IEEE ELECTROMAGNETIC COMPATIBILITY GROUP

NEWSLETTER

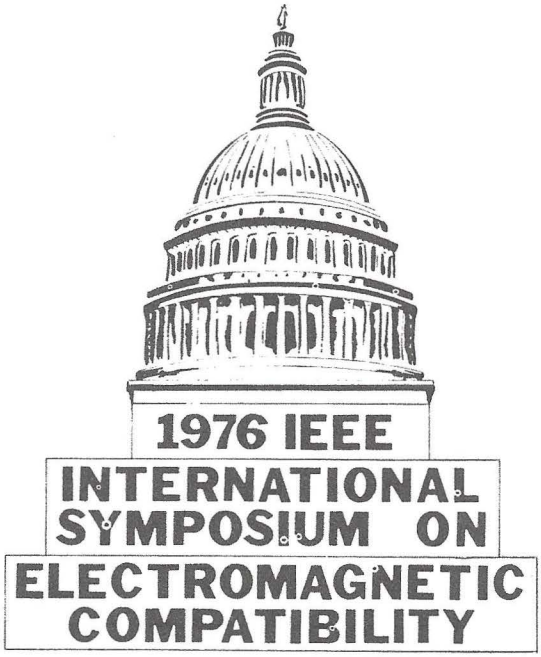
ISSUE NO. 90 SUMMER 1976 EDITOR: ROBERT D. GOLDBLUM

G-EMC SYMPOSIUM

Two U.S. Government exhibits will be featured at the IEEE 1976 International Symposium on Electromagnetic Compatibility in addition to the twenty-four industry and government commercial exhibitors. The U.S. Government exhibitors and their themes are:

FEDERAL COMMUNICATION COMMISSION
WASHINGTON, DC

How various electrical signals mar sound and video reception will be the subject of a demonstration by the Office of Chief Engineer (FCC). An outstanding feature of the exhibit is a switch panel which activates a number of devices which commonly cause interference and demonstrates the effect on certain receiving equipment. Visitors may obtain copies of relevant FCC releases, bulletins, application forms, etc. A direct phone to all Washington FCC bureaus and offices may be used by visitors. The booth will be staffed by Mr. Jules Deitz, Chief, Special Projects Branch, Research and Standards Division, and Mrs. Rose Colella, Supervisory Applications Examiner, Laboratory Division, Office of Chief Engineer, who will entertain questions related to the FCC.



(continued)

IEEE ELECTROMAGNETIC COMPATIBILITY GROUP NEWSLETTER is published quarterly by the EMC Group of the Institute of Electrical and Electronics Engineers, Inc., 345 East 47th Street, New York, N.Y. 10017. Sent automatically and without additional cost to each member of the EMC Group.

Second class postage paid at New York, N.Y., and additional mailing offices.

(continued)

U.S. ARMY ELECTRONICS COMMAND
FORT MONMOUTH, NJ

The theme of the Electronics Command booth will be "EMC at ECOM." Equipment to be displayed includes newly developed antennas for the measurement of electromagnetic compatibility in a shielded enclosure. These antennas are electrically small to minimize perturbation of the field being measured and incorporate fiber-optic transmission lines to eliminate the long standing problem of cable orientation with the resulting measurement errors. In addition, a newly developed modularized automated EMC measuring instrument covering the frequency range of 15 kHz to 40 GHz will be demonstrated.

The G-EMC Adcom and 1976 Symposium Steering Committee would like to acknowledge and express their appreciation for the support of the Symposium from the following participants:

EXHIBITORS

AH SYSTEMS, INC.
ACHESON COLLOIDS CO.
AILTECH, A CUTLER HAMMER CO.
ALL-TRONICS, INC.
ALL-SHIELD ENCLOSURES, INC.
ATLANTIC RESEARCH CORP., ADVANCED PROGRAMS DIV.
AVX FILTERS, DIV. OF AVX CORP.
CHOMERICS, INC.
DAYTON T. BROWN, INC.
DON WHITE CONSULTANTS, INC.
ELECTROMAGNETIC COMPATIBILITY ANALYSIS CTR. (ECAC)
ELECTRO-METRICS, DIV. OF PENRIL CORP.
ERIE TECHNOLOGICAL PRODUCTS, INC.
GENISCO TECHNOLOGY CORP.
HEWLETT-PACKARD
INSTRUMENTS FOR INDUSTRY, INC.
R & B ENTERPRISES
RADCON CORPORATION
RAYSHIELD LIMITED
RF INTERONICS, INC.
SINGER INSTRUMENTATION
SPECTRUM CONTROL, INC.
TECHNICAL WIRE PRODUCTS, INC. (TECKNIT)
WATKINS-JOHNSON CO.

CO-SPONSORS

AEL SERVICE CORP.
ARK ELECTRONICS CORP.
BELLING & LEE LIMITED
BREEZE-ILLINOIS, INC.
CAPTOR CORPORATION
CORNELL-DUBILIER ELECTRONICS
EMERSON & CUMING, INC.
GLENAIR, INC.
GULTON ECD
HONEYWELL INC., AEROSPACE DIV., ANNAPOLIS OPERATION
HOPKINS ENGINEERING CO.
LECTROMAGNETICS, INC.
MAGYAR & ASSOCIATES, INC.
METEX ELECTRONIC SHIELDING GROUP, METEX CORPORATION
NATIONAL SCIENTIFIC LABORATORIES, A DIV. OF SYSTEMATICS GENERAL CORP.
SACHS/FREEMAN ASSOCIATES, INC.
SAN FERNANDO ELECTRIC MANUFACTURING CO.
SOUTHWEST RESEARCH INSTITUTE
TECHNICAL WIRE PRODUCTS, INC.
TRW DEFENSE AND SPACE SYSTEMS GROUP

CHAPTER CHATTER

by Charles F. W. Anderson

Recent correspondence from Dhahran, Saudi Arabia indicates that our associate editor, Charlie Anderson, is quite busy working on some interference problems. It is unfortunate that the timing is such that Charlie could not prepare Chapter Chatter for this issue of the G-EMC Newsletter. However, we wish Charlie success in his endeavor and look forward to his return by early July. Chapter Chatter news for this quarter will be covered in our Fall 1976 issue.

