

# IEEE

# ELECTROMAGNETIC COMPATIBILITY GROUP



## NEWSLETTER

ISSUE NO. 88 WINTER 1976

EDITOR: ROBERT D. GOLDBLUM



JIM TOLER

### PRESIDENT'S MESSAGE

Let me begin by saying that I enthusiastically look forward to this year of service as President of the Administrative Committee (AdCom). After lengthy consideration, I have decided to concentrate my efforts during the year in three areas that directly involve our Group membership. These areas are: (1) establishing Group Level Technical Committees, (2) upgrading the technical and educational level of our membership, and (3) increasing Group membership.

Group Level Technical Committees offer a tremendous potential for both better defining the varied areas of EMC interest and publicizing this interest in other engineering disciplines. As presently visualized, there would be approximately 8 Technical Committees in areas that our Group membership could easily relate to. Committee chairmen will be designated by AdCom, and will in turn select a core of 2-4 Group mem-

bers to work with them. Additional Committee members will then be solicited from the total Group membership, with a goal of 8-12 active and technically competent members on each Committee. Each Committee, within its area of responsibility, will (1) provide an international point-of-contact for technical expertise, (2) assist the Transactions Editor by reviewing papers submitted for publication, (3) organize technical sessions for our annual Symposium or for other conferences desiring a session on EMC, and (4) identify the need and prepare draft material for technical standards. These Committees will have national stature and will provide the primary focal point about which technical activities at the Group level resolve. To assist in accomplishing these responsibilities, a budget will be made available to each Committee Chairman and will be spent at his discretion to further the Committee's technical interests.

As you are well aware, technological developments continue to expand at a rapid rate and in directions unanticipated even a few years ago. These developments not only make concern with EMC more critical than ever before, but also increase the difficulty in staying abreast of a changing technical situation. Consequently, there is an ever-increasing need for more educational opportunities geared to the EMC engineer. As presently visualized, AdCom promotion of these education opportunities will involve encouraging the presentation of currently offered commercial EMC short courses with their emphasis on practical applications. Simultaneously, the development and presentation of courses that present more theoretical instruc-

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tion of interest to EMC engineers will also be encouraged. These latter courses can perhaps be annually presented at selected educational institutions and provide written materials that will evolve into comprehensive EMC texts. A further educational benefit can probably be realized by incorporating high quality tutorial courses directly into the format of our annual Symposium. Additionally, it is hoped that selected educational institutions can be persuaded to offer a graduate degree structured around a core of electrical engineering and management course of interest to the EMC engineer. These courses would emphasize electromagnetic theory and systems plus the technical aspects of engineering management. The degree might be designated a graduate Degree in Applied Electromagnetics.

Regarding efforts to increase Group membership, innovative approaches are still being formulated. It is expected that these approaches will involve providing effective incentives by which local EMC Chapters will be encouraged to acquire new members. It is at the local level that the personal contact and knowledge of individual interests exists; therefore, the major thrust of our membership campaign should be directed there. Obviously, the emphasis on Technical Committees and improved educational opportunities will result in a more attractive professional Group, and this will also help to increase our membership.

In conclusion, it is noted that our previous leadership has left the Group in a strong technical and financial position. Our task this year will be one of building on this position to provide an EMC Group that serves even more its membership and the engineering profession of which we are a part.

Jim Toler  
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Atlanta, GA 30332  
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#### JIM TOLER ELECTED PRESIDENT G-EMC ADCOM

At the October 6, 1975 meeting in San Antonio, the G-EMC Administrative Committee elected James C. Toler of the Georgia Institute of Technology Experimental Station President of the ADCOM for 1976. Other officers elected include:

Senior Vice President	-- E. D. Knowles
Secretary	-- L. W. Thomas, Sr.
V.P. for Communication Services	-- W. E. Corey
V.P. for Member Services	-- F. J. Nichols
V.P. for Professional Services	-- H. M. Sachs
V.P. for Technical Services	-- R. M. Showers

#### RESULTS OF THE AD COM ELECTION BALLOT

As you know, a ballot for the election of six AdCom members for the Electromagnetic Compatibility Group was issued on August 26, 1975. The ballots returned have been counted, and the following members have been elected for the term beginning on January 1, 1976:

Jack E. Bridges  
William E. Cory  
Robert D. Goldblum  
Thomas H. Herring  
Eugene D. Knowles  
Herbert M. Sachs

We wish to thank all nominees for their willingness to serve and for permitting their names to be included on this ballot.

#### DANIELS CONTINUES HIS CONVALESCENCE

Rexford Daniels who suffered a stroke nearly a year ago is continuing his convalescence at his home in Concord, Mass. Rex is best known for his services as editor of the IEEE-EMC Newsletter for over ten years and continuing as a consulting editor for over 8 years. His friends and associates are encouraged to keep sending cards and good wishes to Rex at P.O. Box 129, Concord, Mass. 01742.

#### NEWSLETTER STAFF

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# EMC PERSONALITY PROFILES

by William G. Duff —



JOE FISHER

The EMC personality for this issue of the IEEE Electromagnetic Compatibility Group Newsletter is "Navy Joe" - Joseph J. Fisher of the Naval Air Systems Command. Joe has been a distinguished figure in the EMC community for many years.

Joe was born, raised, and educated in Plymouth, Pennsylvania. During World War II, he served in Naval Aviation aboard the USS Tuscaloosa (CA-37) and shore-based squadrons at various air stations covering a period of six years. Following the war, he studied electronics engineering in Philadelphia and Kansas, Missouri. Joe became a senior instructor in electronics and communications at Capital Radio Engineering Institute in Washington, DC.

In 1952, he became a communication systems design engineer for the Bureau of Ships, leading to a similar position for the Bureau of Naval Weapons in 1961. Joe's areas of responsibility increased when in 1966 the Bureau of Weapons was reorganized into the Naval Air Systems Command and the Naval Ordnance System Command. At the present time, Joe is Chief of the Avionics Engineering Branch of NAVAIR, Code 53303.

Joe's many EMC tasks keep him fully occupied. EMC activities with the AIR 533 Avionics Division require personal visits to NAVAIR field activities, and to manufacturers of air frames and aircraft subsystems.

To enumerate, Joe is active as NAVAIR's representative to the following:

- Chief of Naval Operations Frequency Allocation Advisory Board
- Chief of Naval Material's EMC Executive Committee
- NATO's Working Party - 12
- NAVELEX EMC Standards Committee
- SAE-AE4 EMC Committee/Educational Subcommittee
- BIA-G46 EMC Committee/Educational Subcommittee

Joe's duties have required travel to England, Germany, and Italy to attend NATO meetings.

In addition, Joe coordinates NAVAIR activities in Hawaii; NADC, Johnsville, Pennsylvania; NWC, China Lake, California; and PMTC, California. Frequent trips are required to major aircraft manufacturing plants such as Grumman, Boeing, North American Rockwell, McDonnell/Douglas and others.

Joe has been actively associated with EMC control Advisory Boards (EMCAB's) on such weapon systems as the: F-111A and B, P-3C, S-3A, E-2C, EA-6B, F-14A, missile systems and major avionics subsystems.

Joe has many accomplishments in the field of EMC including:

- \* Producing training films
  - Teletype Operation (series of four)
  - EMC (series of eight)
  - Lightning Protection (series of four)
- \* Navy Radiation Hazard (RAD-HAZ) program
  - Hazards of Electromagnetic Radiation to Ordnance (HERO)
  - Hazards of Ignition of fuel from r-f radiation (SPARKS)
  - Hazards to personnel from electromagnetic radiation (bio-effects).

Joe has been particularly active in establishing committees to consider new ideas for designing instrumentation and procedures for measuring hazard levels. In addition, some new terminology had to be created for this project.

It is difficult to single out the most outstanding feats of Joe's career, but he considers his brainchild involving a large number of ships and aircraft gathered together for one month of dedicated EMC testing as one of the most eventful. Counting all support requirements more than 20,000 individuals were engaged in this mission. He considers his contribution to the RAD-HAZ program as equally important.

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He is a senior member of the IEEE and is in the first year of a second three-year term on the G-EMC Administrative Committee for Electromagnetic Compatibility. On the ADCOM, he heads the subcommittee for EMC education.

Navy Joe Fisher claims he has something big going for him. Whenever something good is said, done, or written by any Joe Fisher, he claims authorship. To the contrary, anything bad or mediocre, Joe attributes to Litton Joe Fisher, who works on the West Coast.

#### Awards and Rewards

- 1951 Instruction Achievement Award
- 1955 Award for the Design of an Automatic Remote Switching System for Ships
- 1965 Achievement Award for Engineering Contribution to Missile Systems
- 1967 Outstanding Engineer of the Year Award from the Association of Naval Weapons Engineers and Scientists
- 1968 Superior Achievement Award
- 1973 An Award for Successful EMC Educational Programs by SAE and West Coast Electronics Manufacturers Association

\*These teletype operation articles were also published in the April, September, December 1956 and June 1958 Bureau of Ships Journal.

#### BERMAN EDITS PRISM

Ira M. (Marty) Berman has taken over as Editor of PRISM, the Schenectady IEEE Section Newsletter. Marty is a Systems Design Engineer at the Knolls Atomic Power Laboratory and was Associate Editor for Chapter Chatter of the IEEE G-EMC Newsletter from 1968 through 1973. Since 1972, he has edited the newsletter of Mensa of Northeastern New York. He promises continued improvement in PRISM, including some new features that will start in a few months.

#### HANK RAY DIES

With deep regret, the G-46 Committee of the EIA advises of the passing of Henry B. (Hank) Ray, Executive Vice-Chairman of the Committee. His contributions to the electronics and aerospace industry over the years, through EIA, AFTRCC, IEEE and SAE, have been of inestimable value to all concerned. His loyal support for the betterment of industry, as a co-worker and especially as a friend, leaves many with an extreme feeling of loss. His friendship and help was recognized by the Masonic organization, who awarded him the 33° in Masonry, the highest degree that can be conferred. Full Masonic Memorial Services were held in Denver, Colorado on September 17, 1975.



