IEEE STANDARDS BEARER

Vol. 10, No. 1

# Lessons Learned: Environmental Safety Consciousness in Standards

*by Pamela Reich*

This issue of the *IEEE Standards Bearer* has a special focus on environmental issues and standards. While a fairly small number of IEEE standards are concerned primarily with environmental issues, most standards involve technologies or processes that, somewhere along the line, may have an impact on the environment. Yet it's not difficult for the environmental effects to be overlooked inadvertently in favor of other considerations.

The issue surfaced in a 1990 publication, *IEEE Std 625-1990, IEEE Recommended Practice to Improve Electrical Maintenance and Safety in the Cement Industry.* This valuable document provides sound, basic guidelines to industry and is in wide use today. At the point of initial publication, however, a problem was detected that required immediate attention and was corrected. As part of a recommended storage-battery maintenance procedure, users were instructed to drain spent nickel cadmium batteries of electrolytes and flush them out with water. This step in the procedure had to be deleted from the standard to protect the user, the environment, and the industry from liability.

The act of draining and rinsing the battery creates a situation whereby the battery handler is exposed to corrosive liquids, and must then manage the corrosive liquid as a separate waste stream. The battery electrolyte and rinse water are likely be considered hazardous waste by the corrosivity characteristic. Depending on the length of service of the battery, the electrolyte may contain toxic metals at levels sufficient to require treatment prior to disposal.

Proper disposal of batteries is a critical issue that should be discussed in standards. Any discharge of this electrolyte material, either to a public sewer, septic system, or the ground, is unpermitted and could result in fines, facility shutdown, and/or remediation costs, unless the site is permitted to discharge treated or untreated battery electrolyte. Potential hazards also exist when a site discards the wash water from battery cleaning, particularly if the site has a large battery installation.

Batteries may be recycled, but it should not be necessary to drain the battery prior to shipment for recycling. Most of the major secondary smelters will capture and recycle the battery acid or use it in their process.

This situation should serve as a lesson to all standards developers. When developing or reviewing standards for reaffirmation or revision, note items that may fall into the category of environmental concerns. Any discussion of the disposal of potentially hazardous materials should be carefully studied. In cases similar to this battery disposal issue, standards developers should be cautioned to review applicable procedures in accordance with current environmental safety laws and practices. ◆

*Pamela Reich is the Director of the Environment, Safety, and Health for C&D Charter Power Systems, Inc., in Pennsylvania. C&D is a manufacturer of industrial batteries in addition to other industrial equipment.*

# Donald Loughry Elected as New VP of Standards Board

Donald C. Loughry was elected by the IEEE General Assembly in November to be the new Vice President of Standards. He will serve as Chair of the IEEE Standards Board. He has served on the IEEE Standards Board for a number of years, the past four as Vice Chair.

Loughry is employed by Hewlett Packard and is the Standards Manager for the Computer Systems Organization. He has 41 years experience in industry with nearly 39 years at HP in Research and Development and engineering management.

For the past 25 years, Loughry has participated in numerous standards programs. He has been the Technical Editor and Chair of the IEEE and International Electrotechnical Commission (IEC) committees involved with IEEE Std 488 (IEC 625), *Digital Interface for Programmable Instrumentation.* He was instrumental in initiating LAN standards work in the international arena. Currently, Loughry is Chair of the LAN MAN Standards Committee, also known as IEEE P802. He is also active on the Computer Society Standards Activities Board.

In addition to IEEE activities, Loughry has served on a number of other standards related bodies—Accredited Standards Committee X3 for 16 years (currently as Vice Chair), Joint Technical Committee 1 (JTC 1) Technical Advisory Group (TAG) as a member, JTC 1 working groups on Publicly Available Specifications (PAS) and Reference Specifications (RS) throughout 1994 and 1995 as head of the US delegation. He is currently a member of the ANSI Information Infrastructure Standards Panel (IISP). Loughry is also active in the Information Technology Industry Council (ITIC) trade association and is an officer on its Technology Program Management Committee.

Loughry has received numerous awards, including the Working Group Chair Award for IEEE Std 802.3, the IEEE Standards Medallion in 1990, and the IEEE Distinguished Service Award in 1995. ◆

## WHAT'S INSIDE



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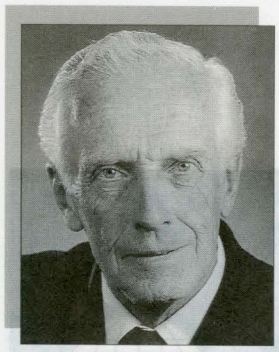

# Message From The Chair

*by E. G. "Al" Kiener*

The year 1995 passed so quickly. It does not seem possible that a full year has transpired since I first took office as Chair. I thought it would be appropriate to look at the first article that I wrote for the *IEEE Standards Bearer* one year ago just to review what I had said. I found the following statement:

"Now, in this changing post Cold War era of far-reaching world trade agreements, there are new opportunities for cooperative standards development between international standards organizations. I see this as a great opportunity for IEEE...."

I believe it is fair to say that we are working very hard (both volunteers and staff) to take advantage of these opportunities to further enhance working relationships with other standards-developing organizations, particularly on the international scene. We are making progress, but it is a slow process, which demands of us patience, diplomacy, and perseverance. Our summer meeting in Geneva, I believe, helped a great deal just by enabling us to meet and get acquainted with the leaders of important international standards organizations. Since that time our volunteers and staff, as well as our International Committee under the able leadership of Chair Ben Johnson, have been working to explore the possibilities for new liaison arrangements with various standards bodies. Progress is being made, and it is my hope that 1996 will see some significant improvements in our international standards participation.

As the SPAsystem® continues its development process, it holds great promise for changing the way that standards are being developed. An electronic system of developing and producing standards will significantly reduce the cost of these projects by eliminating much of the travel, meeting time, and the associated costs involved. This will be especially useful for international standards development and coordination.

On another subject, the Educational Activities Board and Standards Board collaborated to get a reference to "Standards" placed into the ABET (Accreditation Board for Engineering and Technology, Inc.) criteria for engineering schools. As I understand it, the documents are now in the approval cycle. Our interest in doing this comes from a concern, voiced by many in industry, that most new graduates enter the work force knowing nothing about standards or their place in product design and manufacturing. This is a shortcoming that should be corrected. I appreciate the genuine interest that Ken Laker, Vice President of Educational Activities, and his Board have shown in our belief that the use of standards ought to be taught at the undergraduate level. I wish to thank them for their efforts in getting the subject included.

As my term of office as Vice President of Standards is concluded, I believe we have had a good year and much has been accomplished in this relatively short span of time. For me personally it has been a fantastic experience, which I shall always remember as a highlight of my career. I greatly appreciated having the opportunity to serve in this position in 1995.

I wish my successor, Don Loughry, all the very best as he assumes office in 1996. Don is no stranger to our Standards Board, having served for many years. He is the current Vice Chair, and he knows the subject and our Board very well. I will work with him to effect a smooth transition. Thanks again for your support in 1995.