NEWSLETTER STAFF

EDITOR: Robert D. Goldblum
R & B Enterprises
P. O. Box 328
Plymouth Mtg., PA 19462

ASSOCIATE EDITOR: (Chapter Chatter)
Charles F. W. Anderson
2 Bauer Avenue
Oakhurst, NJ 07755

ASSOCIATE EDITOR: (EMC Personality Profiles)
William G. Duff
Atlantic Research Corp.
8601 Greeley Blvd.
Springfield, VA 22150

ASSOCIATE EDITOR: (Book Reviews)
James S. Hill
6706 Deland Drive
Springfield, VA 22150

ASSOCIATE EDITOR: (Sequency Union)
Dr. G. Robert Redinbo
DCA - Code R740
Advanced Syst. Concept Br.
1860 Wiehle Avenue
Reston, VA 22090

ASSOCIATE EDITOR: (Photographer)
Fred. J. Nichols
LMI, Inc.
6056 W. Jefferson Blvd.
Los Angeles, CA 90016

CONSULTING EDITOR: Rexford Daniels
P. O. Box 129
Concord, MA 01742

EMC PERSONALITY PROFILES

by William G. Duff

JACQUELINE RUTH JANOSKI

"Jackie"

"Jackie" Janoski is very well known to most of the EMC community. She has been with the Electromagnetic Compatibility Analysis Center (ECAC) in Annapolis, MD since 1967, first with IITRI and more recently with the Government in a civil service position. Her responsibilities at ECAC include reviewing the center's analysis capabilities, assisting in long-range planning, providing guidance for and monitoring the Model Development Program, developing the measurement support required for model development and coordinating with the military departments.

Jackie also acts as the ECAC expert in standards and specifications, and Handbooks; radiation hazards documentation; and the military communications standards, both long-haul and tactical. In line with the above, she also monitors the activities of the IRAC and OTP, and monitors ECAC participation in the IRAC's Technical Subcommittee working groups, including the EMC/Sharing Working Group. She also participates in the work of the International Radio Consultative Committee (CCIR) Study Group 1 on Spectrum Utilization and Monitoring, and acted for the U.S. Air Force in the preparation of the 1968 and 1969 Department of Defense analysis capability and data base plans. This activity included chairing a session at the 1969 IEEE EMC Symposium. Jackie acted as an instructor in the Naval Air Systems Command Electromagnetic Compatibility (EMC) course, "Electromagnetic Compatibility Program Management," in October 1970. These activities have kept Jackie very busy and have permitted her to work with many others in the EMC community.

Her earlier activities at ECAC included performing an analysis of computer programs being used in engineering analysis. This included evaluating existing transmitter emission spectrum synthesis models and analyzing one of three proposed radars for the the Airborne Warning and Control System (AWACS).

Prior to joining ECAC, Jackie worked at RCA Service Company, Springfield, VA; AGA; Division of Keltes, College Park, MD; and ACF Industries, Applied Physics Laboratory, Silver Spring, MD. In these jobs, she performed radio frequency interference studies, including analytical determination of expected electromagnetic interference from groups of radar emitters; wrote chapters of OP 3840 (Electromagnetic Compatibility Criteria for Surface Missile Systems) concerned with use and application of the criteria; conducted indoctrination lectures on use of criteria (including to staff officers) on both coasts; performed data analysis portion of contract with NWL/Dahlgren; conducted a study on RADHAZ which included HERO, and proposed an analysis system for identifying potential problems; wrote section of Guided Missile Frequency Coordinators Course, concerned with presentation of Frequency Assignment Criteria (OD 28023) and taught first sessions of course; and developed long-range HF propagation models.

Jackie's educational background includes B.S. and M.S. degree from Ball State University, Muncie, IN. In addition, she has taken graduate courses at Catholic University, Johns Hopkins University, and George Washington University.

(continued)

(continued)

Art and sports (viewing, not participating) are Jackie's favorite hobbies. The Baltimore Colts are her first love, even without Johnny Unitas. Art is a more serious activity and she claims that it will be her next job (after retirement). Jackie is always happy to show off paintings and drawings to anyone passing through Annapolis; however, that is not a come on up and see my etchings invitation. Other spare time activities include working with oldsters and teenagers. Jackie claims that the oldsters are special fun and you really haven't lived until you take a group of 3 or 4 seventy-year oldsters to a baseballl game or even just out to lunch. At that age, they figure they can do do and say what they please and certainly do relax and enjoy themselves. The teenage activity is more along the teaching line with special "catch-up" classes in mathematics with a little reading and lecturing, and an occasional lesson in art thrown in.

Jackie is also quite active in EMC professional groups. She is a member of the EMC Group's Administrative Committee; is the ECAC representative to the Society of Automotive Engineers (SAE) AE-4 EMC Committee; and is the ECAC liaison member to the Electronics Industries Association EMC Committee. In her spare time, Jackie is currently acting as the Publicity Chairman of the 1976 IEEE International Symposium on EMC being held in Washington, DC, July 13 thru 15. She hopes to see all of you there.

OPTICAL FIBER TECHNOLOGY

The publication of Optical Fiber Technology, a Book of Selected Reprints, has been announced by the IEEE PRESS. This collection was edited by Detlef Gloge of Bell Laboratories. For ease of use, the 49 reprinted papers are arranged into nine subject categories, as follows: Introductory Survey; Fiber Preparation; Materials and Loss Evaluation; Propagation Theory; Signal Distortion; Fiber Strength and Stability; Connection and Splicing; Transmitter, Receiver, and Peripheral Electronics; Applications and Systems Considerations. The book begins with a comprehensive two-part tutorial review paper that introduces the reader to the background and current state of optical fiber technology.

This 440-page book, sponsored by the IEEE Electron Devices Society and the IEEE Microwave Theory and Techniques Society, is priced at $9.95 for the paperbound member edition. A clothbound edition is available for $19.95 (discounted to $14.95 for IEEE members). This book can be ordered postpaid from the IEEE Service Center, 445 Hoes La., Piscataway, NJ 08854. Payment should accompany the order.

MCKERCHAR HONORED AT SAE AE-4 MEETING

Walter D. McKerchar officially resigned as chairman of the SAE AE-4 Committee on Electromagnetic Compatibility as of December 31, 1976. However, a special banquet was held in his honor on May 6, 1976 during the AE-4 spring meeting. There were many special awards and tributes given to Walt during this surprise affair. Included was a citation from Senator Warren G. Magnuson for his "...contributions to our great Nation in many of your civic, fraternal and National efforts..." The Senator noted McKerchar's address to NATO on October 2, 1975 and presented him with the U.S. flag.

Another award was a citation from H. L. Hoanes, Engineering Supervisor of the Fort Worth and Denver Railway Co. for his "contribution to scientific endeavor in the aeronautics field...and unselfish contributions for all things that Masonry and Shrinedom stand for."

The IEEE Group on EMC presented McKerchar with a Certificate of Recognition "for outstanding personal leadership in advancing EMC technology and in promoting cooperative action of the SAE/AE-4 and the IEEE G-EMC." Other presentations included the Outstanding Achievement Award presented by the AE-4 Committee "In sincere appreciation for 10 years of outstanding leadership as chairman of AE-4," a plaque by the decade Bunch "for a decade of service as chairman of AE-4," and a plaque from Dayton T. Brown, Inc. on behalf of the EMC Test Community.