#### MCKERCHAR RESIGNS AS CHAIRMAN OF SAE AE 4 EMC COMMITTEE

After serving as President of the SAE AE4 Committee on Electromagnetic Compatibility since its formation, Walter McKerchar has resigned, although he intends to be active on the committee in other capacities. The Nominations Committee recommended Jack Moe of General Dynamics, Herb Mertel of General Dynamics and Gus Weinstock of McDonnell Douglas as its slate of candidates to replace Walter. Jack Moe, who served under McKerchar as Vice President for many years, was elected during the AE4 meeting in San Antonio on October 6th to replace McKerchar and will assume the office of president starting in January, 1976. Moe will appoint the new officers of the committee after he has taken office.



#### HERBERT K. MERTEL RECEIVES AWARD

During the SAE AE4 EMC committee meeting in San Antonio on October 6, 1975, Herbert K. Mertel of General Dynamics Corp. received an award from the Committee with the following citation: "In recognition of his international, technical liaison activities on behalf of the SAE/AE4 Committee on EMC." This was the first award of its kind to which Mertel drank an honorable toast.



# CHAPTER CHATTER

by Charles C.W. Anderson



## Los Angeles

From 50 to 75 attendees at each meeting are keeping things going well in the LA area. Fred Nichols reports that their September meeting was addressed by John Coddington who discussed applications of high-mu shielding materials. In October, Bob Cowdell went to work on MIL-STD-704A and B, and brought some of the provisions of these documents into "real world" focus. If business takes you into the Los Angeles area, contact Fred at 213-870-9383 to find out if there's going to be a meeting while you are there.

## New Jersey Coast

In November '74, the Chapter was introduced to the new "cellular" communications concept for the land mobile services by a member of the Bell Labs staff. To start off this year's technical series for this chapter, the October meeting featured Gerald DiPiazza, also of Bell Labs, who presented a talk titled "Ultra High Frequency Field Test Related to High-capacity Mobile Communications." Although described as a "brief tutorial," Gerry DiPiazza's paper turned out to combine both background matter and some extremely interesting results of measurements made in the Philadelphia area. The "cellular" approach does seem to provide economies of both spectrum and hardware. (Your Column Editor thinks this paper should appear in our Transactions - Dick Schulz: please note!) The November meeting featured a description of the Army's new transportable automated EMC measurement system. Originally scheduled for presentation by Mr. L.H. Wagner, Project Manager, DCS Army Communications System, the talk was given by Mr. Joe Valasquez, of the same organization. This system, which is housed in two mobile vans, covers 20 Hz to 40 GHz. It includes all necessary programming equipment, antenna and tuner switching provisions, directional and non-directional antennas, and recording equipment. In active testing status at present, it is scheduled to be available to the user agency by the end of 1976.

The Chapter's annual Christmas Party was held at the Ft. Monmouth Officers' Club on December 11th. Over 30 members, wives and other guests enjoyed the excellent buffet supper, plus the usual libations.

## Washington

Just a little too late to make the Fall Newsletter deadline, the Chapter had their first meeting of the season on September 18th. Mike Lustgarten, of ECAC, gave a presentation on "An EMC Figure-of-merit." Thirty IEEE members and guests attended this luncheon meeting. At the November 20th meeting, Mr. S. E. Probst, Deputy Assistant Director for Frequency Management - OTP, discussed his organization's current program in spectrum management, preparations for the forthcoming ITU conferences, the role of EMC in these efforts, and the impact of OTP's Circular 11, which emphasizes the need for further EMC analytical effort within the Federal Government. Interest in this presentation was indeed high - Al Paul (Chapter Secretary) reported that 65 attended - 42 IEEE members and 23 guests! Washington Chapter's meetings are held at Blackie's House of Beef, 22nd & M, NW, at noon. The January 18th meeting will feature Mr. Brendon Harrington, of Congressman Charles Vanik's staff, speaking on the RFI Bill; H.R. 7052. If you are in the DC area, and can attend, call Al Paul or his secretary for reservations (632-7093).



## CHARLIE'S CORNER



### AMERICAN RADIO RELAY LEAGUE RFI TASK GROUP ACTIVITY REPORT

Those who attended the San Antonio Symposium probably heard Dr. Ted Cohen's paper, "The Susceptibility of Home Entertainment Devices to Strong RF Fields." For those who weren't able to attend, a brief summary is given below. Ted began by defining the problem - in terms both of the number of complaints handled by the FCC and of the likelihood of field strengths in voltage ranges capable of affecting TV receivers, hi-fi equipment and other home entertainment items. He used the now famous map of the Arlington County VA area, which shows transmitter density - for only Amateur, CB and Land Mobile Service stations. (Note: This is the map which is part of the ARRL RFI Info packet - see the Fall issue of the Newsletter for

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## SPEAKERS TRAVELING OVERSEAS

info on obtaining same.) Ted discussed the "RFI Bill," introduced last Spring by Congressman Charles Vanik of Ohio. This is the proposed legislation, which, if approved, would empower the FCC to establish rules for susceptibility for home entertainment devices. Ted also reviewed some of the data available which might be used as the basis for setting up realistic standards for such equipments. It is understood that some lively discussion followed Dr. Cohen's presentation, and that our next Symposium will probably devote some time to this area.

Reciprocal advantages accrue when competent speakers present papers to IEEE Sections in foreign countries. IEEE members in any country, contemplating a foreign trip (transatlantic, transpacific, transcaribbean, etc.) and desirous and capable of making engineering contacts of this type are invited to inform Miss Emily Sirjane at the IEEE Headquarters office in New York, who will furnish the names and addresses of Section Chairmen with whom the speaker may work out arrangements directly.

The list of "persons-to-contact" with entertainment equipment problems (and solutions) within a number of OEM organizations (mentioned in the write-up in the Fall issue) is available as a separate item from ARRL for a self-addressed, stamped envelope with 13¢ postage attached. Address: ARRL, 225 Main St., Newington, CT 06111.)

The susceptibility investigations at the ARRL headquarters laboratories are making progress. Tony Dorbuck, Project Engineer for this activity, reports that he is using a bench-top type shielded enclosure for some of his testing. Direct pickup by circuits seems to be a major factor (as indicated also by Grundig's results in Germany). Recent tests included a check with a color TV receiver in the vicinity of ARRL's station WLAU. With five transmitters on the HF Amateur bands running at the kilowatt level, plus others at somewhat lower powers, reception was wiped out with the TV set unshielded. However, with the receiver in the shielded enclosure at the same location, only slight interference was observed, with a relatively low TV signal field strength.

Also, according to Tony, the ARRL RFI manual previously mentioned in the Newsletter is still in the preparation stages, but should be ready for publication before much longer - we'll keep you advised.

## AGE DISCRIMINATION

The case was Estate of Dilworth Rogers v. Exxon Research and Engineering, United States District Court, District of New Jersey, Civil Action No. 681-70, February 4, 1975 and was cited in COMMERCE CLEARING HOUSE EMPLOYMENT PRACTICES, paragraph 5311, p. 3579.

Dr. Rogers apparently died after initiating the case and it was fought by his widow, Mrs. Gladys Rogers against Exxon. In the case, Mrs. Rogers claimed that her husband had been laid off because it was the practice of Exxon to displace older employees so that additional benefits could be paid to younger employees. The widow claimed that the company involuntarily retired Dr. Rogers and prior to that discriminated against him with respect to his compensation and the terms and conditions of his employment. A determining factor, it was claimed, in that discrimination was age.

The company claimed that it involuntarily retired Dr. Rogers because of a medical disability.

The jury believed Mrs. Rogers. It hit Exxon for \$750,000 (yes, seven hundred fifty thousand dollars). This from the wording in the summary of the case, was in addition to the amount of money that Dr. Rogers was out of pocket as a result of being retired early. So that amount (which was not decided by the jury as both sides came to an agreement on that) was added to the above.

And to add insult to injury - when I called the clerk of the court in New Jersey to see if the verdict was being appealed or held up, or anything - she told me that the Rogers attorney filed a motion and then collected an additional \$65,000 for attorney's fees. No appeals on record.

It was a bad day indeed for firms which have routinely displaced older "non productive" employees. If they want to do that, they had better make sure that they document a really really good case.

## G-EMC SYMPOSIUMS CONTINUE ROTATION

The planned sites for the IEEE EMC Symposiums have been planned through 1979 as follows:

- 1976 Washington, D.C., W.C. Green, Chrm.
- 1977 Seattle, Wash., B.L. Carlson, Chrm.
- 1978 Atlanta, GA, J. Toler, Chrm.
- 1979 Southern Calif. (L.A. or San Diego)

The rotation scheme serves many purposes. For instance, it affords new members the opportunity to participate on the steering committees, and it exposes different sections of the country to the EMC community. Although we have a set pattern of rotation, it is up to the local EMC chapter or Group members to petition to host the event. Administrative Committee approval is given only after the submittal of a proposed budget and the selection of responsible officers.

(Reprinted from the August 1975 issue of the IEEE G-EM Newsletter)





# BOOK REVIEWS

## BOOK REVIEW

by Jim Hill, RCA Service Company

We have two reviews in this issue by two guest reviewers. Dr. Henning Harmuth, representing the sequency community, reviews a new textbook on orthogonal transforms. Mr. Edward Wetherhold, representing the frequency community, reviews an electronic databook. As conductor of this column, I must warn readers that Ed Wetherhold has an axe to grind. Ed contends that there are too many books coming from the technical publishers that should never have had type set. These books are often the product of unqualified authors and they suffer not only from a dearth of information, but also from minor to major errors and plain misinformation. He is mounting a campaign to make publishers aware of this disservice to the engineering profession in hopes that the publishers will do some self-policing.

### *"Orthogonal Transforms for Digital Signal Processing"*

by N. Ahmed and K. R. Rao

1975 - 263 pages, 129 illustrations  
Springer-Verlag, 175 Fifth Ave., New York, NY 10010

Reviewed by Dr. H. F. Harmuth  
The Catholic University of America

Orthogonal systems of functions other than sinusoidal functions have been used by communications engineers for a long time. Examples are Chebyshev polynomials in filter theory and Bessel functions for electric structures with cylindrical symmetry. Despite this fact, sinusoidal functions and block pulses were used almost exclusively as signals or for the representation of signals, and the theory of communications was based essentially on sinusoidal functions only until about ten years ago. The reason is that our technology favored sinusoidal functions until the arrival of semiconductors and digital technology. The change of technology required a broadening of the theory of communications by advancing from sinusoidal functions and Fourier analysis to general systems of orthogonal functions and the Fourier-type analyses associated with them. There were two problems that made this advancement difficult for the electrical engineer.

