seat belt webbing.

DCC has agreed to bring the committee into the Society of Automotive Engineers (SAE) where an industry SAE Recommended Practice, if approved, will be published.

The first 1985 program meeting will be a summary of the work of the committee on March 6, 1985 at the Michigan State University Management Center in Troy, Michigan. This will be an open forum for all interested in color difference determination. The committee will then consider input from the meeting participants before finalizing the test method. For information on registration, contact Dave Alman, E. I. duPont, 313-583-8241 or Bill Longley, Ford Motor, 313-337-5234.

W. V. Longley

ILLUMINATION QUALITY METER

An Illumination Quality (IQ) meter has been developed by Bill Thornton of Prime-Color, Inc. It is a sophisticated, eight-eyed light meter with a microcomputer and software memory for computation. By looking directly at the source of light, the IQ meter evaluates what an expert sees when looking into a room illuminated by that light.

The eight detectors of the IQ meter do what even experienced, highly-trained observers cannot do, namely sense the characteristics of a given light by looking at it. The human observer needs an illuminated scene to assess the effects of the light on the appearance of the scene.

A human observer can rate the color-attractiveness of an illuminated scene as good, fair, or poor. By careful comparison of similar adjacent scenes illuminated differently, an observer can decide which one excels in color-attractiveness, but an observer cannot provide a numerical rating of attractiveness. In addition, judgments of different observers vary in their assessment of color-attractiveness. An important attribute of the IQ meter is that it provides consistent numerical values based on representative assessments of lamplight quality by the average of a number of observers.

The IQ meter is in effect a sophisticated lightmeter. At the push of a few buttons, it will measure 20 characteristics of the light – all the traditional characteristics plus many more important ones. The IQ meter measures the four long-used physical qualities of illumination, namely footcandles, color temperature, color and color-rendering index. More important, however, is the fact that the meter also evaluates visually-based qualities, such as color-attractiveness, color-scheme-stability, perceived brightness and visibility. These scales have been derived from judgments by experienced observers assessing each quality under different kinds and intensities of illumination. The IQ meter provides numbers for both the physical quantities and the esthetic qualities of lighting. It takes the place of a standardized group of talented judges which could not be easily assembled whenever you want them.

High-efficiency industrial lighting with Prime-Color fluorescent lamps has long been advocated by our illustrious ISCC member, William A. (Bill) Thornton, a Fellow of the Illuminating Engineering Society of North America. Now he has produced a unique evaluator, the Illumination Quality (IQ) meter. If you find this Technote interesting, you may wish to contact him at Prime-Color, Inc., 8 Knight Road, Wayne, NJ 07470, telephone 201-633-0543.

Harry K. Hammond III

MEETINGS

Colorful Setting for Color Conference

What is the connection between color, agriculture and landscaping?

The Canadian Society for Color 13th Annual Conference, at Niagara-on-the-Lake, Ontario (May 23-24, 1985) will explore color presentation and measurement as it relates to landscaping, food, wine and other agricultural products. Invited speakers will address each of these relationships.

One session will be devoted to problems encountered by people working with color. Specifically, a working group examining the emotional response to color will be formed. Attendees are encouraged to submit additional problem areas for consideration.

Contributed papers, on any color relevant topic, as always, are welcome and encouraged.

Niagara-on-the-Lake is one of the most colorful settings for such a meeting, giving conference attendees the opportunity to relax and explore this historic town.

For additional information and the submission of contributed papers, contact Conference Chairman: David Chesterton, c/o Humber College, Rexdale, Ontario M9W 5L7; Telephone: (416) 675-3111.

"This will be our first conference away from a big city," David Chesterton, Conference Chairman, reported, and "we feel Niagara-on-the-Lake is a really colorful setting."

1985 CORM Conference

CORM 85, the 1985 annual meeting and conference of the Council for Optical Radiation Measurements, will be held in Gaithersburg, Maryland, in conjunction with the National Bureau of Standards on Wednesday and Thursday, May 29-30, 1985. The conference will include symposia sessions and invited papers.

The first session will be on *Infrared Radiometry* embracing thermal imaging and radiation thermometry with particular attention to standards and measurement problems. These areas of radiometry have not been considered at previous CORM conferences. Dr. Edward F. Zalewski of the NBS is the program

coordinator for this session which will include both invited and contributed papers.

The second session on *Array Radiometry* will be chaired by Philip Wychorski of Eastman Kodak. This is a follow-up to the session at last year's conference which focused on user problems only, with emphasis on scattered light and measurement hysteresis. More general measurement problems will be covered during the 1985 conference.

A third session on *Spectrophotometry* will be devoted to a presentation by the CORM Committee on the accreditation of calibration laboratories with particular regard to spectrophotometry. Calvin S. McCamy of the Macbeth Division of Kollmorgen Corp. will be the session chairman.