Sincerely,
E. G. "Al" Kiener

# Editor's Notes

As you look through this issue, you'll notice a few changes—some new names on the masthead, revamped sections, and a bit of tidying up. We aim to enhance every part of the newsletter to keep the *IEEE Standards Bearer* your premier source for information about IEEE Standards-related activities and events. The most noticeable change is the larger page format. Our redesigned format will let us include more standards information in an easier to read layout.

In 1996 you'll see a few new names, too. Don Loughry, our new Vice President of Standards and Chair of the IEEE Standards Board, will author the Chair's Column. Two IEEE Standards staff members, Rochelle Stern and Karen McCabe, will be sharing the editor-in-chief job. They'll be responsible for producing an information-packed newsletter to keep you on top of IEEE Standards news.

This quarter's issue focuses on environmental issues in standards. There are many standards in use today or under development that address aspects of the environment. Contributing writer Barbara Hill addresses the ISO 14000 series of standards that will set guiding principles and provide tools to evaluate and improve environmental management systems for many organizations worldwide. "Environmental Safety Consciousness in Standards" provides a lesson in the treatment of environmental aspects in standards based on an actual case study of one IEEE standard. PES/IEC columnist Anne O'Neill looks at environmental issues in electrotechnical product standards.

At IEEE Standards, we're also taking an active role when it comes to environmental issues. As part of our growing SPAsystem® we're publishing our Standards Catalog and this newsletter on-line via the Web at http://stdsbbs.ieee.org/ and FTP or Gopher at stdsbbs.ieee.org. If you are currently receiving a printed copy of the newsletter or catalog or both, but have Internet access and would like to stop receiving printed versions, please let us know. Just e-mail stds-maillst@ieee.org. Enjoy the issue!

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## Board Actions News Flash

*Reported by Stephen L. Diamond, IEEE Standards Board Seminar Committee Chair*

The IEEE Standards Board meeting took place in Monterrey, Mexico during the week of December 11. The following highlights some important actions:

- The revised *Bylaws* and *Operations Manual* are available. New rules will address patents, balloting and PAR extensions. These manuals will be mailed in February to working group chairs and Standards Board liaisons. These two manuals cover, in significant detail, the duties, responsibilities, and authority of both the New Standards Committee (NesCom) and the Standards Review Committee (RevCom). There are, however, a number of rules of thumb that both committees have found necessary in order to process their work. These "conventions" have been included in the *IEEE Standards Companion* so that there is consistency of operation as the member composition of NesCom and RevCom changes.
- A few changes were made to the Project Authorizations Request (PAR) form at the December, 1995 NesCom meeting. These forms will be mailed to all Standards Board liaisons as soon as they are printed in February, 1996. Standards sponsors who do not receive them may download them from the Standards Department Web Site or telephone (908) 562-3808 to have a copy sent. The previous PAR forms dated January, 1995 can be submitted through June, 1996.
- The Standards Board has adopted, in principle, a set of guidelines to be used to approve the formation of an Standards Coordinating Committee. Before it will consider the approval of formation of an Standards Coordinating Committee, the Standards Board expects a survey of all existing IEEE societies, standards coordinating committees, and accredited standards committees, in order to avoid duplication of effort and conflicts due to overlapping scopes.

For updated postings, access the web site at http://stdsbbs.ieee.org.

STANDARDS BEARER

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# Disposal of $SF_6$ in Standards

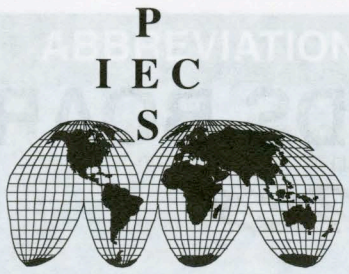
*by Mary Lynne Nielsen*

Many people have heard of the environmental impact of greenhouse gas emissions, such as chlorofluorocarbons. As a result, we have seen design modifications in product packaging, such as changing aerosol propellants to pumps and other environmentally safe dispensers. The IEEE has also been concerned with these greenhouse gases, and in particular with sulfur hexafluoride ($SF_6$), which is commonly used as a dielectric and insulator in circuit breakers, gas-insulated substations (GIS), and related equipment for electrical transmission and distribution systems. According to the Environmental Protection Agency (EPA), $SF_6$ is a desirable gas because of its stability when used in these electrical systems, but it has undesirable properties when released into the environment. It has a long life of about 3200 years, according to the estimates of the Intergovernmental Panel on Climate Change (IPCC). It is one of the worst offenders of the greenhouse gases, having the highest global warming potential.

Currently, there are no regulations regarding the disposal of $SF_6$. However, IEEE standards are encouraging manufacturers to safeguard the release of $SF_6$ into the air. IEEE Std C37.122.1-1993, a guide to GIS, recommends against the unnecessary release of $SF_6$ into the atmosphere because of environmental concerns. Draft standard IEEE P1403, which compares air-insulated substations and GIS, mentions that recent advances in GIS construction include sophisticated equipment needed to reprocess $SF_6$. This recommendation means that less $SF_6$ is released into the atmosphere, helping to alleviate environmental concerns over the release of greenhouse gases.

The EPA also has been involved with the subject of $SF_6$. In August 1995, it hosted a conference entitled *Electrical Transmission and Distribution Systems—Sulfur Hexafluoride and the Atmospheric Effects of Greenhouse Gas Emissions*. This international meeting included IEEE members as attendees. The session urged voluntary compliance among users of $SF_6$ so that further official regulation is not needed in this area. This session also helped to raise the visibility of $SF_6$ disposal as a growing area of environmental concern. Expect to see more discussion of $SF_6$ disposal in the future.

For the final proceedings of the EPA greenhouse gas emissions conference, contact the Atmospheric Pollution Prevention Division; US EPA 6202J; Washington, DC 20460. ◆




# Including Environmental Issues in Electrotechnical Product Standards

*by Anne O'Neill*

IEC Guide 109: 1995, *Environmental Aspects—Inclusion in electrotechnical product standards,* was written for IEC standards-developing technical committees to provide principles and assumptions regarding the life cycle of a product. It advises technical committees to "avoid specifications in standards that have detrimental environmental consequences when suitable alternatives are available."

The guide aids product standards developers by providing a checklist of considerations for energy management. It calls for the examination of the product life cycle from raw material production through final component disposal and recycling. Another checklist considers environmental aspects such as control of hazardous substances, fire risk, maintenance and disassembly, and disposal of the product and its parts.

To determine what environmental considerations are applicable to the product being standardized, the guide provides an annex with principles for conducting an environmental impact assessment (EIA). It suggests that experts knowledgeable in the environmental attributes of materials and substances conduct the EIA. Without listing hazardous substances, which vary with respect to legislation and practice in various countries, the guide merely points out that standards developers should not rule out available alternatives and should give preference to specifying performance requirements, rather than design requirements.