- (a) The functions favored by digital technology such as Walsh and Haar functions were not mentioned in the usual mathematical textbooks.

- (b) No engineering textbooks on general systems of orthogonal functions comparable in understandability to the ones on Fourier analysis were available. The book by Ahmed and Rao goes a long way to overcome these two problems.

One must have a good understanding of Fourier analysis to recognize when it should be used and when not, and to realize the direction of a generalization of communications theory required to take full advantage of digital technology. Hence, Ahmed and Rao start with a sophisticated review of Fourier analysis. They proceed to discuss functions that assume the values  $+1$  and  $-1$  or  $+1$ ,  $0$  and  $-1$  only, which are for digital technology what sinusoidal functions are for a technology based on capacitors, coils and other linear, time invariant components. The equivalents of the Fourier transform and - in short form - Fourier analysis for these functions are then elaborated. The emphasis is on Walsh-Hadamard transform and analysis, but one also finds such lesser known transforms as the Haar and the slant transform, both of which have been used for the compression of PCM television signals in industrial equipment.

The first seven chapters of the book are of general interest to the engineer who wants to keep current with the theory for digital technology. The last three chapters apply this theory to specialized topics: Wiener filters, data compression, and feature selection in pattern recognition. The book is suitable for a one semester course at the advanced graduate level; may it find wide acceptance for this purpose.

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"Electronic Databook (A Guide for Designers)"

by Rudolf F. Graf

2nd Ed., 312 pages, 8 1/2 X 11" paperback, \$10.95  
Van Nostrand Reinhold Co.  
450 West 33rd St., New York, New York, 1974

Reviewed by E. E. Wetherhold  
HONEYWELL INC.  
Aerospace Division  
Annapolis Operation  
Annapolis, Md.

This book was first published in 1971 under the title "ELECTRONIC DESIGN DATA BOOK," at a cost of \$17.95. Essentially the same material is again available in a second edition at the substantially lower price of \$10.95. As implied by the titles of the first and second editions, this book is intended to provide the electronic designer with a wide variety of concise and accurate design information gathered from many different sources and combined under one cover. For the most part, the design material is reprinted from previously published articles which appeared over the past 19 years in the electronic trade journals. Selected pages of several reference books are also reprinted. Forty sources for the reprinted material are acknowledged in a listing which specifies the pages where the material appears in the Databook. Other sources are individually acknowledged on the page with the reprinted material. After a careful and thorough study of the contents of this publication, this reviewer concludes that, because of an excessive amount of inappropriate material, wasteful page formatting, and unreliability due to the large number of errors the ELECTRONIC DATABOOK does not meet the requirements of today's designer.

The Databook is divided into six sections entitled: Frequency Data; Communications; Passive Components and Circuits; Active Components and Circuits; Mathematical Data, Formulas, Symbols; and Physical Data. The book concludes with a 4-page index. Data in the form of tables, charts, diagrams and nomographs (called "nomograms" in the Databook) are presented under the appropriate section heading. For example, Section 2 (Communications) contains various nomographs related to antennas, signal transmission, transmission lines, VSWR vs. attenuation, etc. Other data related to communications includes a listing of Q signals, commercial and amateur license requirements, phonetic alphabets used in voice communications, the Morse Code, etc. Other sections have a similar mixture of data related to their particular subject heading. For the most part, the text is printed in large type which is easy to read and the nomographs are large enough to provide good resolution when reading the scales.

The electronic designer has a definite need for an up-to-date single volume reference source containing and preserving the best design articles which have been published over the past fifteen years in the many electronic trade magazines. In the late 1940's and early 50's, McGraw-Hill's Electronics for Engineers provided such a source. But today's designer needs data on transistors (not vacuum tubes) and the many other modern devices and design techniques that have been developed over the past fifteen years or so. The following discussion should explain why the Electronic Databook does not meet the requirements of today's designer.

In the preface of the Databook, Mr. Graf refers to himself as the "author"; however, the term "editor" is a more proper title since most of the Databook material is simply a collection of article reprints. Also in the preface, Mr. Graf acknowledges the contributions and critical efforts of four others but the specific manner in which they contributed is not stated. To successfully edit such a publication such as the Databook, one must have sufficient breadth and depth of technical knowledge to correctly evaluate and revise (where necessary) the hundreds of articles available for reprint. One must also thoroughly examine all the electronic trade journals published at least over the past ten years so none of the important articles are overlooked. The usefulness of the Databook will depend on how well Mr. Graf and his associates have performed their jobs.

A cursory first glance at the Databook contents gives the impression of wide-spaced easy-to-read diagrams; however, a closer examination shows that about 8% of the contents (equivalent to about 25 pages) consists of blank space. This characteristic of unnecessary page inflation is typified by five of the nomographs where the short explanatory paragraphs could have been included on the same pages containing the nomographs. Instead, the explanatory text was placed on the adjoining page where it occupies only a small portion of the page. Although the Databook (according to the title) is a guide for designers, 30% of the Communications section is useless to the designer because fourteen of the forty eight pages are devoted to Q-signal codes, radiotelephone and Morse codes, signal report codes, and other similar material in place of exceptionally worthwhile and important design information (such as P. Geffe's article, "Comprehensive Tables for Resistive Attenuator Design," *EEE*, Nov. 1964) indicates that the editor and/or his associates did not sufficiently review the back issues of the important electronic trade magazines. Also, the extensive number of errors found by this reviewer indicates the Databook material was too often indiscriminately copied with little concern for accuracy or usefulness. For example, a

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page full of equations for series and parallel-connected combinations of L, C, and R are presented on page 89. Although the source credit for these equations is given to the Centralab Division of Globe-Union (with no mention of date), the original source of the data obviously is the tables that appear on pages 146 and 148 of the 4th edition of the Radiotron Designer's Handbook, and errors in the original tables are reproduced in the Databook. Because the additional useful variations of impedance formulas are not included in the Databook, the reader must refer to the ITT Handbook, Reference Data for Radio Engineers, where the correct and more extensive formulas may be found in either the 2nd or 4th editions.

The errors found by this reviewer can be grouped into the following three categories: (1) superficial errors (such as misspelled words) that can be found by the average non-technical reader - such errors do not affect the usefulness of the material and their presence simply indicates the lack of careful proofreading (2) minor technical errors (such as wrong values, incorrect signs, etc.) which can be detected by the technically trained reader - the continuous appearance of this type error indicates the lack of a thorough technical review; and (3) major technical errors (such as an incorrect design procedure or an incorrect schematic diagram) which are detectable only by one experienced and knowledgeable in the subject matter containing the error - these errors are especially dangerous as they produce a design that won't work or is unnecessarily inferior. Examples of superficial errors in the Databook are: (1) p. 1, improper title - "Electronic Design Data Book," instead of "Electronic Databook;" (2) pp. 14-15, "Monogram" instead of "Nomogram;" (3) p. 60, the proper title "International Civil Aviation Organization" (ICAO) is not used. Examples of minor technical errors are: (1) p. 75, the scales for the wire diameter are not in agreement with the AWG numbers; (2) p. 89, wrong sign of phase angle for the parallel combination of two inductors; (3) p. 105, the network sub-titles are reversed; (4) pp. 113-114, wrong sign for dB attenuation scale of LP filter responses; (5) p. 145, wrong sign for value of common emitter parameter  $H_{12}$ ; (6) p. 105, the text "...either type (of LP network) will perform the same electrically" is imprecise - the attenuation responses will be the same but the stopband  $Z_{in}$  will be different. Examples of major technical errors are: (1) pp. 111 & 120, the filter design examples make use of only m-derived sections which do not provide proper stopband attenuation more than one octave from the cutoff frequency - a proper LP or HP filter design always includes a constant-K midsection; (2) p. 127, the cascade (half-wave) voltage tripler schematic is inaccurate - the negative terminal of C3 should be connected to the negative terminal of C1, and  $R_L$  connected across C3. The half-wave

voltage quadrupler is also inaccurate. Although these two circuits will multiply voltage to the correct no-load level, the voltage regulation under load is inferior to the correct circuit (see QST, Oct. '71, p. 31 and Mar. '73, p. 48).

## EMC ENCYCLOPEDIA

Don White Consultants, Inc. has announced authors for eight volumes of their new multivolume encyclopedia on EMC and related subjects. These volumes should be published by the Spring of 1976.

Volume 2: "National & CISPR Specifications & Test Procedures" by H. Mertel, EMACO.  
Volume 3: "Spectrum Engineering & Management Techniques" by D. Jansky, OTP.  
Volume 4: "EM Ambients & Man-Made Noise" by A. G. Hubbard, USAEC.  
Volume 5: "EMI Control in Avionic Systems" by B. Keiser, Consultant.  
Volume 7: "EMP Effects & Protection for Electronics" by G. Bloom, M. Rose & W. Swift, IRT Corp.  
Volume 8: "Lightning Effects & Protection for Electronics" by W. Hart & E. Malone.

Additional authors are being sought for the following volumes:

Volume 6: Grounding for Control of EMI  
Volume 9: HERO  
Volume 10: Biological Hazards of RF Energy  
Volume 11: EMI Control for Medical Electronics  
Volume 12: EMC Agencies & Organizational Bodies

It is anticipated that the encyclopedia will contain over 40 volumes when complete. For additional information, contact DWCI, P.O. Box 325, Plymouth Meeting, PA 19462; (215) 825-6585.