As part of the ceremonies, Joe Fisher (NAVAIR) read a letter from Admiral Foxgroves citing McKerchar for his many contributions and accomplishments relative to the safety of aricraft.

MAIL

EUGENE KNOWLES PRESENTING EMC CERTIFICATE OF APPRECIATION TO WALT McKERCHAR
Seattle, May 6, 1976

Dear Bob:

Several items of news for you, as follows:

Seattle, WA: At a combined meeting of the Electronic Industries Association and the Aeronautical Engineering Division of the Society of Automotive Engineers (SAE AE-4), Walter McKerchar of the Boeing Co. retired his position as chairman of the AE-4 Committee. Walt held this position for a period of ten years. The newly elected chairman is Mr. Jack Moe, well known in EMC circles and head of the EMC department of General Dynamics, Ft. Worth Division.

In honor of Walt's retirement, he was the guest of honor at a surprise dinner. One of the highlights of this dinner was the award to Walt of a Certificate of Appreciation by the AdCom of the EMC Group of the IEEE. The certificate was awarded "for outstanding advancements and cooperation with the EMC-IEEE in many EMC areas."

Introductions for the IEEE-EMC were made by Fred J. Nichols, and the presentation was by Eugene Knowles. (Photo of the presentation)

Eugene Knowles, after some 20 years with the Boeing Company and a longer time resident of the Seattle area, has moved to Atlanta, GA and effective 1 June 1976 he has assumed a new engineering position with Parsons, Brinckerhoff, Tudor, Bechtel, Consulting Engineers for the Metropolitan Atlanta Rapid Transit Authority. His new address at the company is P. O. Box 941, Atlanta, GA 30301.

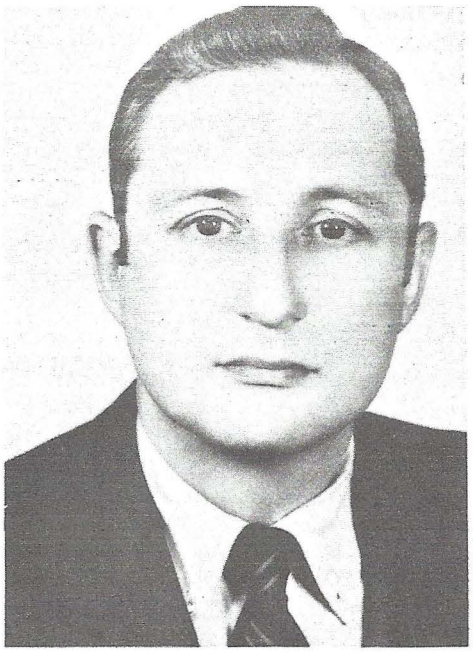
During two different business trips to Texas, I had the opportunity to visit two well known EMC engineers who have retired in the past years.

Lee Avery: I visited Lee and his wife Marie on their ranch-farm at West Texas near Waco. Lee is an engineering farmer-rancher and uses graphs on his cattle yield, feed, cost and net returns. Lee's ranch-farm is a very ideal park type ground in the rolling hills of this part of Texas. Lee passes his regards on to those in the EMC community and expressed his desire to hear from some of his old friends.

William Grubbs: I visited"Bud" and his wife Donna in Garland, Texas. Bud retired from LTV several years ago, after a long period of time at LTV. Prior to LTV, he was at Wright Patterson AFB, Dayton, Ohio. A mutual hobby and task of both Bud and Donna is making of Bible tapes and other church services for handicapped people who cannot attend church services. The engineer in Bud sure shows when he demonstrated his recording and duplicating equipment. Bud and Donna look very happy in their mutual retirement and church work. Donna, at the time of my visit, was making peach cobbler for some 200 people! Bud passes along his regards and would also like to hear from EMC friends. His address is: 3921 Mobile Dr., Garland, TX 75041.

Best Regards,

Fred J. Nichols



Dear Electromagnetic Compatibility Group Member,

This letter is for the purpose of sharing with you some of the more important planning, actions and events which have recently occurred in the Technical Avtivities Board of the Institute. Your views on matters discussed in this letter, as well as any others, would be appreciated.

One important matter involves organization. A plan for a new IEEE organization was issued by the Institute's Long Range Planning Committee (LRPC) late last year. This plan was distributed and analyzed by TAB (Technical Activities Board comprising the 33 Societies, Groups and Councils, the Standards Board, the Technical Committees, etc.). The TAB Planning Committee has generated a recommended variant of the LRPC plan which organizes the appropriate IEEE technical elements in a common structure, eliminates one administrative level, permits adequate representation of technical interest at Board of Director levels, ensures policy review by operational officers and reduces the current administrative burden on the TAB Chairman. The TAB plan has been sent to your Group/Society officers, and a copy can be obtained from them.

The second matter concerns finances. We are currently constructing the Institute's 1977 budget. It is impossible to continue all current programs of the Institute without either having a dues increase or incurring a substantial deficit. This is due almost solely to inflation. Also, several attractive new programs have been proposed which would require additional funds for implementation. The present fiscal effort is directed at reducing current programs to achieve a "break-even" budget in 1977 without raising the Institute's general dues. Even if this effort is successful for the 1977 budget, such a modus operandi could not be pursued indefinitely. Also, several of the Groups/Societies are planning to make small increases in their individual fees for 1977 to cope with specific financial situations.

The last matter involves new activities. Several come to mind. The Energy Committee issued a letter last month on the California Initiative (dealing with the use of Nuclear Power in that state) to our members there. The letter offers to send the members literature, both pro and con, concerning this matter. A second item is our starting an investigation of the feasibility of IEEE forming a candidate Technical Qualification Review Panel for appointments to Federal Regulatory Commissions within our field of expertise, such as is done by the American Bar Association for the Supreme Court. Another important matter is the generation of a policy statement on operation of our Technical Committees which will ensure conformance to anti-trust regulations. This statement is currently being published. Lastly, progress has been made in creating a TAB technical entity dealing with cable television (CATV) technology and in expanding our role in oceanographic electronics.

At the halfway mark of 1976, it appears TAB should have a year marked by progress and accomplishment. Credit for this lies with the Adminstrative Committee and officers of your Group/Society and with you. I wish to convey my thanks and appreciation for these efforts to them and to you.

Sincerely,

Robert D. Briskman

Vice President
Technical Activities

Chairman
Technical Activities
Board

June 16, 1976

BOOK REVIEWS

BOOK REVIEW

by Jim Hill, RCA Service Company

We have two book reviews again in this issue; one from Dr. Henning Harmuth on a book about Walsh functions and their applications, the other by this column reviewer on shielding materials and performance. We try to include something for everyone, so if you don't find something of interest to you, write and let us know. Tell us what you would like to have reviewed in the following issues of the Newsletter.

