

IEEE

ELECTROMAGNETIC COMPATIBILITY GROUP



NEWSLETTER

EDITOR: Robert D. Goldblum

ISSUE NO. 87 FALL 1975

RADIO FOUND STRANGE HAZARD TO WARSHIP GUNS AND PLANES

Washington-Uncle Sam has found much good in radio broadcasting, but now that he has unearthed some evil, he has branded it as a hazard and is making provisions to guard against it as such. He has found that radio waves of the ultra short variety are able prematurely to fire a gun, touch off explosives and start a fire on board warships carrying such instruments.

Experiments on the U.S.S. Texas have revealed that when the muzzle end of a gun is exposed to a high-frequency wave, the entire gun may break into oscillation and thus make premature firing possible.

For that reason Admiral C.F. Hughes, chief of naval operations, has issued an order forbidding the operation of short-wave transmitters on ships at frequencies above 4000 kilocycles during target practice, when fueling ships with oil or gasoline, when wing-tip flares are near objects which might be damaged seriously due to the ignition of the flare, and while fueling aircraft or boats on deck.

Robot Gunner

Investigations on the U.S.S. Texas disclosed that guns in turret No. 3 are a full wave-length long for certain radio waves and the trunnions are about one-quarter of a wave-length from the muzzle ends. Thus, with the muzzle exposed to

high-frequency radio waves it would be like employing a radio robot to fire the gun!

To provide against these hazards, three precautionary measures have been taken by Hughes.

A small filter system has been successfully developed, and, if found necessary, will be supplied to the firing circuits on all exposed mounts. Meanwhile high-frequency transmitters are to be shut down while exposed guns are firing.

Ground Planes and Gas

The present safety precautions guard against the hazard of radio resonance by requiring the filling hose to be grounded to the gasoline tank being filled. This will prevent all danger. The connection is made direct from the hose nozzle to filling apparatus before the filling cap is removed and is broken only after the cap is closed. Planes are kept grounded to the metal of the ship.

To guard against the hazard of radio resonance, the high-frequency transmitter is not allowed to operate while wing-tip flares are installed on planes on exposed decks in the vicinity of the antenna.

Another safety provision is placing of the radiating portion of high-frequency antennae as far as practicable from resonant objects. This portion of the

(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.

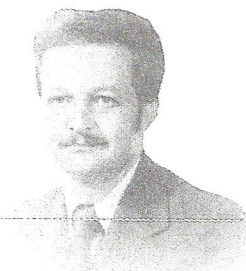
6014849 M
EDWIN L BRONAUGH
6024 CAMMIE WAY
SAN ANTONIO

VO6 ***
AUG01
TX 78238

antenna is designed to be at least 50 feet from such objects when an antenna output of 500 watts is employed on frequencies in excess of 10,000 kilocycles. For greater power this distance is increased.

This is a quote from a 1930 newspaper article. Furnished through the courtesy of Edwin S. Kesney, V.P., Ray Proof Corporation.

EMC NEWSLETTER NEWS



EDITOR:

Robert D. Goldblum

IEEE HQ'S ON CENTREX SYSTEM

During July a CENTREX System was installed at the United Engineering Center in New York City affecting the telephone numbers of IEEE Headquarters. The Area Code number remains the same (212), but 752-6800 has been terminated. Please save and use the following telephone numbers effective immediately:

| | |
|-----------------------------|----------------|
| IEEE - General | (212) 644-7900 |
| General Manager Schulke | " " -7910 |
| Mel Bonaviso | " " -7891 |
| Jessica Carlisle | " " -7889* |
| Peter Edmonds | " " -7887 |
| Marian Herrick | " " -7890 |
| Esther Kelmenson | " " -7892* |
| Ed MacDonald, Conferences | " " -7895 |
| All Standards | " " -7960 |
| Ann Burgmeyer, Transactions | " " -7581 |
| Emily Sirjane, Manager | " " -7757 |
| Field Service Dept. | |
| Robert Asdal, Student Serv. | " " -7759 |

*Dr. Richard M. Emberson may be reached at either of these numbers.

In the last issue of the Newsletter, your editor reported on the status of the Newsletter. Comments were requested relative to space given to Walsh Functions, and I described the Administrative Committee's new policy on distribution through chapter chairman and paid subscriptions. Unfortunately, we have had no response to any of these matters.

In a future issue, I plan to explain why I am a member of the IEEE, and more importantly, a member of the GEMC. Although I do not agree with many policies and programs. Membership in our professional society is still of primary importance to my career.

What are your reasons for being a member? Is it the insurance programs, publications, a sense of belonging, beefing up your resume, technical growth, or other reasons? That would the status of EMC engineering be without the GEMC?