## SAE PUBLISHES ARP 1173

The Society of Automotive Engineers, Inc. (SAE) has published a new Aerospace Recommended Practice (ARP) standard, no. 1173 titled "Test Procedure to Measure RF Shielding Characteristics of EMI Gaskets." The purpose of this procedure is to establish a testing technique of EMI gaskets with reliability and repeatability. The procedure covers low impedance or magnetic fields, high impedance or electric fields and plane-waves. A specially designed steel enclosure of approximately one square foot is required as a test fixture. Test frequencies are 400 Hz, 1 kHz, 14 kHz, 50 kHz and 200 kHz for magnetic fields, 1, 18 and 100 MHz for electric fields, and 0.4, 1, 3 and 10 GHz for planewaves. The use of automated scanning equipment is desirable but is not specified as a procedure. To obtain a copy, write to SAE Inc., 400 Commonwealth Dr., Warrendale, PA 15096.



## NOTES FROM SEQUENCY UNION

by  
G.R. Redinbo



### SQUARE WAVES AND POPULAR MUSIC

A paradox in the hip language of today? Hardly. The Allen Organ Company is offering a Harmonic Synthesizer which uses Walsh functions in its harmonic generators. Where most synthesizers use Voltage Controlled Oscillators (VCO) and filters to obtain tones, the new synthesizer has a patented<sup>1</sup> digital technique for doing it with a Walsh series. The weighting in the summation of a collection of Walsh functions is controlled by front panel settings and is activated from the keyboard.

This gives a precise approach to waveform synthesis and produces overtones beyond audibility. Even the attack and decay weightings of the tones can be developed from the summations of Walsh functions. Thus, dynamic effects can readily be created in addition to those normally produced by the use of voltage controlled filters. The RMI Harmonic Synthesizer, which is used by such popular artists as Stevie Wonder and Ray Charles, contains two harmonic generators for independent outputs so that stereo contrast effects can be produced.

Flexibility and variability are the key words to describe the all digital approach to music synthesizers. The use of Walsh functions in electronic music devices has recently received attention by audio engineers<sup>2</sup> and further technical innovations can be expected.

<sup>1</sup> U.S. Patent 3,878,749.

<sup>2</sup> B.A. Hutchins, Jr., "Experimental Electronic Music Devices Employing Walsh Functions," Journal of the Audio Engineering Society, vol. 21, pp. 640-645, Oct 1973.

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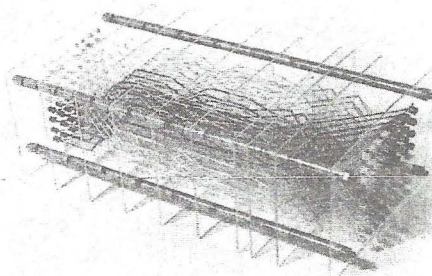
I have had the privilege of corresponding recently with Mr. Maurice L. Retter of Department of Nuclear Physics, University of Oxford, England, about some of his work and interests. I found the thrust of his work and his philosophy to be very interesting and I asked him to share it with the readers of the EMC Newsletter.

Mr. Retter, who holds a natural sciences degree from Cambridge (UK), had an extensive background in sonar array processing and ocean acoustics before turning to on-line computing and bubble chamber film analysis of high energy experiments in his present department. His main project at the moment deals with the search for "charmed" particles, but the broader theme throughout his work has been with computers and

their scientific use. His interest in the theory of Walsh and related discrete functional theories and a recent shift towards parallel computing theory have lead him to the development of a concept he terms Lattice Processors.

### LATTICE PROCESSORS

The fast Fourier transform (and with it all the other "fast" transforms) can be associated to a graph structure, and from the earliest days, the now familiar "signal-flow-networks" or "tree-graphs" have appeared in many papers and books. This is true because FFT techniques are based upon discrete group theory, and group theories are associated with structures of one kind or another. Hardware algorithms have generally avoided the full array-processing configuration because of cost and because micro-processors can perform diverse tasks with high speed and reliability. Conceptually the binary rate multiplier can be used to replace the computer. Whereas the computer introduces fixed word lengths and therefore rounding errors from the start, a stochastic computer such as the rate multiplier represents a number as a stream of transmission pulses the density of which (in time) represents the magnitude of the number and so identifies accuracy with time.



One can consider a signal flow network, therefore, as composed of an array of elements which combine such pulse streams and propagate the result as a new pulse stream to the next layer of elements. Two important topological considerations arise:

- What sort of real dimensional space can these networks occupy, and
- Why propagate?

Considering the first point, it appears that the signal flow networks can be configured in any number of dimensions. (To emphasize the structural interpretation of the graphical representation of the transform theory see the adjoining figure which is a physical model built to illustrate the 2-dimensional real-time Walsh-Hadamard transform.) The second remark suggests the classification of Reverberating and Transmission lattices. In the former the set of cells participating in the transformation undergo a cyclic set of states and in the latter case there are separate planes of cells which enable the separate states to be realized at different places. The concept of R- and T-lattices seems superior to the weak terminology "in-place," and the term lattice network more appropriate than "Butterfly."

(continued)



Just as Michelson used the harmonic analysis for the analysis of lightwaves, so perhaps the realization of such lattice structures suggests their use in modelling physical processes, and it may be that a whole new field in computer technology is just around the corner. One possibility is as a model for the transformation networks of the brain (the ultimate pursuit of information theory) or perhaps as a space-time model of diffraction physics. In principle lattice processors can be used in place of lightwaves for the optical computer or holography.

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#### WALSH FUNCTIONS AT A DISCOUNT IN RUSSIAN

A Russian translation of H.F. Harmuth's popular book Transmission of Information by Orthogonal Functions became available in 1975. The first printing in Moscow of the Russian version numbered about 5,000 and its sale price is 1.60 rubels. This is equivalent to about \$2.00; the English version is priced at \$22.50.

The publication of this book is continuing evidence of the great interest in Walsh and related functions inside the Soviet Union. However, from an author's viewpoint such translations evoke mixed feelings. On the one hand, it is flattering to have international acknowledgement for a text while on the other the Soviet Union does not recognize such technicalities as copyrights and author royalties.

## MEETINGS & EVENTS

### TEMPEST SEMINAR

A government sponsored TEMPEST seminar was held on October 10, 1975 at Lackland AFB. The timing was to coincide with the competition of the IEEE EMC Symposium held in San Antonio on October 6-8, 1975.

Approximately 150 people from government and industry were in attendance. The session was classified as SECRET and only persons who had previously submitted their clearance were allowed to attend. Persons who could not attend and would like to learn more on the subject should write to Director, Attn: S223, Ft. George Meade, MD 20755. Another symposium on the same theme will be scheduled in 1976.

### G-EMC AWARDS ANNOUNCED AT SAN ANTONIO SYMPOSIUM

The recipients of the regular annual group awards were announced recently at the Symposium held in San Antonio. The highest award, the Certificate of Appreciation was awarded to J. Paul Georgi in recognition of his service to the group as a member of the AdCom, its various committees and for his valuable liaison between the military services and G-EMC. In addition, the following awards were announced:

#### Certificate of Achievement -

1. Merrill N. Kustgarten - for his outstanding team leadership in the development of an EMC Figure of Merit
2. J. Meyer de Stadelhofen - for his pioneering development of the MDS Clamp measuring technique

Certificate of Recognition - Raymond E. Spence, Jr. in the field of Telecommunication Regulation

Honorary Life Member - Heinz M. Schlicke - in recognition of his outstanding leadership in the development and application of filter technology

#### 1974 Transactions Prize Paper Award -

Tomas Dvorak - for his related papers, "Electromagnetic Field Immunity - A New Parameter in Receiver Design" and "Measurement of Electromagnetic Field Immunity" Volume EMC-16, Number 3, August 1974

Certificate of Acknowledgement - William E. Cory - for services rendered as Chairman of the 1975 International Symposium on Electromagnetic Compatibility

#### "Debt of Gratitude" certificates to:

1. William E. Cory, President AdCom, EMC Group, 1974
2. Eugene D. Knowles, Vice President, AdCom, EMC Group, 1974, and Member AdCom 1972-74
3. Leonard W. Thomas, Sr., Secretary AdCom, EMC Group, 1974
4. Warren A. Kesselman, Treasurer AdCom, EMC Group, 1975 and Member AdCom 1972-74
5. Robert B. Cowdell, Member AdCom, EMC Group, 1972-74
6. Joseph F. Fischer, Jr., Member AdCom, EMC Group, 1972-74
7. Fred J. Nichols, Member AdCom, EMC Group, 1972-74
8. Dr. Ralph M. Showers, Member AdCom, EMC Group, 1972-74

#### Chapter-of-the-Year Award -

San Francisco Bay Chapter under the leadership of its officers: Victor M. Turesin, Chairman  
George C. Stump, Vice Chairman  
R. H. Kelkenberg, Treasurer  
Wilson Chu, Secretary  
Andrew Nalbandian, Past Chairman  
Clayton E. Doggett, Past Secretary

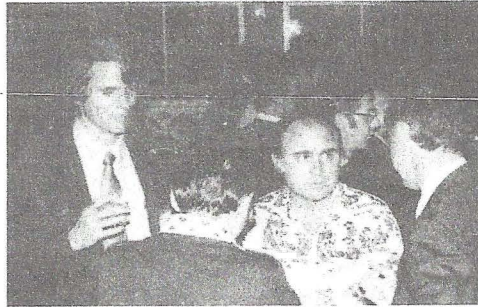
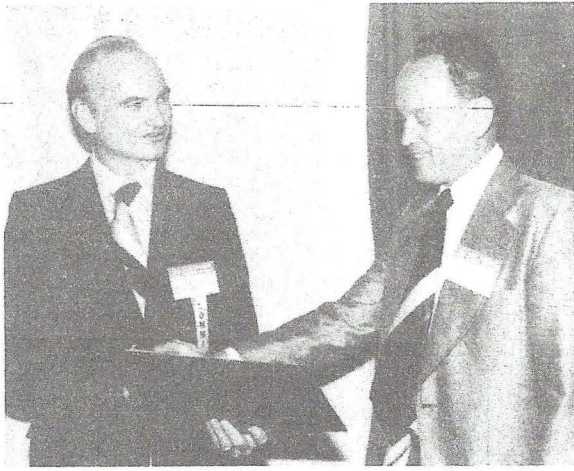


# SYMPOSIUM SNAP SHOTS





# 1995 SYMPOSIUM





THIRD INTERNATIONAL  
ELECTROMAGNETIC COMPATIBILITY SYMPOSIUM

EMC Symposium in Wroclaw is the meeting of specialists interested in the field, organized every two years. These symposiums are planned as a cyclic international event held alternatively with the Symposium and Exhibition on EMC in Switzerland.