In the annex on design for the environment, many production techniques are listed with comments on the environmental impact for disassembly and material recyclability at the end of product life. Specific material processes listed include plastic parts, conductive coatings and materials, as well as marking and labeling. An example on vacuum-deposited aluminum states: "Electromagnetic shielding has also been successfully achieved with plastic parts by vapor deposition of aluminum on the inside surfaces of the cover parts. The deposition process does not require the use of organic solvents and the thickness of the aluminum is quite thin."

In the section on design for maintainability, subassemblies with replaceable and separately repairable parts are recommended.

The guide admits that technical committees do not have the opportunity to design products from the beginning. So to control environmental impact, committees can be attentive to specifications in their standard that may be potentially problematic for the environment. The guide concedes that selecting an alternative specification will be influenced by customer requirements and will require input from product designers, or from experts in life cycle analysis and design for environment.

The only IEEE standards subcommittee whose name focuses on environmental issues is the Power Engineering Society's Substations Environmental Subcommittee. Rich Cottrell, Chair of that subcommittee, "applauds any document that addresses environmental compatibility and community acceptance issues and how aspects of substation design, construction, and operation are affected by those concerns." Cottrell goes on to point out that IEEE Std 1127-1990, *IEEE Guide for the Design, Construction, and Operation of Safe and Reliable Substations for Environmental Acceptance,* is the only American National Standard that addresses these concerns. "The 109 Guide addresses their topics at about the same level of detail we often do," Cottrell states. "It focuses on product manufacture, while we focus on community acceptance and environmental compatibility with the outdoor area immediately adjacent to the substation." ◆

*Anne O'Neill is the PES International Program Engineer. She can be reached at (908) 562-3852 or a.oneill@ieee.org.*

# IEC Report Concludes Electromagnetic Fields Do Not Pose Short-Term Risks

A new Technology Trend Assessment (TTA) report published by the International Electrotechnical Commission (IEC) concludes that electromagnetic fields associated with domestic appliances and overhead power lines do not in the normal course of events pose any short-term biological problem for the general public. Hutzler and Baraton are the authors of the report, which is entitled "Magnetically induced currents in the human body."

IEC Technology Trend Assessments (TTAs) are a response to the need for global collaboration on standardization questions in the early stages of technological innovation, and are designed to show the state of the art or trends in emerging fields of technology.

The report states that among the physical agents to which human beings are exposed and that may influence health, electromagnetic fields are of particular interest. They are also the subject of a worldwide controversy, because science is at present unable to clarify all the biological effects that such fields may have.

The report categorizes the types of possible effects as short-term and long-term. Short-term effects are actually quite well known and are generally described as a function of the current density within the human body. Long-term effects cannot be so clearly described. Indeed, the report says that at present it is not even possible to prove their existence, although research continues in this area.

The specific aim of this well illustrated report is to present methods for calculating the electric fields and associated current densities induced in the human body by externally applied magnetic fields.

The first part of the report presents the computation method used by the authors, which is then validated by comparisons using configurations in which analytical solutions are actually available. The second part describes results obtained in three cases where the calculations are applied to a human being, namely a man standing in a uniform magnetic field, a live-line worker, and someone using a hair dryer. The third part is a sensitivity analysis of the various parameters, combining the computer program and basic physical laws.

For more information on the report, please contact the IEC Central Office, 3 rue de Varembé, PO Box 131, CH-1211, Geneva 20, Switzerland; Phone +41 22 919 0211 or Fax: +41 22 919 0300. ◆

# IEEE STANDARDS BOARD ACTIONS

**December 12, 1995** **Monterrey, Mexico**

## APPROVED PARs FOR NEW STANDARDS

**P1003.1n** (C/PA) Standard for Information Technology—Portable Operating System Interfaces (POSIX®)—Part 1: System Application Program Interface (API)—Amendment n: Technical Corrigenda to Threads API Extensions [C Language]

**P1003.23** (C/PA) Guide for Developing User Open System Environment Profiles

**P1226.9** (SCC20) Standard for Software Interface for Resource Classes for a Broad Based Environment for Test (ABBET)

**P1226.10** (SCC20) Standard for Software Interface for Runtime Services for a Broad Based Environment for Test (ABBET)

**P1278.4** (C/DIS) Recommended Practice for Distributed Interactive Simulation—Validation and Verification

**P1441** (PE/T&D) Guide for Inspection of Overhead Transmission Line Construction

**P1442** (PE/T&D) Guide for Field Testing and Monitoring of In-Service Non-Ceramic Insulators

**P1443** (MTT) Standard for Microwave Network Parameters

**P1449** (SCC32) Recommended Practice for Engineering Considerations Related to Lightning Protection: Device Placement, Grounding, Bonding and Physical System Geometry

***P1453*** *(PE/T&D) Recommended Practice for* Measurement and Limits of Voltage Flicker on AC Power Systems

**P1454** (SCC32) Recommended Practice for the Selection and Installation of Fiber Optic Cable in Intelligent Transportation Systems (ITS) Urban, Suburban, and Rural Environments, As Well As Transportation Operation Centers and Associated Campuses

**P1455** (SCC32) Standard for Message Sets for Vehicle/Roadside Communication

## REVISED PARS

**P1149.2** (C/TT) Standard for Shared Input/Output Scan Test Architecture

**P1149.4** (C/TT) Standard for a Mixed-Signal Test Bus

**P1226.3** (SCC20) Standard for Software Interface for Resource Management for a Broad Based Environment for Test

**P1226.4** (SCC20) Standard for Software Interface for Instrument Drivers for a Broad Based Environment for Test (ABBET)

**P1226.5** (SCC20) Standard for Software Interface to Communication Buses for a Broad Based Environment for Test (ABBET)

**P1289** (PE/NPE) Guide for the Application of Human Factors Engineering in the Design of Computer-Based Monitoring and Control Displays for Nuclear Power Generating Stations

**P1299** and **PC62.22.1** (PE/IC & PE/SPD) Guide for the Connection of Surge Arresters to Protect Insulated Shielded Electric Power Cable Systems

**P2003** (C/PA) Standard for Information Technology—Test Methods for Measuring Conformance to POSIX®

**PC57.12.35** (P1265) (PE/TR) Standard for Bar Coding for Distribution Transformers

**PC57.16** (PE/TR) Standard for Requirements, Terminology, and Test Code for Dry-Type Air Series Connected Reactors

## PARs FOR STANDARDS REVISIONS

**P211** (AP) Standard for the Definition of Terms for Radio Wave Propagation

**P450** (SCC29) Recommended Practice for Maintenance, Testing and Replacement of Vented Lead-Acid Batteries for Stationary Applications

**P487** (PE/PSC) Recommended Practice for the Protection of Wire-Line Communication Facilities Serving Electric Power Stations