Please take a moment and write to your editor? Some of the replies will be published, but your name will be withheld upon request. Lets make our Group a more viable organization through participation by our members. Enthusiasm is contagious. Your letters will entice others to join and will initiate changes that will make our Group be of greater service to our members.



DECADE BUNCH LUNCH

The first official meeting of the dB Bunch will take place on Wednesday, October 8, 1975 at a luncheon in the El Tropicano Motor Hotel, San Antonio, Texas. Members and guests are invited. Lunch will be free to members and those who join the organization at the door. The subsidized price is \$3.50 to guests.

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, N. J. 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:

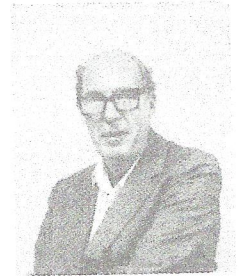
(Sequency Union)
Dr. G. Robert Redinbo
Code R740
Advanced Systems Concept Branch
Defense Communications Agency
1860 Wiehle Avenue
Reston, VA. 22090

CONSULTING EDITOR:

Rexford Daniels
P.O. Box 129
Concord, Mass. 01742

CHAPTER CHATTER

by Charles C.W. Anderson



General

The summer doldrums, as usual, have affected both activities and reporting thereof. Only a few Chairmen have sent reports in time for us to meet the issue deadline. Even just copies of your standard meeting reports with a few scribbled notes would enable your column Editor to put you in print. Deadline for Winter Issue: December 10!

San Francisco

Chairman Vic Turesin sent in a fine summary of the Bay Area Chapter's activities during the past year. Most of which have been covered in this column as they occurred. Chapter Officers for 1975/76 are: Chairman, George Stump (EMC Engineering), Vice Chairman, Eugene Brummet (Lockheed), Secretary/Treasurer, Wilson Chu (GTE-Sylvania).

Vic Turesin presented a paper "Theoretical Analysis and Design Techniques for Grounding to Accomplish EMI Control", at the Montreux Symposium in May. Andy Nalbandian, Gene Brummet and your Column Editor had a good lunch together after the EMC/EMI session at the ICC in June.

Boston

John Clark reported by telephone - and letter - that the Chapter Officers for 1975/76 are: Chairman, John Clark, Vice Chairman, Stephen Cantor, Secretary/Treasurer, Dale Samuelson. Planned meetings are as follows: September 23: Joint meeting with Communications and Electron Devices; with J-P. P. Gravel of Raytheon-Sudbury speaking on "EMC Considerations for a Plasma Display Data Terminal for the TDMA Communications System". October 16: Joint meeting with Audio Engineering; at which Dick Schulz, of ECAC/IITRI, will present "A Formalized Approach to Integrated Electromagnetic Analysis and Testing". December 9: Joint meeting with AES, Communications and VT; speaking will be Dean McKay, of AH Systems, on the topic "Spectrum Management for the Military".

Plans are underway for their '76 meetings - details later, said John.

Jersey Coast

The Chapter's June meeting saw the following officers elected for the 1975/76 term: Chairman, Paul Major (U.S. Army Electronics Command), Vice Chairman, Don Heirman (Bell Labs-Holmdel), Secretary/Treasurer, Herb Bennett (USAECOM). At this meeting, which was held jointly with the Section, awards were distributed by the Division Director. First meeting of the Fall season will be on 16 October, says Paul.



Special Plea To All Chapter Chairmen and

Secretaries

One of my duties as your Chapter Chatter Editor is to be "scorekeeper" for the Chapter-of-the-Year award. All chairmen are *supposed* to have the scoring schedule sheet. If you review that, you will note that almost *anything* a Chapter does counts towards your score. Please get copies of your reports, Chapter Newsletter issues, *advanced*/annual program mailings, and similar items to me; so that I may credit *your* Chapter with its rightful score. Remember, just *one* extra member or non-member attending *one* meeting might make the difference between the winner and the runner-up!

Charlie



SOVIETS' U.S. - AIMED BEAM PERILS FINNS

The following is excerpted from an article written by Jack Anderson & Les Whitten which appeared in the May 16, 1975 issue of The Washington Post.

From a remote lake site near the Russian-Finnish border, the Soviet Union is aiming a mysterious microwave beam at the United States.

American intelligence experts believe the strange beam keeps a round-the-clock watch on U.S. missile sites in the Dakotas.

The rays are so powerful that most Russians in the vicinity reportedly have been moved out. They now monitor the beam, it is believed, by computer from afar. But just across the border, unlucky Finns have developed alarmingly high rates of cancer and heart disease.

The silent beam emanates from clusters of buildings on the eastern shores of Lake Ladoga, which is located in a barren region northeast of Leningrad. One structure has been identified as an enormous parabolic antenna capable of firing the high-powered impulse.