During the symposium, a truly international platform will be offered for contacts and exchange of ideas and information in the field of EMC, i.e. in studying of the EMC environment status and of interaction between man-made electromagnetic radiation and technical and biological systems. The problems that are to be discussed become more and more important as the civilization develops and the sphere of this newly born discipline constantly enlarges. The interdisciplinary character of EMC makes such symposiums particularly advisable.

Date: September 22 to 24, 1976  
Place: Wroclaw, Poland  
Language: English and Russian  
/Simultaneous interpretation  
will be offered  
Participation: Registration deadline:  
March 30, 1976  
Further  
information: All the correspondence  
should be sent to:  
Technical University  
of Wroclaw  
EMC Symposium  
ul. Wybrzeze Wyspianskiego  
27  
50-370 Wroclaw  
Poland

ICC '76 TO OFFER TWO EMC SESSIONS

The International Conference on Communications will be held on June 14-16, 1976 at the Philadelphia Marriott Hotel. Sponsored by the Communications Society of the IEEE, the conference will focus on "Communications - Cornerstone of Freedom."

There will be two EMC sessions during this symposium. The first will be titled "EMC - Fact or Fantasy" and will feature four papers including, "The EMC Process (RFI vs EMC)" by Jacqueline Janoski, ECAC; "The Evolution of Communications EMC Standards" by Carl Pearlston, Aerospace Corp.; "FCC Standards for Imported Equipment" by Herman Garlan, FCC; and, "Communications EMC from the Radio Amateur Viewpoint" by Dr. Theodore Cohen, ARRL. The session chairman will be Robert D. Goldblum, R & B Enterprises.

The afternoon session will be a panel discussion on the technical merits, problems of compliance, and fairness of FCC rules and their variations in interpretation from industry to industry. The session chairman will be Mr. Paul A. Major, USAEL, and speakers will include Ivan Godier, Bell Northern Research, Don Jansky, OTP, Herman Garlan, FCC, and R.J. Mayher, OT. For additional information, write to: ICC '76, P.O. Box 8357, Phila., PA 19101.

EMC COMPUTER APPLICATION SYMPOSIUM

A two-day symposium on "Computers and Programs for EMI/EMC Applications" will be presented in four half-day sessions covering (1) programmable calculators and computers, (2) equipment and sub-system level EMC applications, (3) inter-system prediction and design applications, and (4) intra-system prediction and design for the control of EMI. Technical papers will be presented by invitation only. Attendance will be limited to 130 participants plus 20 government and industry speakers. A symposium summary digest of papers will be issued and speakers will pass out copies of their papers. Attendance fee is \$35 per session or \$100 per participant for the two-day symposium.

The purpose and mission of this symposium is to seek out the truth regarding how programmable calculators and computers really fit into the solution of EMI problems. How accurate are mathematical models and supporting data base in computing EMI? What are the statistical or probability-of-EMI implications? What is the effect on equipment/system overdesign and underdesign? What programs are available - small, medium and large? Do they really work? What are the cost implications including hardware and software? What are the lead and reaction times to prepare and enter problem data into calculators and computers, and how much elapsed time is required for results? How easy or difficult are programmable calculators and computers to use and how much training is needed?

The Symposium, sponsored by Don White Consultants, Inc. will be held at the Sheraton-National Hotel in Alexandria, VA on March 23 and 24, 1976. For additional information, contact Don White, 14800 Springfield Rd., Germantown, MD 20767, Tel: 301-948-0028.

1976 MICROWAVE POWER SYMPOSIUM  
CALLS FOR PAPERS

The International Microwave Symposium will be held at the Katholieke Universiteit Leuven, Louvain, Belgium on July 27-30, 1976. The Symposium will include technical sessions as well as a short course on microwave power. Original and review papers are being solicited which describe new technical contributions in non-communication areas of microwave power. Authors are invited to submit an abstract of less than 40 words and a summary of less than 500 words, typed double-spaced. The summary must include specific information since selection will be made on the basis of summary content. Forward 5 clear copies of both summary and abstract before February 2, 1976 to the Technical Organizing Committee, Chairman, Robert V. Decareau, P.O. Box 247, Amherst, NH 03037. Authors from Europe and Asia should address, Antoine R. van de Capelle, Dept. of Electrical Engineering, Div. of Microwaves and Lasers, Katholieke Universiteit Leuven, Kardinall Mercierlaan 94, B-3030 Heverlee, Belgium.



## INTERNATIONAL UNION OF RADIO SCIENCE (URSI)

### GENERAL ASSEMBLY

The URSI held its 18th General Assembly in Lima, Peru on August 11-19, 1975. There were over 400 attendees from 35 countries. Also, for the first time, the URSI held open symposia in conjunction with the assembly: Symposium A on "Radio Waves and the Ionosphere," Symposium B on "Non-stationary Signal Analysis," and Symposium C on "The Telecommunications Noise and Interference Environment."

The URSI reorganized in Lima from eight to nine commissions, with increased emphasis on the scientific aspects of telecommunications: Commission A (similar to old Commission 1) on Electromagnetic Metrology, Chairman Dr. H.M. Altschuler (USA); Commission B (similar to part of old Commission 6) on Fields and Waves, Chairman Prof. Van-Blavel (Belgium); Commission C (similar to part of old Commission 6) on Signals and Systems, Chairman Prof. B. Picinbono (France); Commission D on Physical Electronics (similar to old Commission 7), Chairman Prof. A. Smolinski (Poland); Commission E on the Interference Environment (similar to old Commission 8), Chairman Dr. Ya. I. Likhter (USSR); Commission F on Wave Phenomena in Non-Ionized Media (similar to old Commission 2), Chairman Dr. K.F. Eklund (Sweden); Commission G on Ionospheric Radio (similar to old Commission 3), Chairman Dr. J.W. King (UK); Commission H on Waves in Plasmas (similar to old Commission 4), Chairman Dr. R. Gendrin (France); and Commission J on Radio Astronomy (similar to old Commission 5), Chairman Dr. G. Westerhout (USA).

The Academy of Sciences of Sophia, Bulgaria was admitted to URSI as a new member Committee. The 19th General Assembly is scheduled for Helsinki, Finland in the summer of 1978.

Among the highlights of the Lima meeting was a panel discussion in Open Symposium C organized by Mr. G.H. Hagn of Stanford Research Institute on the present and possible roles and relationships of URSI, CCIR and CISPR regarding noise and interference studies. Participants included Prof. F.L. Stumpers (Netherlands), Dr. F. Horner (UK), Mr. J.W. Herbstreit (USA), Dr. S.S. Sviridenko (ITU), Mr. O. Larsson (Sweden), Mr. M.M. Thue (France), and Mr. A.G. Hubbard (USA).

The new URSI Board of Officers includes:

President - Mr. J. Voge (France)  
Vice Presidents - Prof. N.W. Christiansen (Australia)  
Prof. V.V. Miguelin (USSR)  
Prof. W.E. Gordon (USA)  
Prof. F.L. Stumpers (Netherlands)  
Secretary General - Dr. C.M. Minnis

Anyone desiring additional information on URSI, subscriptions to the URSI Bulletin (\$8.00/year, issued quarterly) can obtain it from Dr. Minnis, c/o URSI Secretariat, 7 Place Emile Danco, B-1180 Brussels, Belgium.

A 133 page book, Review of Radio Science, 1972-1974, ed., Dr. S.A. Bowhill, Aeronomy Laboratory, Department of EE, University of Illinois, Urbana, Illinois, 61801 was distributed at the meeting. Copies of this book are available from Dr. Bowhill for \$7.50, including postage.

## MISCELLANY

### A COMPARATIVE STUDY OF MEDIUM FREQUENCY SKY WAVE FIELD STRENGTH PREDICTION METHODS

A report (RS75-07) entitled "A Comparative Study of Medium Frequency Sky Wave Field Strength Prediction Methods" has been issued by the FCC. This report was prepared by the Research and Standards Division of the FCC's Office of Chief Engineer. Extensive FCC measurements have been used as a common base of a comparative study which compares FCC curves, curves from CCIR Report 264-2 and the new modified U.S.S.R. prediction method. Calculated and measured results are compared and their differences analyzed in detail in this report.

Limited copies are available through the Research and Standards Division, Room 7202, 2025 M Street, N.W., Washington, D. C. 20554. The telephone number is Area Code 202, 632-7040.

### HARMFUL EFFECTS OF POWER LINES

The International Telecommunication Union (I.T.U.) has published new pages (additions and amendments) to be inserted in the "Directives Concerning the Protection of Telecommunication Lines Against Harmful Effects from Electricity Lines," 1965 edition, as well as the Guide for the Application in a Simple Case of the Directives Concerning the Protection of Telecommunication Lines. The Directives set measures to be taken to avoid or reduce the harmful effects of power lines on neighboring telecommunication lines.

The 136 new pages, published in separate French and English versions in format 4A are available at a cost of 53 Swiss francs, from

General Secretariat of the ITU  
Place des Nations  
CH-1211 Geneve 20, Switzerland

A complete list of available publications may be obtained free of charge.