**P605** (PE/SUB) Guide for the Design of Substation Rigid-Bus Structures

**P610.12** (C/SE) Standard Glossary for Software Engineering Terminology

**P625** (IA/CI) Recommended Practice to Improve Electrical Maintenance and Safety in the Cement Industry

**P643** (PE/PSC) Guide for Power Line Carrier Applications

**P982.1** (C/SE) Standard Dictionary of Measures to Produce Reliable Software

**P982.2** (C/SE) Guide for the Use of Standard Dictionary of Measures to Produce Reliable Software

**P1313.1** (PE/TC) Standard for Insulation Coordination—Definitions, Principles, and Rules

**P1313.2** (PE/TC) Guide for the Application of Insulation Coordination

**PC37.013** (PE/SWG) Standard for AC High-Voltage Generator Circuit Breakers Rated on a Symmetrical Current Basis

## WITHDRAWN PARS

**P487a** (PE/PSC) Recommended Practice for Protection of Wire-Line Communication Facilities Serving Electric Power Stations

**P518** (IA/IC) Guide for the Installation of Electrical Equipment to Minimize Electrical Noise Inputs to Controllers from External Sources

**P1101.5.1** (C/BA) Mechanical Standard—Extension for Air-Flow-Through Cooled Modules, Format E Form Factor—396 Pin Connector

**P1101.5.2** (C/BA) Mechanical Standard—Extension for Air-Flow-Through Cooled Modules, Format E Form Factor—372 Pin Connector

**P1101.5.3** (C/BA) Mechanical Standard—Extension for Air-Flow-Through Cooled Modules, Format E Form Factor—360 Pin Connector

**P1101.6.1** (C/BA) Mechanical Standard—Extension for Air-Flow-Through Cooled Modules, 10SU Form Factor—556 Pin Connector

**P1101.8.1** (C/BA) Mechanical Standard—Extension for Liquid-Flow-Through Cooled Modules, 10SU Form Factor—556 Pin Connector

**P1101.9.1** (C/BA) Mechanical Standard—Extension for Liquid-Flow-Through Cooled Modules, Format E Form Factor—396 Pin Connector

**P1101.9.2** (C/BA) Mechanical Standard—Extension for Liquid-Flow-Through Cooled Modules, Format E Form Factor—372 Pin Connector

**P1101.9.3** (C/BA) Mechanical Standard—Extension for Liquid-Flow-Through Cooled Modules, Format E Form Factor—360 Pin Connector

**P1101.9.4** (C/BA) Mechanical Standard—Extension for Liquid-Flow-Through Cooled Modules, Format E Form Factor—428 Pin Connector

**P1149** (C/TT) Standard Testability Bus

**P1288** (C/SE) Recommended Practice for Information Technology—Software Function Point Determination from Requirements

## NUMBER CHANGE

**P1101.4.2** (C/BA) has been changed to **P1101.4b** Mechanical Standard—Extension for Conduction Cooled Modules, Format E Form Factor—372 Pin Connector

## NEW STANDARDS

**802.3v** (C/LM) Supplement to Information Technology—Local and Metropolitan Area Networks—Part 3: Carrier Sense Multiple Access with Collision Detection (CSMA/CD) Access Method and Physical Layer Specifications: Informative Annex for Support of 150 Ohm Cables in 10BASE-T Link Segment

**802.9c** (C/LM) Supplement to IEEE 802.9 Integrated Services Local Area Network: Managed Object Conformance Statement (MOCS)

**896.4a** (C/BA) Supplement to IEEE Standards for Conformance Test Requirements for Futurebus+™—Errata, Corrections and Clarifications

* **1026** (PE/IC) Recommended Practice for Test Methods for Determination of Compatibility of Materials with Conductive Polymeric Insulation Shield and Jackets

**1044.1** (C/SE) Guide to IEEE Standard for Classification of Software Anomalies

**1076.4** (C/DA) Standard for VITAL Application Specific Integrated Circuit (ASIC) Modeling Specification

* **1260** (PE/T&D) Guide on the Prediction, Measurement, and Analysis of AM Broadcast Re-Radiation by Power Lines

**1262** (SCC21) Recommended Practice for Qualification of Photovoltaic (PV) Modules

**1344** (PE/PSR) Standard for Synchrophasors for Power Systems

**1348** (C/SE) Recommended Practice for the Adoption of CASE (Computer Aided Software Engineering) Tools

**1364** (C/DA) Standard Hardware Description Language Based on the Verilog™ Hardware Description Language

**1394** (C/MM) Standard for a High Performance Serial Bus

**1420.1a** (C/SE) Standard for Information Technology—Software Reuse—Data Model for Reuse Library Interoperability: Basic Interoperability Data Model

**PC37.10** (PE/SWG) Guide for Diagnostics and Failure Investigation of Power Circuit Breakers

## REVISED STANDARDS

**115** (PE/EM) Guide: Test Procedures for Synchronous Machines, Part I: Acceptance and Performance Testing, and Part II: Procedures for Parameter Determination for Dynamic Analysis

**387** (PE/NPE) Standard Criteria for Diesel-Generator Units Applied as Standby Power Supplies for Nuclear Power Generating Stations

**446** (IA/PSE) Recommended Practice for Emergency and Standby Power Systems for Industrial and Commercial Applications

**730.2** (C/SE) Guide for Software Quality Assurance Planning

**739** (IA/ES) Recommended Practice for Energy Management in Commercial and Industrial Facilities

**743** (COM/T&A) Standard Equipment Requirements and Measurement Techniques for Analog Transmission Parameters for Telecommunications

* **1067** (PE/T&D) Guide for In-Service Use, Care, Maintenance, and Testing of Conductive Clothing for Use on Voltages Up to 765 kV ac and ±750 kV dc

**1070** (PE/T&D) Guide for the Design and Testing of Transmission Modular Restoration Structure Components

* **C37.20.3** (PE/SWG) Standard for Metal-Enclosed Interrupter Switchgear

**C37.102** (PE/PSR) *Guide for AC Generator* Protection

**C57.93** (PE/TR) Guide for Installation of Liquid-Immersed Power Transformers

## REAFFIRMED STANDARDS

**67** (PE/EM) Guide for Operation and Maintenance of Turbine Generators

**802.4** (C/CC) Standard for Token-Passing Bus Access Method and Physical Layer Specifications

**959** (C/MM) Standard Specifications for an I/O Expansion Bus: SBX Bus

**1003.1** (C/PA) Information Technology—Portable Operating System Interface (POSIX)—Part 1: System Application Program Interface (API) [C Language]

**1023** (PE/NPE) Guide for the Application of Human Factors Engineering to Systems, Equipment, and Facilities of Nuclear Power Generating Stations

**1120** (PE/IC) Guide to the Factors to Be Considered in the Planning, Design, and Installation of Submarine Power and Communications Cables

**1178** (C/MM) Standard for Scheme Programming Language

## WITHDRAWN STANDARDS

**C57.19.101** (PE/TR) Guide for Loading Power Apparatus Bushings

## 5-YEAR REVIEW OF STANDARDS

*RevCom recommends that these standards be balloted by the Standards Board for administrative withdrawal:*