"Walsh Functions and Their Applications"

by
K. G. Beauchamp
236 pages, 87 illustrations, $24.50
Academic Press, 111 Fifth Ave., N.Y., NY 10003

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

This book should be primarily of interest to two classes of readers: (A) Those who want a readily understandable introduction to the theory and applications of Walsh and related functions, and (2) Those who want an evaluation of the work done and in progress in this field.

Beauchamp compiled the first bibliography on Walsh and related functions in 1972. His extraordinary knowledge of the literature is put to good use in the book. Those new to the field will appreciate to be guided through the various definitions and notations used by different authors; the illustration of theoretical developments by practical examples will be appreciated by everybody.

The first four chapters give an introduction to orthogonal functions, Walsh functions, Haar functions and the Walsh as well as the Haar transform. The emphasis is on simplicity and understandability. The following chapter on spectral decomposition brings a very good discussion of when to use a Fourier and when a Walsh spectrum, backed up by practical examples. Chapter Six is on sequency filtering, which is carried to the filtering of non-stationary signals and to two-dimensional spatial signals. The last two chapters review applications to communications, image transmission, electromagnetic waves, radar, spectroscopy, medical signal processing, etc. The appendix contains a collection of computer programs for Walsh and Haar transforms.

"Electromagnetic Shielding Materials and Performance"

by
Donald R. J. White
MSEE/PE
164 pages, $24.50
Don White Consultants, Inc., 14800 Springfield Dr., Germantown, Maryland 20767

Reviewed by James S. Hill
RCA Service Company

This recent book from the desk of Don White is an addition to his handbook library. It is probably the most complete treatise on shielding published to date. It includes information on the characteristics of some of the more recently introduced exotic shielding materials with notes on their application.

Chapter One gives a broad coverage of the theory of shielding as derived from Maxwell's equations. Equations are given for English and metric parameter values. This is a chapter you will want to refer to when you are explaining the shielding mechanism to your boss.

Chapter Two deals with the characteristics of shielding materials, both homogenous metal materials and pseudo-homogenous mater-

(continued)

(continued)

ials such as conductive paints, coatings, depositions, flame-sprayed metals, metalized textiles, and conductive glass. Illustrative examples are used to show the ways these materials can be used.

Chapter Three tells how to use the design graphs included in the voluminous appendices. There is also a HP-65 program for shielding effectiveness with several illustrative examples. Chapter Four is a list of 144 references, most of them in recent literature.

A very valuable part of this handbook is the set of seven appendices. They contain 42 pages of shielding effectiveness design graphs for several commonly used metals of thickness from 0.0001 mil to 1 inch. For both near and far-field calculations, the design graphs cover source-to-metal distances ranging from 10 cm to 10 km. Frequency coverage is 10 Hz to 30 GHz. Reference to any specific subject is aided by a complete index.

This handbook does not cover the topics of where and when to shield, and where to ground the shield. These topics are covered in the author's EMC Handbook Series. The purpose of this book is to explain the theory and performance and to present design graphs, including all of the principal variables presented in a clear understandable manner.

EMC VIDEO TAPES AND COMPUTER PROGRAMS NOW AVAILABLE

A series of video tape cassettes on Electromagnetic Compatibility subjects has been released by Don White Consultants, Inc. The new video tapes are additions to the growing family of training material including seminars, handbooks, and computer programs offered by DWCI on a world-wide basis. The video tape cassettes come in 20, 30, or 60-minute lengths. They may be rented or purchased. Computer Programs for EMC Design Synthesis is a new way to select the right combination of grounding, floating, or isolating, network balancing, shielding, filtering, etc., specifications to prevent both EMC underdesign and overdesign. The new DWCI EMC SYNTHESIS computer programs, developed for equipment and subsystem-level hardware, are now available in BASIC language for any time-share terminal or in-house computer and for the HP-9815A and Wang-2200.

For additional information, contact Don White Consultants, Inc., 14800 Springfield Dr., Germantown, MD 20767; Telephone: 301-948-0028.

SAE COMMITTEE AE-4 DOCUMENTS

NO.	TITLE	ISSUED/ REVISED	PRICE
ARP 935	Suggested EMI Control Plan Outline	12-15-70	$1.50
ARP 936	Capacitor, 10 MFD for EMI Measurements	5-31-68	1.50
ARP 937	Jet Engine EMI Test Requirements and Test Methods	11-1-68	3.50
ARP 958	Broadband EMI Measurement Antennas; Standard Calibration Requirements and Methods	3-1-68	1.50
AIR 1147	EMI on Aircraft from Jet Charging	6-1-70	1.50
ARP 1172	Filters, Conventional, EMI Reduction, General Specification for	5-72	2.25
ARP 1173	Test Procedure to Measure the RF Shielding Characteristics of EMI Gaskets	7-75	2.25
AIR 1208	Bibliography - Lightning and Precipitation Static	4-20-73	2.25
AIR 1209	Construction and Calibration of Parallel Plate Transmission Line for EMI Susceptibility Testing	3-74	2.25
AIR 1221	EMC System Design Checklist	10-71	1.50
AIR 1255	Spectrum Analyzers for EMI Measurements	9-71	2.25
ARP 1267	EMI Measurement Impulse General Standard Calibration Requirements and Techniques	8-73	2.25

NOTES FROM SEQUENCY UNION

by
G. R. Redinbo

Periodically, I have asked individuals in various geographic areas to review the local activities in Walsh and related functions. Dr. A. L. Abdussattar who is Professor and Head, Department of Electronics and Communication Engineering, Regional Engineering College, Tamil Nadu, India, has consented to survey some of the work being carried forth in India.

STUDIES ON WALSH FUNCTIONS AND RELATED TOPICS IN INDIA

A large number of scientists and engineers are working in India on WALSH FUNCTIONS and related topics. To summarize their work in the short time given to me is just impossible. The summary given here, therefore, is sketchy and obviously has taken into account the work of only a few authors who have graciously replied to my enquiries.

Mr. P. S. Moharir and his colleagues at the Indian Institute of Science, Bangalore, are conducting studies on Walsh-related orthogonal transforms. For many Walsh-Fourier-Hadamard transforms, certain lower order transform kernels are embedded in the higher order transform kernels. One of the consequences of this fact is that the knowledge of the properly defined subsequence of the transform coefficients is equivalent to the knowledge of certain mutually exclusive and exhaustive linear combinations of the signal samples. This equivalence has been recursively used for the adaptive quantization scheme in the transform domain.

In secrecy coding, the sequence to be coded is multiplexed with the key either in predetermined manner or a programmed random manner. Only the subsequence of transform coefficients is then transmitted. From this, with the knowledge of how the sequence to be coded is multiplexed with the key, the authorized receiver can decode the transmitted sequence. The transform used can be chosen in a programmed random manner from a set of transforms.