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H W DURRWACHTER 2ND  
CINCINNATI  
M C EDGAR JR  
M F FAVERKOS  
JOHN W KINCAID JR  
MALCOLM A MAC LEED  
ARTHUR C STEWART

CLEVELAND  
H M FUGE  
ROBERT E NESS  
STEVEN L SAFAJCAK  
C E SMITH  
ANDREW E YOUNG  
COLUMBUS  
EDWIN K EVENSEN  
C G SVALA  
G A THIELE

### DAYTON

H M PARTMAN  
J E PRANCELIC  
WILLIAM F GIBBCAS  
W J FALE  
J C HOFFFEL  
R W ITTELSON  
CLIFF KEHL  
DOLGLAS C LOCKIE  
P T MARTI

VICTOR MCRAITS  
CHARLES E SETH  
SAMUEL SKCLNIK  
D R WALTER  
ELDEN E WICK  
JAMES M WILLCLCHRY JR  
KENNETH E WILSON  
R L WIRT

### DELAWARE BAY

THOMAS T ROTHMAN  
EASTERN SHORE  
DAVID C SHIREY  
ERIE  
C A PURKHARD  
MARSHALL A GARNER  
P CHOWCHURI  
JOSEPH W JOHNSON  
JOHN R LANE  
THOMAS L VENABLE  
J J WALSH  
E L ZEIGLER

### LEHIGH VALLEY

CHARLES F KERCHNER JR  
LIMA  
W E FAWLEY  
NORTH CENTRAL  
OHIO  
RONALD W BREWER  
PHILADELPHIA  
W E AMOS  
R E ANDERSON  
JOSEPH BANASIAK  
M C BECHER  
ROBERT E BENDER  
HOWARD A BONC  
E M BROWN  
J E CASEY  
EMICIO CELANI JR  
DAVID L FAUST  
ROCCO F FICCHI  
NEIL M FCGIANI  
LUKE A FCRREST JR  
CONRAD J FCHLER  
STEVEN C GARCIA  
E E GARFIELD  
ALBERT J GEJA  
R C GOLDBLUM  
FRED HABER  
JAMES E HAMILTON  
NORMAN A HOLLAND  
W JARVA  
A R KALL  
M KANT  
ANTHONY R LEPCNE  
T W LIAO  
DANIEL F LILLIE JR  
SANCFORD S MERSKY  
A G NEWHAM  
R C NUSSBAUM  
M M CFLAFERTY  
GERALD T PIRRLNG  
EVERETT T RAYLMAN  
J S REESE  
L J SHANE  
W C SHEN  
R M SHOWERS  
DANIEL J SIGNCRE  
R H SUGARMAN  
R F THOMPSON  
W A VISHAR

### PITTSBURGH

F M CIFTIRICH  
M L CSBORN  
A G POKRANT  
DERRILL F SHANKLE  
DONALD E STARK  
SUSQUEHANNA  
WILLIAM P FRITZ  
W J HUMPHSON JR  
JAMES C LATIMER



WASHINGTON  
EDWIN L ABELL  
J C AHLGREN  
A P ALBRECHT  
C C ALLEN  
VIRGIL ARENS  
JAMES H ATKINSON  
WILLIAM RABRINGTON JR  
S L BAILEY  
WILLIAM A RAKER  
ROBERT B RIRCHFIELD  
R J POTTEILHC  
ROBERT C BRISKMAN  
ALEXANDER C BROWN JR  
G A BROWN  
IRVING A BROWN  
JCHN BLCKMAN  
R A BULLOCK  
CARL B CAHILL  
A F CARROLL  
E P CARROLL JR  
ARTHUR CASEY  
DAVID P COFFIN JR  
R T COLLINS  
J J CRENCIA  
H DAVIS 3RD  
EARL J DIEHL  
HAROLD F GINGER  
J E GUDGE  
THOMAS W GUEPPNER  
WILLIAM G DUFF  
J F EWING  
ARTHUR H FELLER  
FRANK E FERRANTE  
JOSEPH J FISHER  
THEODORE R FLICK  
CARL L FREDERICK SR  
E R FREEMAN  
J T FREEMAN  
ROBERT F FRENCH  
RICHARD W FRIER  
ALBERT W FRIEND JR  
CHARLES F FULTON  
F M GAGER  
WILLIAM CAMPLE  
F CARLAN  
CHARLES F GASKIN  
GEORGE E GAUTNEY  
WILLIAM C GREEN  
RALPH E GRIMM  
C M GWALTNEY  
G H HAGN  
ROBERT J HANSLMAIER  
HENNING F HARMUTH  
WILLIAM F HEINZ  
J S HILL  
M W HODGWITZ  
W F W HOWE  
C M JACOBS  
R E JONES  
B E KEISER  
J J KELLER  
JUNE KOSTYK  
S KRASSOWSKY  
R F LANE  
DAVID P LAPCINTE  
J C LEE  
RONALD J LEPKOWSKI  
JACK W LINTHICUM  
C W LYNN  
ERNEST A MAGYAR  
ROBERT F MAIER  
R C MAPSHALL JR  
J W MC CLUTCHEN  
ROBERT C MC INTYRE  
JAMES G MC NELLIS  
H P MEISINGER  
GEORGE MERKEL  
W MCFELLI  
W P MORTON  
ARTHUR W MURPHY  
R C PAGE  
R C PARLCK  
ALVIN W PAUL  
WILLIAM S PICKETT  
H RANDALL  
A P RASMUSSEN  
R R REHRING  
ALVIN REINER  
J J PENNER  
HAROLD R RICHMAN  
MELVIN S ROBERTS  
J BROWN  
MORTON PONEY  
JOHN J REVITY  
ROBERT R VASCA  
ROBERT M VACHS  
C F SANDY JR  
ERIC J SCHYVEL  
DAVID A SEGERSEN  
R A SETTERSTEN  
GLEAVE SHAPIRO  
MARVYN E STEGAL  
R F SIMMONS  
J W SKAGGS  
JAMES E STEPPON JR  
RODMOND C STEVENS  
J L STEWART  
ALFRED C STRAIN JR  
A H SULLIVAN JR  
T C TALLANT  
WILLIAM E TATE  
R E TAYLOR  
RICHARD A TELL  
LEONARD W THOMAS SR  
A VAN WINEGARDEN

HEARY H VARHLS  
LESLIE A WALL JR  
J P WALSH  
C P WATKINS  
BRUCE D WETINSCHER  
EDWIN P WETINSCHER  
DONALD R WHITE  
DENIS A WHITTAKER  
GEORGE F WINTERS  
E A WOLFF

WEST VIRGINIA  
JAMES L OCLAN

## Region 3

ALABAMA  
ZEP L BURRELL 3RD  
DENNIS J GALLCWAY  
ATLANTA  
F L CAIN  
HUGH W DENNY  
ERNEST E DONALDSON JR  
R S DUGGAN JR  
F P FOLDER  
E G HOLMES  
H F JENKINS  
R C JOHNSON  
RONALD W LARSEN  
D W ROBERTSON  
W ROBINSON  
LEONARD W THOMAS JR  
J C TOLEF  
JIMMY A WOODY  
BROWARD  
WILLIAM S BURICK  
PETER J CARLSON  
A FEMPHILL  
JAMES C KOEPER  
CANAVARAL  
J A BLOOF  
PALL KNIGHT  
W E PAKALA  
CENTRAL VIRGINIA  
A L BRAUN  
R P GIFFORD  
LOUIS J KOCOTAS  
RICHARD T MYERS  
NEAL H STEPHENS  
EVANSVILLE-OWENSBORO  
ANTHONY W NINCHAY  
FLORIDA WEST COAST  
CHARLES W DEAN  
H W HUNT  
PATRICIA J KARN  
MARY E LIPTHAY  
P PELTZER JR  
GEORGE F SILBERMANN  
GAINESVILLE  
ROGER V KRUHM  
R R MC PHERSON  
HAMPTON ROADS  
J N BOLAND  
R P FAUST  
ROBERT E METCALFE  
HUNTSVILLE  
ROBERT K PARKER  
H R SEIG  
J W WEIMER  
LEXINGTON  
DONALD R RUSH  
CLAYTON F PALL  
LOUISVILLE  
E L MARVEN SR  
T L WILSON  
MEMPHIS  
JIM HARKINS  
EDWARD K YUNG  
MIAMI  
FREDERICK W DAUER  
MISSISSIPPI  
HILLY D CRAVES  
CLAYBORNE D TAYLOR  
L L TSAI  
TE-KAO WU  
MOBILE  
M C PAKER  
NASHVILLE  
RONALD A WRIGHT  
NEW ORLEANS  
A W ANDERSON JR  
CLIFF M PIRAM JR  
J A CRONVICH  
WILLIAM F FREEMAN  
J W JOYNER  
ORLANDO  
D P BAXTER  
SAM J BREIDT  
HERBERT E COOPER  
R A FOKKANEN  
C F MC CLURE  
G W NORTH  
BERNARD F ROBINSON JR  
PHILIP A TONEY  
C E WHITESCARVER

PALM BEACH  
R B BURKLUND  
L W FEENEY  
JUNIOR R NICHOLSON  
PANAMA CITY  
ROBERT C GORMLEY  
RICHMOND  
RICHARD T FORC  
TEC R SODTA  
DAYTONA  
R P ROUCHARD  
R R RASCHE  
W K ROBERTS

AFFILIATION OF  
NORTH CAROLINA  
SECTIONS

EASTERN  
NORTH CAROLINA  
DAVID F TACKLEMAN  
SEIKI OGURA  
JACK D WILLIAMS  
WINSTON-SALEM  
HENRY J GREATER  
G C WATFORD  
AFFILIATION OF  
SOUTH CAROLINA  
SECTIONS  
COASTAL  
SOUTH CAROLINA  
H W ASKINS JR

## Region 4

CALUMET  
HEFFERT W CRAIG  
CEDAR RAPIDS  
JOHN A BIRKLAND III  
R C DIECKMANS  
MARGARET M ERNST  
MILTON A LAHR  
CENTRAL ILLINOIS  
J C DYSON  
PALL NIELSEN  
CENTRAL INDIANA  
V CONES  
H C FASSBURG  
KENNETH C MCWERY  
MILES S CLSON  
WARREN D PEELE  
DANIEL G WAYNE  
CHICAGO  
NORMAN R ANDERSON  
ROGER A RAIM  
J F REALL  
ABEUL A EHATTI  
J F BRIDGES  
JOHN F CLEUGH  
CARL P COPEY  
L R COSTELLO  
DENNIS CZIEPZAKSKI  
VINCENT C FORMANEK  
P GOLDSTEIN  
JOHN W GROSS  
H P HEGNER  
J P JALLITS  
JAMES C KLOUDA  
J J KRZANSKY  
P J MARKS  
M A MIHALKANIN  
VEC P MANDA  
WERNER E NEUMAN  
BRUCE G PEYNOLDS  
EDWIN M SCHAEFFER  
W A SCHLESINGER  
ROBERT F SHARP  
EMIL SKOCYFEC  
STEVE SMANDRA JR  
L S SMULKSTYS  
JAMES P VALANCIUS  
R A WAGHORN  
E W WEBER  
NORMAN W WEHLING  
WILLIAM C WELLS  
COLIN B WILLMOTT  
H L WOLFMAN  
FORT WAYNE  
FRANK A NEIDIGH  
ILLINOIS VALLEY  
WILLEM F RAKKER  
MADISON  
MEHRAD ROZERGZAD  
KIM P SCHIFF  
MILWAUKEE  
LAWRENCE B KORTA  
H W SCHULKE  
R G WHEELER  
FREDERICK J WOLTERS  
NEBRASKA  
A G CARPENTER  
K F WYCOFF