**389-1990** (PEL/ET) IEEE Recommended Practice for Testing Electronic Transformers and Inductors

** Final approval subject to Standards Board conditions being met.*

**421.2-1990** (PE/ED&PG) IEEE Guide for Identification, Testing, and Evaluation of the Dynamic Performance of Excitation Control Systems

**421.4-1990** (PE/ED&PG) IEEE Guide for the Preparation of Excitation System Specifications

**449-1990** (PEL/ET) IEEE Standard for Ferroresonant Voltage Regulators

**1001-1988** (SCC23) IEEE Guide for Interfacing Dispersed Storage and Generation Facilities with Electric Utility Systems

**1021-1988** (SCC23) IEEE Recommended Practice for Utility Interconnection of Small Wind Energy Conversion Systems

**1118-1990** (IM/AI) IEEE Standard Microcontroller System Serial Control Bus

**1139-1988** (SCC27) IEEE Standard Definitions of Physical Quantities for Fundamental Frequency and Time Metrology

**C37.04f-1990** (PE/SWG) Supplement to C37.04-1979, IEEE Standard Rating Structure for AC High-Voltage Circuit Breakers Rated on a Symmetrical Current Basis, Section 6.5: Operating Mechanism Requirement

**C37.04h-1990** (PE/SWG) Supplement to C37.04-1979, IEEE Standard Rating Structure for AC High-Voltage Circuit Breakers Rated on a Symmetrical Current Basis, Section 6.2 (4): For Circuit Breakers Rated Over 800 kV

**C37.36b-1990** (PE/SWG) IEEE Guide to Current Interruption With Horn-Gap Air Switches

**C37.96-1988** (PE/PSR) IEEE Guide for AC Motor Protection

**C37.103-1990** (PE/PSR) IEEE Guide for Differential and Polarizing Relay Circuit Testing

**C57.114-1990** (PE/TR) IEEE Seismic Guide for Power Transformers and Reactors

# News TidBITS

## *Board Action Correction*

The Standards Board, at its September 21, 1995 meeting, approved a Transnational Project Authorization Request (TPAR) to initiate the process of adopting IEEE's Std 1448/ISO/IEC JTC 1 12207, International Standards—Information Technology—Software Life Cycle Processes.

## *Environmental Check-Off on the PAR Form*

Question 9d on the PAR form asks if the project is intended to focus on health, safety, or environmental issues. This is merely an attempt to make all concerned aware of the potential impact a project could have on the environment. Only obvious issues of concern would need to be elaborated on if they were acknowledged on the form by a positive response.

## *New PAR Form Is Issued*

A revised PAR form is now available. The revisions are editorial in nature. The current PAR form (dated 1/95) will be accepted for NesCom submissions through at least June of 1996.

For more information please contact Rona Kershner at (908) 562-3808 or r.kershner@ieee.org.

## ABBREVIATIONS

| | |
|---|---|
| AP | Antennas and Propagation |
| C/BA | Computer/Bus Architecture |
| C/CC | *See* C/LM |
| C/DA | Computer/Design Automation |
| C/DIS | Computer/Distributed Interactive Simulation |
| C/LM | Computer/Local and Metropolitan Area Networks |
| C/MM | Computer/Microprocessors and Microcomputers |
| C/PA | Computer/Portable Applications |
| C/SE | Computer/Software Engineering |
| C/TT | Computer/Test Technology |
| COM/T&A | Communications/Transmission & Access Systems |
| IA/CI | Industry Applications/Cement Industry |
| IA/ES | Industry Applications/Energy Systems |
| IA/IC | Industry Applications/Industrial Control |
| IA/PSE | Industry Applications/Power Systems Engineering |
| IM/AI | Instrumentation & Measurement/Automated Instrumentation |
| MTT | Microwave Theory and Techniques |
| PAR | Project Authorization Request |
| PE/ED&PG | Power Engineering/Energy Development and Power Generation |
| PE/EM | Power Engineering/Electric Machinery |
| PE/IC | Power Engineering/Insulated Conductors |
| PE/NPE | Power Engineering/Nuclear Power Engineering |
| PE/PSC | Power Engineering/Power System Communications |
| PE/PSR | Power Engineering/Power System Relaying |
| PE/SPD | Power Engineering/Surge-Protective Devices |
| PE/SUB | Power Engineering/Substations |
| PE/SWG | Power Engineering/Switchgear |
| PE/TC | Power Engineering/Technical Council |
| PE/T&D | Power Engineering/ Transmission & Distribution |
| PE/TR | Power Engineering/ Transformers |
| PEL/ET | Power Electronics/Electronic Transformers |
| SCC20 | Standards Coordinating Committee 20 (ATLAS) |
| SCC21 | Standards Coordinating Committee 21 (Photovoltaics) |
| SCC23 | Standards Coordinating Committee 23 (Dispersed Power Generation) |
| SCC27 | Standards Coordinating Committee 27 (Time & Frequency) |
| SCC29 | Standards Coordinating Committee 29 (Stationary Batteries) |
| SCC32 | Standards Coordinating Committee (Intelligent Transportation Systems) |

# Recent IEEE Standards Publications

### Communications

**167A.1-1995** IEEE Standard Facsimile Test Chart—Bi-Level (Black and White) [1-55937-556-6] [SH94331-NYL] $35.00

*When you order IEEE Std 167A.1-1995 you'll receive one copy of the instructions along with the actual test chart. You can reproduce as many copies of the instructions as you require. The instructions will also be available for free downloading on our Web site at: http://stdsbbs.ieee/org/.*

The discount structure for the test chart is as follows:

2-9 copies.....10%

10-100 copies .....20%
*(must be purchased in quantities of 10)*

110-500 copies ....40%
*(must be purchased in quantities of 10)*

510+ .....60%
*(must be purchased in quantities of 10)*

### Information Technology

**1149.5-1995** IEEE Standard for Module Test and Maintenance Bus (MTM-Bus) Protocol [1-55937-558-2] [SH94333-NYL] $75.00

**802.9a-1995** IEEE Standards for Local and Metropolitan Area Networks: Supplement to Integrated Services (IS) LAN Interface at the Medium Access Control (MAC) and Physical (PHY) Layers: Specification of ISLAN16-T [1-55937-560-4] [SH94335-NYL] $72.00

**802.9d-1995** IEEE Standards for Local and Metropolitan Area Networks: Supplement to Integrated Services (IS) LAN Integrated Services (IS) LAN Interface at the Medium Access Control (MAC) and Physical (PHY) Layers: Protocol Implementation Conformance Statement (PICS) [1-55937-563-9] [SH94343-NYL] $50.00

**802.10g-1995** IEEE Standards for Local and Metropolitan Area Networks: Supplement to Interoperable LAN/MAN Security (SILS): Secure Data Exchange (SDE)—Security Label (Annexes 2I, 2J and 2K) [1-55937-562-0] [SH94342-NYL] $50.00