Walsh functions have been used to synthesize Hindustani classical music. Concert music of this style consists of a precomposed or "deterministic" portion called "chees" and a randomly improvised or "stochastic" portion called "Alaap" and "Taan," all within the framework of a "Raga." The bivalued Walsh functions are being used to synthesize the "Taans."

Permutation properties of Walsh transforms, masks for Hadamard spectroscopic images and fast algorithms for a wide class of transforms are also under investigation by the above referred group.

Generation of Walsh functions is another fascinating problem. A function generator which can give thirty two Walsh functions simultaneously has been developed by Mr. R. B. Joshi and his colleagues at the Indian Institute of Technology, Bombay. Detailed investigation of orthogonality errors using a digital computer is being carried out. Analog sequency filters, digital image processing using Walsh-Hadamard and Hadamard-Harr transforms, are also being studied by these workers.

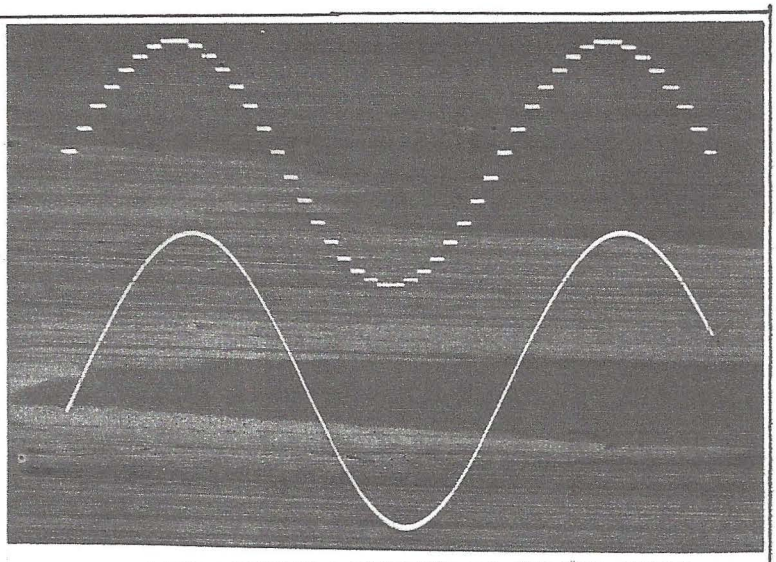
At the Indian Institute of Technology, Madras a group is working with Dr. V. U. Reddy and their research activities center around the development of fast algorithms to compute the phase spectrum of the Walsh Hadamard transform for various circular shifts of the data and to reconstruct the data from phase and power spectrum of the transform. They are also considering fast techniques to compute arithmetic auto correlation and linear convolution through dyadic convolutions. Further, investigations on application of Walsh functions for spectral analysis of switching functions in threshold logic synthesis are also being carried out.

Myself and my coworkers at this College are primarily interested in the development of efficient techniques for the evaluation of the discrete Fourier transform coefficients using Walsh Hadamard transform. Another area being investigated is the use of Walsh Hadamard transform spectral modes for the analysis and identification of electrocardiograms by trained machines. General signal processing techniques, simpler methods of generating a predetermined set of Walsh functions simultaneously, and sequency filters are also being investigated.

(continued)

(continued)

As many of our readers undoubtedly noticed, the oscillograph trace that was a figure in the letter from Dr. Reuven Kitai which appeared in the Spring Edition was missing. We apologize and deeply regret any confusion or inconvenience which might have resulted. We now include a newly obtained copy of that trace.



GROUP FORMING TO TRAVEL TO EMC SYMPOSIUM IN WROCLOW, POLAND

Two group travel plans are being offered for travel to the 1976 EMC Symposium in Wroclaw, Poland scheduled for September 22-24, 1976.

Plan A is a one-week trip to Wroclaw which includes Pan American air transportation, New York to Wroclaw and return, hotel accomodations in Wroclaw, transfer between the airport and hotel, and an orientation tour of Wroclaw. If a group of 15 can be formed for this trip, the cost will be about $660 each, with two people traveling together and sharing a room. A supplementary charge of $40 is required for single room accomodations. Hotel accomodations are in new modern hotels where all rooms have private baths. Continental breakfast is included.

Plan B is a two-week tour. The first week is in Wroclaw including all the features of Plan A. The second week will be spent in the delightful Dalmation Coast region of Yogoslavia where the tourist is being courted with true hospitality. This 8-day tour starts in Dubrovnik and moves up the Dalmation Coast to Split, Plitvic, and winds up in Zagreb. The tour will be made in comfortable motor coaches with stops at interesting botanical gardens, the Diocletian Palace and picturesque old ports along the coast. Hotel accomodations, breakfast, most lunches, dinner, transfers and porterage are included in the cost. The estimaged price for this tour is $1150 each where two share a hotel room. The supplement for a single room is $80.

Both Plan A and Plan B are in the formative planning stage at present (June 15th). Detailed descriptions of both trips will be ready by July 15th. Firm reservations will be required by August 20th (30 days before departure). For detailed information, write or call Jim Hill, RCA, 5260 Port Royal Rd., Springfield, VA 22151, Tel. 703-321-8900, Ext. 122.

GROUP MEMBERS ELECTED TO FELLOW GRADE

Four members of the IEEE G-EMC have been elected to Fellow Grade as of January 1, 1976. They are as follows:

Name & IEEE Mailing Address	Citation
Mr. Gordon Y. R. Allen Toronto, Canada	For contributions to safety and reliability of wire communications facilities in high-voltage environments.
Dr. Woodrow W. Everett, Jr. Bridgeport, NY	For contributions to electromagnetic compatibility, and for pioneering advances in university-federal laboratory relations.
Mr. Joseph J. Naresky Rome, NY	For contributions to the quantification of electronic equipment reliability.
Mr. John J. Renner Arlington, VA	For contributions in the application of systems engineering to telecommunications for government and industry.

We wish to offer our congratulations.

IMPULSE NOISE IN CB TRANSCEIVERS

John W. Foster of the E. F. Johnson Co. outlined how a manufacturer of two-way radio communications equipment copes with the problem of electrical impulse noise at the 1976 Automotive Engineering Congress of the Society of Automotive Engineers. Noting that noise is undesirable because it reduces communication range, annoys the listeners, induces operator fatigue and creates dissatisfaction with the product, Foster discussed such subjects as impulse noise reduction techniques and their cost to the customer, as they apply to transceivers for the Citizens Radio Service.

Copies of Mr. Foster's presentation can be obtained by writing to the Society of Automotive Engineers, Inc., 400 Commonwealth Dr., Warrendale, PA 15096. Ask for paper number 760277, "Reducing Impulse Noise in CB Transceivers."