NORTHEAST  
MICHIGAN  
J C MC LAUGHLIN  
NORTHEASTERN  
WISCONSIN  
A C FITZNER  
SOUTHEASTERN  
MICHIGAN

NICHOLAS ALINFICH  
J G PARRIE  
F PALER  
DENIS J BEAULNE  
A C COTY JR  
F A FANYSZ  
F W FARE  
JOHN N LATTA  
J A M LYNN  
C E MAST  
SEYED H MOUSAVINEZHAD  
DONALD E NEUMANN  
GARY SKODACK  
P G TOWNSEND  
WILLIAM C TRARCLD  
R P WALLACE  
NORMAN WELSH  
JAMES C YOUNG  
MINNESOTA  
JOHN KERNFELD  
TWIN CITIES  
LEONARD RIGELCH  
V B ROLLESEN  
F E FINEGAN JR  
S J GADLER  
DAVID A FIMLEY  
JOHN HERNSTBY  
CHARLES C JACKSON  
THOMAS J JORGENSEN  
D J KEATING  
HARRY G MAURER  
RICHARD F MEESSE  
J W NESTING  
JOHN B POPE  
ROBERT J SCHLENTZ  
G W SCHMITT  
R W SECOR  
C A SWENSON  
MARK A TAUBE  
YUNG-YU I WANG  
L WERNER  
DAVID L WHITE  
WEST MICHIGAN  
HARRY FEISSEL  
JAMES D HABEGGER  
L M YIKF

## Region 5

CENTRAL TEXAS  
JAMES F ROHREN  
C M PRENKAN  
EDWIN L PRONAUGH  
WILLIAM E CRY  
LEWIS S FOUNTAIN  
O L JOUFFRAY  
DONALD R KERNS  
CARL C LAMBERT  
MAX C TERBS  
G A VAN STEENBERG  
R J KELTY  
C P WILKES  
TULSA  
W A PONDY  
E F CHEW  
DAVID CLIFTON  
GENE H FRESTER  
C M JONES  
DAVID T KUFFELCLIST  
JAMES P MCINTOCMERY  
J R MOSE  
DAVID H SHAFF  
G P STEELE  
DON F TAYLOR  
DENVER  
H AKIMA  
WILBUR J ANSCA  
WILFORD G ARTHUR  
GENE G AX  
A F BARGHAUSEN  
DARRELL V COBLE  
ROBERT W ELLISON  
G C GIERFART  
FRANK M GREENE  
RAYMOND E JENNINGS  
RICHARD C JOHNSON  
JAMES F KLUGE  
EDWARD F KUESTER  
V G LEENERTS  
ROBERT D LEWIS JR  
FRANK V MC FARLAND  
F A MILLER  
CLIN J MCCRE  
J P MURRAY  
ROBERT E NELSON  
HENRY R RAY  
ROBERT M SHUFFLER SR  
H E TAGGART  
JOHN J TARY  
F F WILLIS

FORT WORTH  
LARRY A FRAZER  
K W KOERITZ  
EDWARD F VANCE  
O F WATKINS  
HOUSTON  
W T HUDGINS JR  
HOWARD H LITTLE  
THOMAS M ROBERTY

VICTOR F ACUNA  
NASTIP AHMED  
DAVID P ANDERSON  
R BASHAM  
R L CLARKE  
HAROLD D MCRANEY  
R I MOWER  
LOUISE P SPECK  
J E WOODWARD  
OKLAHOMA CITY  
CARL L SCHEIPMAN  
SAINT LOUIS  
JOHN BREMER  
J R COX JR  
C FISHER  
DARRELL J KRATZER  
JERRY C LEE  
ROBERT H LIVINGSTONE  
JOHN N WANGCFF JR  
KEYAN MCCLAVI  
R T STINCHCOMP  
DALLAS  
J E FANKINS  
LARRY P WRIGHT  
WICHITA  
JAMES R FOEDE  
D E DENNY  
LEONARD C HENRY  
JOHN E HOLLAND 3RD  
W R JOHNSON  
WALTER C RHOES JR

## Region 6

ALASKA  
JAMES G ARFKIT7  
W A COLAN  
ALBUQUERQUE  
STEFFEN W ACHRAMCW  
CARL BAUM  
R E GLASER  
C W HARRISON JR  
ROBERT L HUTCHINS  
GARTH MAXAM  
DAVID E MEREWETHER  
BOISE  
L R LANGDON  
FORT HUACHUCA  
ROPPY G ALLEN  
CALVIN R CHRISTIANSON  
JOHN S DAVIES JR  
HAWAII  
R R FORD  
STEVEN P GOUVEIA  
J M JOUVENAT  
NORMAN J METZ  
W C MEUCORFF  
WILFRED I TSKAMOTO  
LEE R WICAL KFERZF  
R F WELER  
DWAYNE W ABERKAMP  
J M ELARK  
ROBERT E ELWORE  
DAVID L CUNTRY  
CARL P JESPERSEN  
ROBERT E KEMPER  
R R LASH  
R F LELAND  
PHILLIP C MARFENEN  
V I MINKEL  
HAROLD E NILFS  
JOHN K CLIVER JR  
VERLE E FARMER  
R E ROSEFERRY  
R E SAMUELSON  
BEN E SIMMONS  
RONALD D STOKER  
PORTLAND  
K B AUSTIN  
VERNON L CHARTIER  
FREDERIC H DICKSON  
S L CYRNFS  
VAL S LAVA  
R A PROVINCE  
R E SHOW  
SACRAMENTO  
PHOENIX  
P J DUGAL  
A F HOFFLICH  
CHARLES F LAMPERT JR  
G G NORTH  
A L PETERSON  
JOHN P SCHOCK 3RD



## WASHINGTON

EDWIN L. ABELL  
J. C. AHLGREN  
A. P. ALBRECHT  
C. C. ALLEN  
VIRGIL ARENS  
JAMES H. ATKINSON  
WILLIAM R. BARRINGTON JR.  
S. L. BAILEY  
WILLIAM R. BAKER  
ROBERT A. BIRCHFIELD  
R. J. POTTEILHC  
ROBERT C. BRISKMAN  
ALEXANDER C. BRUNN JR.  
G. A. BROWN  
IRVING R. BROWN  
JOHN BUCKMAN  
R. A. BULLOCK  
CARL B. CATHILL  
A. F. CARROLL  
E. R. CARROLL JR.  
ARTHUR C. CASEY  
DAVID P. CECILIN JR.  
R. T. COLLINS  
J. J. CRENSA  
H. DAVIS-3RD  
EARL J. DIEHL  
HAROLD F. DINGER  
J. E. DODGE  
THOMAS W. DOEPFNER  
WILLIAM G. DUFF  
J. E. EWING  
ARTHUR H. FELLER  
FRANK E. FERRANTE  
JOSEPH J. FISHER  
THEODORE R. FLICK  
CARL L. FREDERICK SR.  
E. R. FREEMAN  
J. T. FREEMAN  
ROBERT F. FRENCH  
RICHARD W. FRENIER  
ALBERT W. FRIEND JR.  
CHARLES F. FULTON  
F. M. GAGER  
WILLIAM CAMBLE  
H. CARLAN  
CHARLES E. GASKIA  
GEORGE E. GAUTNEY  
WILLIAM C. GREEN  
RALPH E. GRIMM  
C. M. GWALTNEY  
G. H. HAGG  
ROBERT J. HANSLWATER  
HENNING F. HERMUTH  
WILLIAM F. HERMUTH  
J. S. HILL  
W. H. HODGKINS  
W. F. H. HOWE  
C. M. JACOBS  
R. F. JONES  
B. E. KEISER  
J. J. KELLER  
JUNE KESTYK  
S. KRASSOWSKY  
R. F. LANE  
DAVID R. LAPCINTS  
J. C. LEE  
J. M. LEPCOLD  
DONALD J. LEPCOWSKI  
JACK M. LINTICUM  
C. M. LYON  
ERNEST A. MAGYAR  
ROBERT F. MAIER  
R. S. MARSHALL JR.  
J. W. MC CLIFFEN  
ROBERT C. MC INTYRE  
JAMES G. MC NELLIS  
H. P. MEISINGER  
GEORGE MERKEL  
W. MCCELLI  
W. P. MORTON  
ARTHUR W. MURPHY  
C. E. PAGE  
R. C. PARLOW  
ALVIN W. PAUL  
WILLIAM S. PICKETT  
H. RANDALL  
A. R. RASCHUSSEN  
G. R. REINARD  
ALVIN REINER  
J. J. RENNER  
HAROLD R. RICHMAN  
MELVIN S. ROBERTS  
J. ROMAN  
MORTON RONEY  
JOHN J. ROVITO  
ROBERT R. RYAN  
ROBERT M. SACHS  
G. F. SANDY JR.  
ERIC J. SCHWENKEL  
DAVID A. SEGERSON  
R. J. SETTERSTEN  
GLAUSTAV SHAPIRO  
MARVYN E. SIEGAL  
R. F. SIMMONS  
J. W. SKAGGS  
JAMES E. STEEDMAN JR.  
RODMOND C. STEVENS  
J. L. STEWART  
ALFRED C. STRONG JR.  
A. F. SULLIVAN JR.  
I. C. TALLANT JR.  
WILLIAM E. TATE  
P. L. TAYLOR  
RICHARD A. TELL  
LEONARD W. THOMAS SR.  
H. VAN WINEGARDEN

HENRY H. VARHLS  
LESLIE A. WALL JR.  
J. P. WALSH  
C. F. WATKINS  
BRUCE D. WINSCHER  
EDWIN P. WESTERCK  
DONALD R. WHITE  
DENIS A. WHITTAKER  
GEORGE F. WINTERS  
E. A. WOLFF