**8802-3 : 1996** Information technology—Telecommunications and information exchange between systems—Local and metropolitan area networks—LAN/MAN-Type Specific Requirements, Part 3: Carrier sense multiple access with collision detection (CSMA/CD) access method and physical layer specification *(Includes 802.3m-1995, 802.3n-1995, 802.3s-1995 and 802.3t-1995)* [1-55937-555-8] [SH94330-NYL] $135.00

**9945-1: 1996** Information technology—Portable Operating System Interface (POSIX®)—Part 1: System Application Program Interface (API) [C Language] *(Includes 1003.1c-1995 and 1003.1i-1995)* [1-55937-573-6] [SH94352-NYL] $TK

**1003.10-1995** IEEE Standard for Information Technology—POSIX®-Based Supercomputing Application Environment Profile [1-55937-546-9] [SH94321-NYL] $50.00

**1278.2-1995** IEEE Standard for Distributed Interactive Simulation—Communication Services and Profiles [1-55937-574-4] [SH94355-NYL] $64.00

**1387.2-1995** IEEE Standard for Information Technology—Portable Operating System Interface (POSIX®) System Administration—Part 2: Software Administration [1-55937-537-X] [SH94301-NYL] $72.00

### Power & Energy

**665-1995** IEEE Guide for Generating Station Grounding [1-55937-567-1] [SH94347-NYL] $56.00

**C57.12.91-1995** IEEE Standard Test Code for Dry-Type Distribution and Power Transformers [1-55937-569-8] [SH94348-NYL] $58.00

**C62.48-1995** IEEE Guide on Interactions Between Power System Disturbances and Surge-Protective Devices [1-55937-566-3] [SH94346-NYL] $50.00

**C136.3-1995** American National Standard for Roadway Lighting Equipment—Luminaire Attachments [1-55937-571-X] [SH9435-NYL] $35.00

*To order IEEE Standards Publications, please call (800) 678-IEEE. Outside the US and Canada, call (908) 981-1393.*

## Now Available
## 1996 IEEE Standards Catalog

The 1996 *IEEE Standards Products Catalog* contains the complete listing of over 800 standards available from IEEE, along with detailed information about IEEE standards services and special products.

This year's catalog has undergone significant change. The new look of the catalog improves its appearance and usefulness. The packaging of standards products has been addressed. Please note that many standards will be available from IEEE only as part of a standards collection. Many standards with supplements will be sold only with their respective supplements. Supplements will continue to be sold individually.

To receive a printed copy of the 1996 IEEE Standards Catalog, please contact (908) 562-3800; fax: (908) 562-1571; or **e-mail**: stds-maillst@ieee.org.

Please check out the up-to-date, searchable IEEE Standards Catalog online at **Web:** http://stdsbbs.ieee.org/ **Gopher** or **FTP:** stdsbbs.ieee.org.

## STANDARDS Profile

***Donald C. Heirman** is Chair of the Procedures Committee (ProCom) of the IEEE Standards Board, and the Electromagnetic Compatibility (EMC) Society Standards Committee. A Fellow of the IEEE, Don is a chair or principal contributor to many standards committees within the IEEE EMC Society, ANSI C63, and the International Special Committee on Radio Interference (CISPR). A consultant in the field, Don speaks about radio frequency (RF) environmental issues in EMC standards.*

DONALD C. HEIRMAN

***Q: What was the first standards project you ever worked on?***

A: My first introduction to standards writing for the IEEE was authoring inputs to IEEE Std 473, *IEEE Recommended Practice for an Electromagnetic Site Survey (10 kHz to 10 GHz)*. I found this work fulfilled a long-term desire of mine to contribute to this measurement technique, especially as it relates to measurements inside buildings, which are difficult to perform. I used this technique in my previous work as an RF interference troubleshooter in the field for my company in the 1970s.

***Q: Why did you decide to participate in standards work in the IEEE?***

A: I wanted to work with dedicated people who have enough patience to stick with such work to get the final product out perhaps years later. I have always stated that you have to start standards work early in life to increase the probability to get the standards completed before you retire!

***Q: What are some key aspects of RF environmental issues in writing standards in the EMC field?***

A: To be able to assess effects on the RF spectrum and "interference pollution" from all sources of RF on people and products, reproducible and accurate measurements of the RF spectrum including product RF emissions must be made. Hence, most EMC standards deal with measurement procedures and the specification of instruments used in these measurements. The key here is to have agreement among producers, users, those with general interest, and regulating authorities. Even with such a consensus agreement, there are uncertainties in the measurements for regulatory compliance. This particular topic of measurement uncertainty will be addressed at an ANSI ASC C63/NIST (National Institute of Standards and Technology) workshop on measurement uncertainty [*see the calendar of events for details*].

***Q: What is your favorite hobby?***

A: In between work and standards activities (at least once or twice a year), I enjoy collecting and operating model railroad equipment dating back to the 1940s, especially Lionel 0/027 Gauge. I have stayed away from "standards" gauge, which seems odd for a "standards" person. I also have a layout in my basement that allows room for the washing machine and dryer, but barely.

***Q: My most memorable standards meeting was....***

A: I was at a standards meeting in San Antonio many years ago. We were locked up in a long meeting trying to get a final draft written when one of the participants simply would not shut up and let the group proceed to consensus. The Chair, who was always a gentleman and quiet, suddenly burst out, "If you don't shut up since you are out of order, I'll have you physically removed!" That's an attention grabber! We concluded our deliberations quickly.

***Q: What lessons have you learned from your participation in standards?***

A: It's quality, not quantity. I've helped write a one and one-half page standard (ANSI C63.6), which to this day is referred to throughout the world in part due to its cogency without superlatives and unnecessary verbiage. The challenge has always been and will continue to be, in my opinion, to say what is needed in the fewest words. I lay down that challenge to all standards writers. ◆

# ISO 14000 Series
## Environmental Management Systems Standards

*by Barbara Hill*

Standards of global impact dedicated solely to environmental aspects in organizational management systems are on the fast track. In 1992, the International Organization for Standardization (ISO) established Technical Committee (TC) 207 to develop the Environmental Management Systems (EMS) standards. These standards, known as the ISO 14000 Series, will set guiding principles and provide tools to evaluate and better environmental management systems for almost any type of organization.

There are two aspects of the 14000 Series. The first is the organizational element, which addresses environmental management systems, with three Sub-Technical Advisory Groups (Sub-TAGs or STs)—Environmental Management Systems (ST1), Environmental Auditing (ST2), and Environmental Performance Evaluation (ST4). The second aspect addresses product-oriented issues comprised of three development groups—Environmental Labeling (ST3); Life-Cycle Assessment (ST5); and Sub-Working Group Environmental Aspects in Product Standards (WG1). This last group is establishing a guide for standards developers on how environmental issues interact with and relate to standards.