American experts say the lakewater helps concentrate the rays into a powerful beam, which is "launched" off the lake's surface. This gives the beam a better launch and angle, according to the experts, than would forest land or hill country.

Just as ordinary radar picks up distant objects, the Soviet super-radar can monitor movement around the intercontinental ballistic missile sites 4,500 miles away. The Lake Ladoga installation would give the Soviet Union almost instant warning of missile launchings from the U.S. heartland. The Soviet monitors could also determine quickly where the missiles were headed.

Because of the dangerous radiation from the powerful microwave rays, Soviet scientists reportedly direct the beam from the safety of a distant headquarters. But the Finns across the border have been afflicted with unusual maladies.

In the Finnish towns of Kuopio, Joensuu and Ilomantsi, the World Health Organization has discovered extraordinary rates of cardiac disease. Ilomantsi, the town nearest the microwave station, has the highest rate of any place its size in the world.

Two other border hamlets, Koitanlahti and Parikkala, have shown inexplicable increases in cancer.

An American physician and microwave scientist Dr. Milton Zaret, investigated the strange plague that has hit these small Finnish towns. At a Warsaw meeting of microwave specialists, he blamed the Lake Ladoga installation for the diseases.

The dangerous microwaves scatter from the main beam, he declared, just as droplets fall near the nozzle when water is squirted from a hose.

Footnote: There has been increasing evidence that exposure from radar and other microwave devices can cause cataracts and damage the nervous system, blood, genitals, and genes. Yet the producers of microwave ovens discount the danger. They are supported by the Pentagon, which would have to change billions worth of military radar and related equipment if U.S. safety standards are tightened.

FCC REPORTS AVAILABLE

The Research and Standards Division of the FCC Office of the Chief Engineer has announced the limited availability of the following reports and programs:

1. "The Quasi-Stationary Satellite Orbit" by John Wang of the Applied Propagation Branch
2. Two computer programs for assigning television channels. The two reports, both by Gary S. Kalagian of the Applied Propagation Branch are RS 74-01 "VHF-TV Computer Assignment Program (VCAP)" and RS 75-02 "UHF-TV Channel Assignment Program (UCAP)".

A limited number of copies are available from the Research & Standards Division of the FCC in Room 7202, 2025 "M" St., N.W., Washington, D.C. Future distribution will be by NTIS.

AT&T PLANS TO TEST NEW HIGH-CAPACITY CAR TELEPHONE SYSTEM

If the FCC approves, AT&T will begin a trial system in Chicago in 1978 of a new high-capacity, "cellular" public mobile telecommunications (car-telephone) system. The cellular concept is a radical departure from present mobile systems which severely limit the number of people who can use car-telephone. There are now about 80 000 customers of car-telephone systems.

Under the present low-capacity system, a single high-powered radio transmitting station, connected to the telephone network, broadcasts conversations over an entire metropolitan area preventing the same frequency from being used simultaneously by other cars in the same or nearby areas. The cellular system eliminates the need for high-powered transmission by carrying the conversation over wire lines to a radio-transmitting base station, or cell, near the mobile customer. Using low power and a directional antenna, the cell site completes the call by radio transmission covering only the small area in which the car is traveling. Sophisticated electronic switching equipment automatically "hands over" calls from one cell area to another as a car or truck travels through them.

EMC PERSONALITY PROFILES

by William G. Duff —



William C. Green



Bill Green is a dedicated old timer in EMC. He has served on many IEEE EMC committees including Secretary through Chairman of the Washington DC Chapter from 1970-73; and has been an activity chairman or officer on the Steering Committees of three past IEEE International Symposiums.

Since October 1969 he has been operating an engineering consulting firm in EMC, EW, COMSEC, TEMPEST--under the name of William C. Green Associates. The firm principals consist of himself plus six colleagues, all senior engineers in the EMC field.

From 1952 to 1969 he was employed by National Scientific Laboratories, Inc. He started as a staff Senior Engineer and was promoted successively to Project Manager, Asst. Dir./Eng., Director of Engineering, VP/Eng'g., President and Chairman of the Board. The firm was engaged heavily in EMC, TEMPEST, and associated fields during his incumbency.

Previously, he was Resident Engineer on a VOA construction project in Okinawa; Resident Engineer at Anchorage, Alaska, on an auroral zone communication feasibility project; Chief Radio Engineer of the Philippine Long Distance Telephone Co., where he was engaged to design, install, and operate interisland and international radiotelephone and data systems.