Those desiring to contribute to the above sessions should contact the conference chairman, Alton R. Karoli, The Eppley Laboratory, Inc., 12 Sheffield Avenue, Newport, RI 02840 (401-847-1020) by January 15. At this meeting a new approach to stimulate participation will be tried. Attendees are invited to present appropriate material for discussion using slides, transparencies, etc. which will be coordinated with the particular session chairman.

The conference program will include the annual business meeting as well as a dinner with speaker to be held the evening of May 29.

For further information contact the above conference chairman or CORM Secretary Norbert L. Johnson, 3M Center, Bldg. 582-1-15, St. Paul, MN 55144 (612-733-5939).

RIT to Host Color Conference

A conference entitled "Communicating with Color in Arts, Science and Industry" will be presented at Rochester (N.Y.) Institute of Technology (RIT) on March 28 and 29, 1985.

Organized by W.D. Wright, the 1984-85 Kern Professor of Communications at RIT, and by Dr. Franc Grum, RIT's Richard S. Hunter Professor of Color Science, Appearance and Technology, the conference will include presentations by ten well-known authorities on the use of color in their respective fields.

Under the theme of communications speakers will explore the role of color in architecture, the performing arts, nature, graphic arts, remote sensing, marketing and computer graphics.

The speakers include Sandra Saari, professor of language and literature at RIT; Dr. John Jespersen, professor of architectural history, theory and design at Massachusetts Institute of Technology and at Yale University School of Architecture; Robert F. Sisson, chief, Natural Science Division, National Geographic Magazine; Wright; Dr. John Schott, assistant professor of imaging science at RIT; Grum; Zenon Elyjiw, senior technologist at RIT's Technical and Education Center for the Graphic Arts; and Evelyn Rozanski, associate professor of computer science and technology at RIT.

For further information, contact Grum, Rochester Institute of Technology, One Lomb Memorial Drive, Rochester, N.Y., 14623, or (716) 475-2230.

ART EXHIBITS

"Edgar Degas: The Painter as Printmaker" features more than 200 impressions from his vast collection of lithographs and etchings. The subjects of these prints vary as much as the mediums Degas selected to produce them: landscapes, portraits, cafe scenes and offstage glances at the ballet and theater. The show may be seen at the Philadelphia Museum of Art (February 16-April 14, 1985) before heading to London's Flayward Gallery in late spring and early summer.

Contemporary British painter Howard Hodgkin will be the focus of an exhibition entitled "Howard Hodgkin: Forty Paintings, 1973-1984" at the Yale Center for British Art in New Haven, Connecticut (January 16-March 17, 1985) then on to Hanover, West Germany and London.

The Marquette University's new $2.5 million Museum of Art in Milwaukee celebrates its opening through June 1, 1985 with a show including works of Chagall, Dali, Bierstadt and Rembrandt.

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The following summary of contents is intended to improve ease of access to the articles published in this Newsletter. This index covers the years 1983 and 1984. The last previous index may be found in No. 281, November-December 1982.

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CALENDAR

AATCC
Color Symposium, March 20-21, 1985, Charlotte, NC

AIC
International Congress Colour 85, June 16-22, 1985, Monte Carlo

CANADIAN SOCIETY FOR COLOR
Annual Conference, May 23-24, 1985, Niagara-on-the-Lake, Ontario

ISCC 1985 ANNUAL MEETING
April 14-16, Sheraton Station Square Hotel, Pittsburgh, PA

ISCC 1985 WILLIAMSBURG CONFERENCE
"Color: Then and Now," February 11-13, 1985

SOCIETY FOR INFORMATION DISPLAY
Conference on Colour in Information Technology, March 26-29, 1985, University of Surrey, Guildford, Surrey

SOCIETY OF PHOTOGRAPHIC SCIENTISTS AND ENGINEERS
Second International Congress on Advances in Non-Impact Printing Technologies, November 4-8, 1984, Arlington, VA

Deadlines for submitting items to be included in the Newsletter are: February 15, April 15, June 15, August 15, October 15, and December 15; in other words, the fifteenth of the even-numbered months.

Send newsletter items to:
Ms. Mary Ellen Zuyus
Hunter Associates Laboratory, Inc.
11495 Sunset Hills Road
Reston, VA 22090

COMMITTEE ON PUBLICATIONS

Mary Ellen Zuyus, Chairman
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1700 S. Mount Prospect Road
Des Plaines, IL 60018
(312) 391-9426

President-Elect
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Troy Laboratory
945 Stephenson Highway,
Troy MI 48084
(313) 583-8245

Secretary
Miss Therese R. Commerford — U.S. Army Natick Laboratories
Attn: DRDNA-ITCP
Natick, MA 01760
(617) 651-5467

Treasurer
Mr. Edward T. Connor — Gardner/Neotec Instrument Div.
Pacific Scientific Company
2431 Linden Lane
Silver Spring, MD 20910
(301) 495-7090

Past President
Mr. Louis A. Graham — Color and Dyeing Laboratories
Burlington Industries
P. O. Box 21327
Greensboro, NC 27420
(919) 379-1809

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