The following standards are expected to be published by early 1996:

- — ISO 14001: Environmental Management Systems—Specification with Guidance for Use
- — ISO 14010: Guidelines for Environmental Auditing—General Principles

ISO 14001 addresses topics such as corporate policy, legal, and other requirements; objectives and targets; management programs; training; communications; documentation; control procedures; emergency preparedness; monitoring and measurement; corrective and preventive actions; auditing; and management review. The framework allows for a company to perform a first-party audit.

The focus of ISO 14010 is on the implementation, maintenance, and assessment of an environmental management system by way of the management review and compliance processes.

The life-cycle assessment Sub-TAG (ST5) is working on establishing guidelines and principles for the use of life-cycle concepts and application. These standards are numbered ISO 14041 through 14044. Much of the work to date is based on the established practice of inventory assessment. The areas of impact analysis and interpretation still need much work and review before consensus can be reached at an international level. The eco-labeling Sub-TAG is working on guidelines and principles for various eco-labeling programs. This effort should greatly help to ensure that eco-labeling programs are established appropriately and do not produce trade barriers.

The establishment of the ISO 14000 Series and the work done thus far shows that there is an international commitment for better environmental care. Internally, corporations will be able to step up their standards by maintaining quality environmental performance. The future benefits of these standards will be felt in the many domains of the commercial marketplace as nations harmonize rules, labels, and methods. ◆

*Barbara Hill is manager of Product Safety Technology at IBM. She currently has the responsibility for setting strategic direction and policy for the corporation in the areas of product safety and environmentally conscious products.*

*She is currently a member of the IEEE Environment, Safety, and Health Committee, and is the program Co-Chair for the 1996 IEEE Electronics and the Environment Symposium.*

## IEC 1998 General Meeting To Be Held in the US

The IEC Council accepted the invitation extended by the US National Committee to hold its 1998 General Meeting in Houston, TX, from October 12 through 23. This invitation was accepted at the IEC's 59th General Meeting in Durban, South Africa, in October. This event will represent the first time in 25 years that the United States has hosted an IEC General Meeting.

The annual General Meeting is composed of a series of technical and administrative meetings on standards matters that will impact the electrical and electronics industry worldwide. The meeting will be held in conjunction with the International Conference and Exhibit of the International Society for Measurement and Control (ISA). Questions should be directed to Charlie Zegers, USNC Secretary, ANSI, 11 West 42nd St., New York, NY 10036, USA, (212) 642-4936; fax (212) 398-0023; or czegers@ansi.org. ◆

# CONGRATULATIONS

## AWARDS SPOTLIGHT

### Distinguished Service Award

**Donald C. Loughry** has been awarded the 1995 IEEE Standards Board Distinguished Service Award for his significant contributions to the IEEE Standards Board and the standards-development process.

* * * *

*The IEEE Standards Board formally congratulates the officers as well as their working groups on the publication of their standard or collection.*

**Dennis Bodson,** Chair: *167A.1-1995* IEEE Standard Facsimile Test Chart—Bi-Level (Black and White)

**Malcolm V. Thaden, Jr**. Chair: *665-1995* IEEE Guide for Generating Station Grounding

**Dhadesugoor R. Vaman,** Chair; **Ronald R. Kemper, Sr.,** Vice Chair; **Sanjay Popli,** Editor; **Sven Olof Akerlund**, Secretary: *802.9a-1995* IEEE Standards for Local and Metropolitan Area Networks: Supplement to Integrated Services (IS) LAN Interface at the Medium Access Control (MAC) and Physical (PHY) Layers: Specification of ISLAN16-T

**Dhadesugoor R. Vaman**, Chair; **Ronald R. Kemper, Sr.,** Vice Chair; **Leslie A. Collica,** Editor; **Sven Olof Akerlund,** Secretary: *802.9d-1995* IEEE Standards for Local and Metropolitan Area Networks: Supplement to Integrated Services (IS) LAN Interface at the Medium Access Control (MAC) and Physical (PHY) Layers: Protocol Implementation Conformance Statement (PICS)

**Kenneth G. Alonge**, Chair; **Russell Housley,** Vice Chair; **Noel A. Nozario,** Technical Editor: *802.10g-1995* IEEE Standards for Local and Metropolitan Area Networks: Supplement to Interoperable LAN/MAN Security (SILS): Secure Data Exchange (SDE)—Security Label (Annexes 2I, 2J, and 2K)

**Norman Aaronson**, Chair; **Joseph Ramus,** Technical Editor: *1003.10-1995* IEEE Standard for Information Technology—POSIX®-Based Supercomputing Application Environment Profile

**Patrick F. McHugh**, Chair; **Rodham E. Tulloss,** Technical Editor: *1149.5-1995* IEEE Standard for Module Test and Maintenance Bus (MTM-Bus) Protocol

**Jay Ashford,** Chair: *1387.2-1995* IEEE Standard for Information Technology—Portable Operating System Interface (POSIX®) System Administration—Part 2: Software Administration

**William C. Corwin,** Chair: *1003.1c-1995* IEEE Standard for Information Technology—Portable Operating System Interface (POSIX®)—Part 1: System Application Program Interface (API)—Amendment 2: Threads Extension [C Language]

**John Zolnowsky,** Technical Editor: *1003.1i-1995* IEEE Standard for Information Technology—Portable Operating System Interface (POSIX®)—Part 1: System Application Program Interface (API)—Amendment: Technical Corrigenda to Realtime Extension [C Language]

**Dave Barnard,** Chair: *C57.12.91-1995* IEEE Standard Test Code for Dry-Type Distribution and Power Transformers

**Hans J. Steinhoff,** Chair: *C62.48-1995* IEEE Guide on Interactions Between Power System Disturbances and Surge-Protective Devices

**William D. Griffin,** Standards Coordinator: *C136.3-1995* American National Standard for Roadway Lighting Equipment—Luminaire Attachments

# CALENDAR

## OF EVENTS

### FEBRUARY

**2** *Deadline for draft and PAR submission for March Standards Board meeting*

**5–7** **US TAG for ISO/IEC JTC1/SC7**
San Diego, CA
contact—Leonard Tripp
(206) 237-5240,
fax (206) 237-5444, or
lltripp@kgvi.beems.boeing.com

**26–Mar. 1** **Design Automation Standards Committee (DASC) meeting**
(Computer Society)
Santa Clara, CA
contact—Paul Menchini
(919) 990-9506, fax (919) 990-9507, or mench@mench.com

### MARCH

**11–15** **LAN MAN Standards Committee Meeting**
(Computer Society)
La Jolla, CA
contact—Classic Consulting
(604) 527-1045, fax: (604) 527-1046, or e-mail:
72630.107@compuserve.com

**19–21** **IEEE Standards Board and Committee meetings**
Somerset, NJ
contact—Terry DeCourcelle
(908) 562-3807, fax (908) 562-1571, or t.decourcelle@ieee.org

**5–8** **EMC Standards and Board of Director Committee meeting**
(Electromagnetic Compatibility Society)
Piscataway, NJ
contact—Luigi Napoli
(908) 562-3812; fax (908) 562-1571 or l.napoli@ieee.org