WEST VIRGINIA  
JAMES L. ECLAN

## Region 3

ALABAMA  
ZEP L. BURRELL 3RD  
DENNIS J. GALLCWAY

## ATLANTA

F. L. CAIN  
HUGH W. DENNY  
ERNEST E. CONALDSON JR.  
R. S. CUGGAN JR.  
F. P. FOLDER  
E. G. HOLMES  
H. F. JENKINS  
R. C. JOHNSON  
RONALD W. LARSON  
D. W. ROBERTSON  
J. ROBINSON  
LEONARD H. THOMAS JR.  
J. C. TOLE  
JIMMY A. WOODY

## BROWARD

WILLIAM S. BURDICK  
PETER J. CARLSON  
A. HEMPHILL  
JAMES C. KOOPER

## CANAVARAL

J. A. BLOCH  
PAUL KNIGHT  
W. E. PAKALA

## CENTRAL VIRGINIA

W. L. BRAUN  
R. P. GIFFORD  
LOUIS J. KOCOTAS  
RICHARD T. MYERS  
NEAL H. SKEPHERD

## EVANSVILLE-OWENSBORO

ANTHONY W. NIMCHAY

## FLORIDA WEST COAST

CHARLES M. DEAN  
H. W. HUNT  
PATRICIA J. KARN  
MARY E. LIPTHAY  
E. P. PELTZER JR.  
GEORGE F. SILBERMANN

## GAINESVILLE

ROGER V. KRUMM  
R. MC PHERSON

## HAMPTON ROADS

J. A. POLAND  
R. F. FAUST  
ROBERT E. METCALFE

## HUNTSVILLE

ROBERT W. PARKER  
H. R. SEID  
J. W. WEIMER

## LEXINGTON

RONALD R. RUSH  
CLAYTON F. PAUL  
LOUISVILLE  
E. L. MARVEN SR.  
T. L. WILSON

## MEMPHIS

JIM HARKINS  
EDWARD K. YUNG  
MIAMI  
FREDERICK W. DAUER

## MISSISSIPPI

BILLY C. CRAVES  
CLAYBORNE D. TAYLOR  
L. L. TSAI  
TE-KAO WU

## MOBILE

M. C. PAKER  
NASHVILLE  
RONALD A. WRIGHT

## NEW ORLEANS

A. W. ANDERSON JR.  
CLIFF M. PIRAN JR.  
J. A. CRONVICH  
WILLIAM F. FREEMAN  
J. W. JOYNER

## ORLANDO

J. C. BAXTER  
SAM J. BREIDT  
HERBERT C. CECER  
R. N. HOKKANEN  
G. F. MC CLURE  
C. W. NORTH

BERNARD F. ROBINSON JR.  
PHILIP A. TONEY  
C. D. WHITESCARVER

PALM BEACH  
R. E. BURKLUND  
L. W. FEENEY  
JUNIOR R. NICHOLSON  
PANAMA CITY  
ROBERT C. GHEMLEY  
RICHMOND  
RICHARD T. FORC  
TEC R. SEROTA

## DAYTONA

R. P. PRITCHARD  
R. R. RASCHKE  
W. K. FORESTS

## AFFILIATION OF NORTH CAROLINA SECTIONS

## EASTERN

NORTH CAROLINA  
DAVID F. HACKLEMAN  
SEIKI HIGURA  
JACK D. WILLIAMS

WINSTON-SALEM  
HENRY J. GRIFFIN  
G. C. WATFORD

## AFFILIATION OF SOUTH-CAROLINA SECTIONS

COASTAL  
SOUTH CAROLINA  
H. W. ASKINS JR.

## Region 4

## CALUMET

HERBERT W. CRAIG  
CEDAR RAPIDS  
JOHN A. BIRKLAND III  
R. C. DIECKMANN  
MARGARET M. ERNST  
MILFRED A. LAHR

## CENTRAL ILLINOIS

J. D. DYSON  
PAUL NIELSEN  
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MASAYOSHI HOSHINA

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IKIC TANAKA  
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FUSAO TANIGUCHI  
N TATSUMI  
KAZUTO TOGINO  
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## STATUS REPORT ON AIR FORCE INTRASYSTEM ANALYSIS PROGRAM (IAP)

BY

WILLIAM G. DUFF

For several years now, Rome Air Development Center (RADC) has been working on the IAP which consists of the Intrasytem Electro-magnetic Compatibility Analysis Program (IEMCAP) and supplemental models covering lightning, static electricity, TEMPEST, nonlinear receiver effects, and electromagnetic field analysis. The IAP provides a computer-oriented mathematical modeling technique designed to give the EMC engineer the flexibility required to design EMC into a system. It will also provide the system manager with greater visibility and more accurate information on which to base program decisions.

The IEMCAP is the basic building block from which the total program will evolve. It is written in USA Standard FORTRAN IV. This makes it readily adaptable to most computers. It is an engineering oriented program. All input data is in freefield format. The program generates equipment specifications based on the individual system in which it is to be used. It also can be used to perform a survey of a system for possible interference, a trade-off analysis of two different designs or a waiver analysis when an equipment does not meet its intended specification.

The output from the IEMCAP provides interference margins for all equipments in the system. It also contains an Intrasytem Signature File (ISF). This is a total record of the complete system including interference margins, port spectra, equipment locations, wire routing and bundling data. This is the information that will be needed for any additional analyses on the system whether it be now or in the future when a system modification is being considered.

The IEMCAP is currently operational and can be provided to potential users on either seven or nine track magnetic tapes. Complete documentation is also available through NTIS.

RADC has conducted two training courses on the IAP and is contemplating a third one for June 1976 if enough interest is expressed. This third course will be held at either Syracuse University, New York, or Electronics Systems Division Hanscom AFB, Massachusetts.

Individuals interested in obtaining more information on IAP or in attending a course should contact:

Mr. James C. Brodock  
Rome Air Development Center, RBCT  
Griffiss AFB, N.Y. 13441  
Phone: (315) 330-3490



## INSTITUTIONAL LISTINGS

The IEEE Electromagnetic Compatibility Group is grateful for the assistance given by the firms listed below and invites application for Institutional Listings from other firms interested in the electromagnetic compatibility field.

AEL SERVICE CORP., Subs. of American Electronic Labs., Inc., Richardson Rd., Colmar, Pa. 18915

EMI/EMC, shield, enc. consult. test. & anal.; Scrn. rm. (incl. for large veh.); Comp. instr. for Mil. EMI test.

GLENAIR, INC., Air Way, Glendale, Calif. 91201  
Telephone (213) 247-6000

EMI/RFI Connector accessories and assemblies; EMP interface assemblies; EMI/RFI cable assemblies.

ELECTROMAGNETICS, INC., 6056 W. Jefferson Blvd., Los Angeles, Calif. 90016  
Telephone (213) 870-9383

RF Shielded Enclosures, Modular, Prefabricated & All Welded. RFI/EMI Power Line Filters; Signal Line Filters

An Institutional Listing recognizes contributions to support the publication of the IEEE Newsletter and TRANSACTIONS ON ELECTROMAGNETIC COMPATIBILITY. Minimum rates are \$75.00 for listing in one issue; \$200.00 for four consecutive issues. Larger contributions will be most welcome. No agency fee is granted for soliciting such contributions. Inquiries, or contributions made payable to the IEEE, plus instructions on how you wish your Institutional Listing to appear, should be sent to R. M. Emberson, The Institute of Electrical and Electronics Engineers, Inc., 345 East 47 Street, New York, N.Y. 10017.

# 1976 IEEE SYMPOSIUM ON JULY 13 TO 16, 1976 ELECTROMAGNETIC WASHINGTON, D.C. COMPATIBILITY

## EMC TECHNICAL GROUP PARTICIPATION

In accordance with Clause 10 of the G-27 Bylaws, Technical Committees having major responsibility for the technical work of the Group are being organized. The major technical tasks will be to:

- (1) be a focal point of expertise, maintain current visibility and lead future development in the technical area,
- (2) organize sessions at symposia,
- (3) review papers for publication in the Transactions, and
- (4) prepare standards.

Overall responsibilities in connection with items (3) and (4) will continue to be borne by the Transactions and Standards Committees, and individual symposia committees have corresponding responsibility in connection with item (2). A given symposium committee will still have overall responsibility for each symposium and its technical session structure, but presumably most of the technical sessions will be organized by the Technical Committees.

The following Technical Committees are currently planned and being implemented:

1. Natural Phenomena - Atmospheric/Space, Lightning, Transients, P-static - Magnetospheric charging - solar activity and propagation, planet environments.
  - a. Physics of phenomena
  - b. Impact on hardware/system
  - c. Design solutions
2. Man Made Phenomena - Atmospheric/Space, Earth surface, low altitude, space, EMP, etc.
3. Spectrum Utilization - Frequency Coordination; International negotiations - support to OTP
  - a. Current
  - b. Future - millimeter waves and optics

4. Prediction and Analysis - Inter-system - antennas - propagation - operational environments
5. Prediction and Analysis - Intra-system - Within a system - equipment, component characteristics and response, etc.
6. Instrumentation/Measurement Techniques - Automation, Computer control and data analysis
7. Interference Control
  - a. Generation - design techniques, shielding, filtering, grounding, bonding
  - b. Susceptibility - design techniques, shielding, filtering, grounding, bonding
  - c. Coupling
8. EM Radiation Hazards - safe levels, exposure time, frequency biologic dependency, public areas, manufacturing facilities, medical facilities, etc.

These committees are considered permanent to the extent that need, interest and active participation dictate. The scope of effort is to be flexible and primarily determined by the committee. Your suggestions for additional committees or comments on the activities and scope of those proposed are welcome.

Your individual participation is invited, whether it be as a technical expert or because of personal interest in the subject. Participation is not limited to G-27 IEEE members. Your comments, suggestions and recommendations on the committees and tasks are solicited. Please send comments to:

Eldon S. Hughes  
Box 2429  
Palos Verdes Peninsula  
California 90274

by February 1, 1976 and let him know your area of interest and extent of your desired participation.