REPORT COMPARES TRANSIENT VOLTAGE SUPPRESSORS

General Semiconductor Industries has recently published an 8-page report titled "A Comparison Report of TransZorbs versus Metal Oxide Varistors." This report provides comparative data on published specs and presents actual data from comparative tests. Oscillographs demonstrate the dynamic performance parameters of each type of device under simulated transient conditions. They show comparisons of response time and clamping voltage for suppressors with various voltage ratings. Graphs show results of aging on breakdown voltage and leakage current.

The report points out the key parameters designers should consider in specifying transient voltage suppressors, defines these parameters, and tells how to make meaningful comparisons between the two types of devices. For more information, contact General Semiconductor Industries, Inc., P. O. Box 3078, Tempe, AZ 85281; Phone: 602-968-3101.

RADIATION HARDENING OF ELECTRONICS

The ABC's of Radiation Hardening is a 38-page brochure outlining hardening methods and analytical techniques. The brochure is designed to familiarize either designers or managers with radiation hardening. It features a background description of the nuclear threat and how to interpret nuclear environments, hardening methods, and sample hardening analysis. Also, briefly discussed are combined environmental effects and considerations for performing the hardening task in-house, as opposed to subcontracting. For additional information, contact IRT Corp., Attn.: M. Rose, P.O. Box 80817, San Diego, CA 92138; Tel.: 714-565-7171.

EMP SEMINAR

The EMC Nuclear Science and AES groups of the IEEE Central New England Council will be sponsoring a two-day seminar on Electronics In a Space Radiation and Nuclear Environment. The seminar will be held on November 16-17, 1976 and the cost will be about $100, depending on early registration, IEEE membership, etc. The speakers for the EMP and TRE topics will be known before the end of July. For more information, you may contact Herbert Ullman at GTE-Sylvania, CSD, Dept. 8450, 189 "B" St., Needham, MA 02194; (617)449-2000 X661.

NEW BROCHURE ON RF WELDED SHIELDED ENCLOSURES

A new 8-page brochure on RF Welded Shielded Enclosure Systems manufactured by Ray Proof has been issued. The Company's Series 95 factory constructed rooms are described in the publication, as well as Structurally Integrated and Custom Designed Systems. The advantages of welded over bolted enclosures are outlined with particular reference to temperatures, proper selection of welding rod and other factors required for a high performance end-product. Performance test data are provided in addition to descriptive material on RF shielded doors, accessories and optional equipment. Copies of Catalog 951 may be obtained by writing Ray Proof Division, Keene Corporation, 50 Keeler Ave., Norwalk, CT 06856.

PEM NOTES

The following Protection Engineering and Management (PEM) Notes were released in April, 1976, and are available from NTIS, Dept. of Commerce, 5285 Port Royal Rd., Springfield, VA 22151.

1. "Stripline Test Method for Measuring Transfer Impedance," by J. S. Miller, Rockwell International, Los Angeles, CA, PEM-46, November, 1975.

2. "Conducted EMP from a Commercial Prime Power Network," by Kenneth S. Story and Ronald V. Row, GTE Sylvania, Needham, MA, PEM-48, February, 1976.

NEW STAFF LINE-UP AT HEADQUARTERS

A major reorganization of Headquarters staff is now 90 percent complete, according to IEEE General Manager, H. A. Schulke. The reconfiguration, initiated in January, is aimed at achieving maximum efficiency in Headquarters' operations at a time of severe economic hardship for the Institute. It comes in the wake of an 8-percent reduction in the professional staff-a measure necessary despite this year's increase in the level of basic member dues from $30 to $35-and it means that EE readers will want to acquaint themselves with "who's doing what at HQ."

As shown in the organization chart, Charles Stewart, formerly Director of Member and Field Services, is now Senior Staff Director in charge of the Institute's support services in Piscataway, N.J. Taking over Mr. Stewart's Field responsibilities is Robert Asdal, who continues, for the time being, in his former capacity as Manager of Student Services. Emily Sirjane, who has served as Manager of Field Services for many years, has assumed the function of Manager, Corporate Services, and will be concerned with services rendered to the Board of Directors, the Executive Committee, and the Awards Board, and with support for IEEE Standing Committees.

Another major change in the Headquarters' line-up involves Richard Emberson, the Institute's long-time Director of Technical Services. Dr. Emberson is now Director of Educational and Field Services in addition to his duties as Technical Services Director. Assisting Dr. Emberson are Robert Asdal and Emma White, another experienced IEEE employee who is now supervising Educational Services. And a new face has been added to Dr. Emberson's staff: Ivan G. Easton has been appointed head of IEEE's Standards Program, succeeding Sava Sherr who has become deputy managing director for energy matters at the American National Standards Institute.

IEEE's Professional Services staff has also experienced significant changes. Headquartered in Washington, DC, Professional Services Director Leonard Farrell's staff has been expanded with the addition of two new Program Managers, Dorothy Bomberger and Leo Fanning. They join Joseph Casey who has shifted his efforts from New York to Washington to become a Program Manager under Mr. Farrell. Acting as Consultants to IEEE's Washington Office are John Kinn, formerly Educational Services Director, and Ralph Clark, well known to those Institute members who have had occasion to drop in on IEEE's Washington Office over the years.

FORD SIGNS SCIENCE POLICY LEGISLATION

A new law creating the Office of Science and Technology Policy was signed May 11 by President Gerald Ford as members of the scientific and engineering community, including the IEEE president, looked on. The function of science advisor to the President has been carried out for the past three years by the Director of the National Science Foundation. Congress felt that the extra burden of this assignment was too much for one individual to carry. Therefore, this new law was fashioned to ensure that this need in the White House is adequately and appropriately met.

The main provisions of the bill are as follows: to recognize the profound national importance of science, engineering and technology, planning, support, development, participation, and utilization; to establish an Office of Science and Technology Policy (OSTP) in the Executive Office; to provide for the creation of an Intergovernmental Science, Engineering and Technology Advisory Panel; to establish a presidential Committee on Science and Technology; to authorize a federal science, engineering and technology survey to examine and analyze the overall Federal effort in this area; and to establish a council composed of the director of OSTP and representatives of other agencies to determine policy for ongoing activities in the field.

IEEE volunteer and staff members were effective during the legislative process leading up to the signing of this bill into law in furthering the following items which coincide with IEEE professional activities:

1. The recruitment, education, training, and beneficial use of adequate numbers of scientists, engineers, and technologists and the promotion by the Federal Government of the effective and efficient utilization in the national interest of the nation's human resources in science, engineering, and technology.

2. Encouragement for development and maintenance of an adequate data base for human resources in science, engineering, and technology including the development of appropriate models to forecast future manpower requirements and assess the impact of major governmental and public programs on human resources and their utilization.

The new law recognizes that there should be a continuing national investment in science, engineering, and technology.