### APRIL

**8** **Microprocessor Standards Committee Meeting**
(Computer Society)
Santa Clara, CA
contact—David B. Gustavson
(415) 961-0305; fax (415) 961-3530; or dbg@sunrise.scu.edu

**14–17** **Transformers Committee meeting**
(Power Engineering Society)
San Francisco, CA
contact—J. H. Harlow
(813) 544-2326; fax: (813) 546-0121

**14, 17, 19** **US TAG for ISO/IEC JTC1/SC22/WG15**
Jackson Hole, WY
contact—Barry Needham
(408) 992-2527

**14–19** **Portable Applications Standards Commitee (PASC) meeting**
(Computer Society)
Savannah, GA
contact—Ellen Bodalski
(202) 371-1013; fax: 202-728-0884; or ebodalsk@computer.com

**14–17** **Insulated Conductors Committee meeting**
(Power Engineering Society)
Houston, TX
contact—L. J. Hiivala (416) 467-4158 or fax (416) 421-4779

**18–19** **ANSI ASC C63 Electromagnetic Compatibility (EMC) meeting**
Piscataway, NJ
contact—Rosemary Tennis
(908) 562-3811; fax (908) 562-1571; or r.tennis@ieee.org

**29–30** **ANSI ASC C63 Measurement Uncertainty Workshop**
Washington, DC area
contact—Don Heirman
fax (908) 530-5695

**29–Mar 3** **Substations Committee meeting**
(Power Engineering Society)
Savannah, GA
contact—K. B. Stump
(404) 740-3852 or fax (404) 740-3397

### MAY

**6–8** **US TAG for ISO/IEC JTC 1/SC7**
Rhode Island
contact—Leonard Tripp
(206) 237-5240, fax (206) 237-5444, or e-mail
lltripp@kgvi.beems.boeing.com

**6–9** **Switchgear Committee meeting**
(Power Engineering Society)
Ft. Lauderdale, FL
contact—K. I. Gray
(708) 597-8190; fax (708) 597-3028

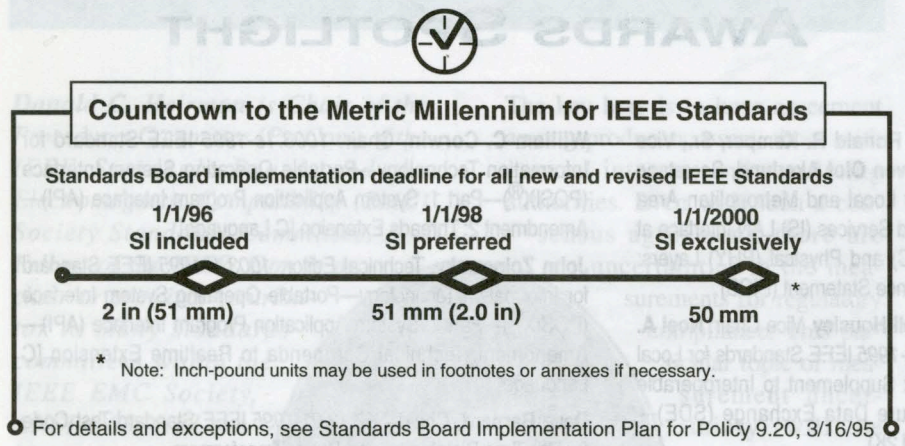
**9–11** **Industrial and Commercial Power Systems Seminar**
(I&CPS Society)
New Orleans, LA
contact—Tina Alston
(908) 562-3816; fax (908) 562-1571 or t.alston@ieee.org

**10** *Deadline for draft and PAR submission for June Standards Board meeting*

**20–22** **C136 Roadway Lighting Committee meeting**
Orlando, FL
contact —Rosemary Tennis
(908) 562-3811; fax (908) 562-1571 or r.tennis@ieee.org

# [In]significant Digits

*by Bruce Barrow*




No problems in applying the metric system to existing standards are more vexing than those associated with significant digits. SCC14 has recently reviewed a draft standard that is concerned with high voltage. The proposed standard concerns systems rated at 500.000 kV. It calls for a basic impulse insulation level (BIL) of 1800.000 kV, and lists a critical striking distance of "30.268 m (99.3 ft)." Only the last of these involves a conversion, but all the data, including 99.3 ft, include digits that are in no way significant.

The problem is not restricted to engineers. Accountants may be even more susceptible—counting beans one by one when they should be counting by bushels (excuse me!). Recently, I was given an eight-figure estimate of a government agency's telephone bill for 1998.

Some of the blame for insignificant digits falls upon the unthinking computer, which gives us eight or ten digits more easily than two. Back in the good old days, when engineers worked with slide rules, we didn't often need to worry about having too much precision. Now, however, we need to look critically at the data we manipulate, and throw away meaningless digits even when no metric conversion is involved. ◆

*Bruce Barrow is Chair of SCC14, Standards Coordinating Committee on Quantities, Units, and Letter Symbols.*

## VHDL Self-Study Course Available

IEEE Educational Activities, in cooperation with IEEE Standards, have published the self-study course, *VHDL: Features and Applications.* This independent learning package was developed to meet today's educational and training needs in hardware description languages. J. Bhasker of AT&T participated in the development of IEEE Std 1076-1993, *VHDL Language Reference Manual.* The course contains the revised edition of a VHDL book authored by Bhasker and published by Prentice Hall, a study guide, a final exam, IEEE Std 1076-1993 and IEEE Std 1164-1993, *IEEE Standard Multivalue Logic System for VHDL Model.*

Reviewing the course was Paul Menchini, the recent recipient of a Meritorious Service Award from the IEEE Computer Society for his role in the development of the IEEE Std 1076-1993. According to Menchini, "One of the IEEE's most important functions is continuing education. Employment and personal pressures often make classroom attendance impractical, and textbooks are often not targeted at the working professional. With new standards comes a need for education, and the IEEE's course offers the technical community resources that promote technical and professional vitality."

THE IEEE STANDARDS PRESS will also be releasing the VHDL Interactive Tutorial in the spring.

Future course involving the cooperative effort of Standards and Educational Activities will deal with other topics including grounding, phase overcurrent protection, and batteries.

To order the VHDL self-study course, call:
IEEE Customer Service
1-800 678-IEEE
Product no. HL5712
Member price is $229.00
List price is $299.00.
For more information, call Barbara Coburn (908) 562-5498. ◆

## Correction Sheet

The following correction sheets are available from the IEEE Standards Department.
IEEE Std 1010-1987, *IEEE Guide for Control of Hydroelectric Power Plants.*
IEEE Std 1164-1993, *IEEE Standard Multivalue LogicSystem for VHDL Model Interoperability (Std_logic_1164)* is accessible on the Web Site (stdsbbs.ieee.org/products/errata), as well as in hard copy. Write to IEEE Standards, ATT: Correction Sheets, for a free copy.

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NYL

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