THE WASHINGTON SCENE
BY ERIC SCHIMMEL

Goldwater and TVI

Senator Barry Goldwater has introduced a bill in the U.S. Senate which proposes to amend the Communications Act so as to authorize the FCC to regulate the design of audio and visual electronic equipment, e.g., TV and Hi-Fi sets, with respect to their susceptibility to radio frequency interference. This bill, S. 3033, is complimentary to the House version, H.R. 7052, introduced by Representative Vanik last year.

In his introductory remarks, Senator Goldwater pointed out that C. B. and amateur transmitters which are often related to interference complaints, are in themselves operating properly and are in compliance with FCC requirements. The thrust of his legislative proposal is to require equipment which receives interference to incorporate protective circuit designs and shielding.

The proposed version of Section 302 of the Communications Act is reproduced below. Revised portions are underlined.

Sec. 302. (a) The Commission may, consistent with the public interest, convenience, and necessity, make reasonable regulations governing (1) the interference potential of devices which in their operation are capable of emitting radio frequency by radiation, conduction, or other means in sufficient degree to cause harmful interference to radio communications, and (2) the use of protective components in audio and visual electronic equipment which are capable of reducing interference to such equipment from radio frequency energy. Such regulations shall be applicable to the manufacture, sale, import, offer for sale, or shipment of such devices and electronic equipment or the use of such devices.

(b) No person shall manufacture, import, sell, offer for sale, or ship devices and electronic equipment or use devices which fail to comply with regulations promulgated pursuant to this section.

(c) The provisions of this section shall not be applicable to carriers transporting such devices or electronic equipment without trading in them, to devices or electronic equipment manufactured solely for export, to the manufacture, assembly, or installation of devices or electronic equipment for its own use by a public utility engaged in providing electric service, or to devices or electronic equipment for use by the Government of the United States or any agency thereof. Devices or electronic equipment for use by the Government of the United States or any agency thereof. Devices or electronic equipment for use by the Government of the United States or any agency thereof shall be developed, procured, or otherwise acquired, including offshore procurement, under United States Government criteria, standards, or specifications designed to achieve the objectives of reducing interference to radio reception and electronic equipment taking into account the unique needs of national defense and security.

USAB MAKES GRANT TO STUDY LEGAL RIGHTS OF ENGINEERS

The United States Activities Board (USAB) of the IEEE has funded a grant request from the LaVerne College Law Center in La Verne, CA, to study the legal rights of engineers. The Study Group, called SCORE for Special Committee on Rights of Engineers, is headed by Selwyn Berg. Mr. Berg is a graduate engineer who has returned to LaVerne College to complete his law studies. As a part of the research toward his Doctor of Laws Degree, he has undertaken this Project because of his concern for the legal rights of members of the engineering profession.

Specifically, SCORE will investigate complaints submitted by engineers who feel their legal rights have been violated. SCORE will also investigate legal cases that appear in the Court Reports, although most cases do not get into such case histories, regardless of merit, because the engineer frequently accepts actions against him without seeking legal recourse.

The SCORE team plans to document the problems referred to them and the disposition of each case. Using this material as input, SCORE will select those cases which would be of greatest interest to a majority of the membership, and prepare a Handbook for use by those members who may need such reference material for initiating court actions. An article based on the contents of this Handbook will be submitted to the American Bar Association for publication.

IEEE members who would like the assistance of SCORE should prepare a communication to the Law Center and include the following:

- Description of any actions against an engineer which resulted in economic hardship or loss of professional status because of lack of timely legal knowledge.

Communications should be sent to: Mr. Selwyn Berg, SCORE LaVerne College Law Center, LaVerne, CA 91750.

REGIONAL OUTSTANDING

LECTURE TOURS

Attention All International Travelers! Sabbaticals Anyone?

For the past three years, IEEE has provided modest financial support for qualified members who have volunteered to speak at IEEE Section meetings during their international travels.

The Program has been popular in host Sections and is still operational. Its success relies completely on the initiative of potential speakers in notifying IEEE Headquarters of their availability. Information is desired from qualified members who have travel plans.

The qualifications required are:

A technical topic of potential interest to a non-specialized audience of electrical engineers.

An up-to-date knowledge of theory and practice in that topic with views on forecasts of future developments and an assessment of technical and social implications.

An ability to present a talk in an interesting, audible and coherent manner.

A source of basic financial support for intercontinental travel, e.g., for business or vacation.

Volunteer speakers are asked to provide the following data to Miss M.J. Vogelsang, IEEE, 345 E. 47 St., New York City 10017 - 212/752-6800, Ext. 622.

- Your phone number and address
- Date and city of first availability abroad
- Date and city of last availability abroad
- Itinerary and commitments to the extent known.
- Titles of talks offered with 100-200 word abstract of each
- The name and phone number of a peer referee who has heard you speak
- Language capabilities
- Constraints on availability to speak
- Any address where you may be contacted abroad

In exchange for this information, Miss Vogelsang will notify the IEEE Regional Director who will contact the Section Chairmen at the destinations. If a Section Chairman wishes to invite a speaker, he will do so directly. Any incremental expenses incurred by the speaker in fulfilling such a speaking engagement are reimbursable by IEEE headquarters.

May we hear from you at least three months before departure?

NOTE: Section meetings are rare in July and August in Europe.

A LETTERWRITER'S GUIDE TO CONGRESS

Today's Congressional work schedule no longer permits the frequent and extended visits back home that used to keep Members of Congress in close personal touch with their constituents. As a result, letters from back home have come to be the main form of voter contact with their legislators--and the prime source of constituency views.

Writing an effective letter to your Senators or Representative is easy. Here are a few guidelines:

Write on your personal or business letterhead, if possible, and sign your name over your typed signature at the end of your message.

Be sure your exact return address is on the letter, not just the envelope. Envelopes sometimes get thrown away before the letter is answered.

Identify your subject clearly. State the name of the legislation you're writing about. Give the House or Senate bill number, if you know it.

State your reason for writing. Your own personal experience is your best supporting evidence. Explain how the issue would affect you, or your family, your business or profession--or what effect it could have on your state or community.

Avoid stereotyped phrases and sentences that give the appearance of "form" letters. They tend to identify your message as part of an organized pressure campaign--and produce little or no impact.

Be reasonable. Don't ask for the impossible. Don't threaten. Don't say, "I'll never vote for you unless you do such and such." That won't help your cause, but may harm it.

Ask him to state his position in his reply. As his constituent, you're entitled to know.

The timing of your letter is important. Begin to encourage approval or disapproval of a bill, or to recommend that it be amended favorably, while it is in committee. Your Representative and Senators usually can be more responsive to your appeal at that time, than after a bill has already been approved by a committee. Of course, this isn't always the case. Sometimes your legislator may reserve his judgment--and his vote--until the sentiment of his constituency has crystallized.

Thank him, if he pleases you with his vote on an issue. Everybody appreciates a complimentary letter, and remembers it. Congressmen are no exception. But if he votes contrary to your position, don't hesitate to let him know. He will remember that, too.

CITATION ANALYSIS

A recent issue of the magazine "Science" featured an article about a new way to assess scientific productivity. According to "Science," Citation Analysis has been refined to the point where it will soon find major uses in decision making at the national science policy level, as an adjunct to the peer review process, and in evaluating the performance of individual scientists.

In Citation Analysis, one counts the number of times an article or author is cited in the scientific literature. On the assumption that the number of citations reflects an author's influence, and therefore quality, proponents argue that this measure can be used to rate and evaluate individual scientists by quantifying their contributions in a manner far more objective than the usual practice of peer recommendation and review which is necessarily flawed by admitting subjective and personal factors. Of course, articles are often cited for reasons other than their importance, but to citation analysts such references are the system "noise" which they believe can be reduced to insignificance.

The quarterly publication "Science Citation Index" ($2,850 a set for the 1975 edition) provides the raw material for Citation Analysis studies by its listing of all citations in some 2600 of the world's most cited journals. It turns out that only half of the scientific articles published are ever referred to in the literature and the average cited paper is only cited 1.7 times a year.

The range of application of Citation Analysis is continuously expanding. For instance, there is a court case in which a female biochemist who was denied tenure at an Eastern university alleges that she is the victim of sex discrimination. Her case has been championed by a team of experts who have devised a way of estimating the "lifetime citation rate" of a scientific article based on its citations to date.

It turns out that the articles published by the female biochemist have an expected lifetime citation rate of 53.5 times per article. The chairman of her department has a 51.4 rate per article and two men who received tenure at the same time she was denied it have 21.8 and 50.9 citation rates respectively.

My purpose in writing this article is to acquaint the readership with the promises and problems of Citation Analysis and to suggest that an evaluation of its use and effectiveness for the transactions be undertaken (How about a joint AP-MTT-Radio Science Index?). Clearly the possibilities are many.

G. N. Tsandoulas
Radar Systems Group
MIT Lincoln Laboratory
Lexington, MA 02173

(Excerpted from the February 1976 issue of the IEEE AP-S Newsletter)

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.

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

RF shielded enclosures, modular, prefabricated & all welded. RFI/EMI power line filters; signal line filters.

SINGER INSTRUMENTATION, 5340 Alla Road, Los Angeles, CA 90066

Automatic/manual EMI test systems, EMI meters, impulse generators, antennas, and components.

SPECTRUM CONTROL INC., 152 E. Main, Fairview, PA 16415
Telephone (814) 474-5593

MIL-STD-461 testing, L, Pi, and T filters, capacitors fixed and variable in stock at HALLMARK.

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.

TV, FLUORESCENT LIGHT MAKERS SLOW TO UTILIZE SAFEGUARDS

This article has been excerpted from the December 1975 issue of the "EHLRI News" published by the Environmental Health and Light Research Institute, 3112 Southgate Circle, Sarasota, Florida 33579.

Neither TV manufacturers nor fluorescent light makers have rid their products of radiation emissions despite EHLRI's demonstrations that both products can be made completely safe (according to EHLRI). John Nash Ott pattented a television radiation shield which uses a mirror device to achieve zero-level radiation. The viewer no longer looks directly into the cathode ray gun of the picture tube. But no manufacturers of TV sets have adopted the shield because they are already complying with government standards on TV radiation and "find nothing to be concerned about," Ott pointed out.

It turns out, they are not complying, as evidenced by the fact that more than 1,300,000 new color TVs have been recalled in 1975 because they were found to be out of compliance with government standards. More recalls than ever occurred this year. Random checks have shown that 20% of sets give off excessive radiation, some dangerous amounts.

It was EHLRI's experiments that showed exposure to a color TV screen would kill laboratory mice within 12 days but mice protected from the TV by a lead shield showed no physical changes. Although Ott's testimony before Rep. Paul G. Rogers' House Committee helped bring about the 1968 Radiation Health and Safety Act, limiting sets to .5 miliroentgens of radiation per hour, he believes that level is not low enough to safeguard viewers. Russian standards are far more strict than ours. Indeed, Rogers has alerted Ott to be ready to testify again before the House sub-committee on Public Health and Environment. The 1968 change was the ninth time safety levels had been tightened since x-ray was first discovered. Dr. Norman Telles of the Bureau of Radiological Health says, "We have made the assumption that there is no threshold, that radiation to the zero level evokes a response from body tissues."

Rogers also wants his committee to look into the possibility that stricter standards are needed for fluorescent lights. Way back when Ott was filming the flowers Barbra Streisand sang to in the movie, "On a Clear Day You Can See Forever," he noticed that the ones growing under the ends of the fluorescent tubes shriveled up. At the ends of all fluorescent tubes is a little cathode ray gun, similar to the ones used in TV picture tubes and hospital x-ray machines.

Ott wondered if fluorescent lights in windowless schools were adversely affecting children the way they did plants and laboratory animals in his experiments. An earlier study had already shown a correlation between hyperactive children and television sets which leaked excessive radiation. When TVs were repaired and watching hours restricted, behavior problems of the children improved. Then in 1973, EHLRI undertook a pilot project in a windowless elementary class in Sarasota, Florida. Under their normal classroom lighting, some first graders in the study demonstrated nervous fatigue, irritability, lapses of attention and hyperactive behavior. After installing whiter full-spectrum lighting with lead foil shields over the cathode ends of the fluorescent tubes to stop suspected soft x-ray and an aluminum screen grid over the entire fixture to stop known RF radiation, which is characteristic of all fluorescent tubes, a marked improvement appeared in the youngsters.

Without any use of drugs, the first graders settled down and paid more attention to their teachers. Nervousness diminished and teachers reported that the overall classroom performance improved. Sequences of time-lapse pictures filmed the changes. The improvement occurred when the new lights supplied that part of the visible spectrum which is lacking in standard artificial light sources and eliminated excessive radiation.

Dr. Ott's worry is that hyperactive children will be prescribed drugs for stress actually caused by malillumination and radiation - drugs which may lead to later dependence on drugs or alcohol.

ED GREENWOOD JOINS AXEL ELECTRONICS

Axel Electronics, Inc., A Unit of General Signal and manufacturers of DriMica Capacitors, RFI Filters, Wave Filters, and Modem Test Equipment has announced the appointment of Ed Greenwood to the post of Filter Engineering Project Leader. Mr. Greenwood brings over 20 years of experience to his new post, having served as Vice President of Engineering with Filtron Corp. In his last post, he was responsible for the design, development, and manufacture of RFI/EMC interference filters. His duties at AXEL ELECTRONICS will be to broaden the company's product base and develop new products to meet both commercial and military requirements for RFI/EMC filters.