Bill had four years of military service with the US Army Signal Corps. from 1943-47 as a Radio Engineer Officer. His engineering assignments included: Instructor in theory and operations; Design and Installation of a staff telephone system Manila/Okinawa; System engineering of a multichannel telephone/teletype system Guam/Saipan; OIC of the Military Crystal Grinding Lab for the Far East; OIC of a major tape relay center; Electromagnetic spectrum management.

He studied engineering at Columbia and New York Universities. He also went through the AT&T Co. Long Lines Schools for an extended period where he studied Bell System Practices, Multichannel carrier systems, and the Western Electric SSB transmitter and receiver. He is a registered Professional Engineer and is also a member of the National Society of Professional Engineers and the American Institute of Physics.

Bill Green is now General Chairman of the IEEE 1976 EMC Intl. Symposium to be held in Washington, D.C. July 13-16, 1976. He is a great organizer and has assembled a powerful steering committee to assure that the 1976 Symposium will be the best and biggest ever--since it will be held in a key bicentennial city--and smack in the middle of the American Bicentennial activities. It will be held in the Shoreham Hotel in Washington, and to assure adequate meeting rooms, exhibit space, and guest rooms for the attendees, he first booked the Shoreham Hotel for this symposium five years in advance. Bill tells us that a block of hundreds of guest rooms has been earmarked for the EMC Symposium in order to assure accommodations for all IEEE attendees. He anticipates a large attendance and one of the largest collections of exhibits. The Symposium theme is "Focus on Spectrum User Problems". Pertinent papers, which will be both informative and interesting, are anticipated on a world-wide basis.

PROFESSIONAL REGISTRATION

PROFESSIONAL REGISTRATION in Engineering Statement has been issued by IEEE in response to the request of the National Council of Engineering Examiners (NCEE).

The IEEE continues to support the concept of licensure for the practice of engineering. In reviewing the various recommendations currently being put forth on the question of relicensure, it seems clear that much more effort must be expended in developing a meaningful and suitable set of criteria for the measurement of individual competence to practice. By and large such competence is derived primarily as a result of practice, hence the IEEE feels any system developed to certify individuals for relicensure must have built into it a technique for review and evaluation of the immediate past performance of the individual in his working environment.

The IEEE is aware of numerous proposals to use programs oriented toward the accumulation of educational "credits" as a means of assessing competence to practice. The IEEE does not believe such programs can be used as the sole criterion for relicensure of individuals to practice. The IEEE does feel there is a place for educational assessment in the overall relicensing procedure as one of a number of criteria used to requalify the individual.

NSPE PUBLISHES EXPLANATION OF NEW PENSION LAW

NSPE has published a 96-page booklet which explains in detail the many facets of the Pension Reform Act of 1974, recently signed into Federal law.

Publication of the booklet is a follow-up to NSPE's role in support of the Act, which includes provisions for the self-employed, plan participation requirements, vesting of employee benefits, minimum funding standards, limitations, saving for retirement, termination insurance, etc.

The booklet is available from MSPE, 2029 K St., N.W., Washington, D.C. 20006; price, \$1 (\$2 for nonmembers).

IEEE MAILING ADDRESSES

If the name and address of a specific staff member is known, by all means address mail to that individual. When in doubt, however, the following guidelines may be helpful:

- A. IEEE Headquarters remain at 345 E. 47th Street, New York, New York 10017. All mail involving the General Manager and all Staff Directors except the Director of Administrative Services, W.J. Keyes, should be sent to this address. Telephone No. (212) 752-6800.

SENIOR MEMBER RECOGNITION

The higher grade of membership is a badge of recognition and achievement. A membership certificate is provided to the member at no charge. A special congratulatory letter is sent to every member admitted or transferred to Senior Member grade. The employer of the member is notified that the employee has been elected to the highest professional grade for which application may be made. The member's prestige is thereby enhanced in his own company and throughout the profession.

Senior Member applications will be furnished promptly on request to Miss Emily Sirjane at IEEE Headquarters.

PROMOTING TRANSFERS TO SENIOR MEMBER GRADE

Why should the Membership Development Committee be concerned with transfers in membership grade - is this not an individual responsibility? Yes, it is, but we need to motivate members to take the little extra effort necessary to do so.

ANY MEMBER OR IEEE ORGANIZATIONAL UNIT MAY PROPOSE A MEMBER FOR TRANSFER.

If a qualified member cannot be induced to upgrade, he or she can be proposed for advancement in grade. How is this done?

- (1) The proposer will fill out the application. Most members already have a resume which can be used for this purpose. Mail the completed (and unsigned) application with a letter to IEEE Headquarters stating that you are proposing the candidate for transfer.
- (2) The proposer is responsible for soliciting the required three references on the application which are to be mailed direct to IEEE Headquarters.
- (3) Upon receipt of the three references, the application will be reviewed in the usual way by the Admission and Advancement Committee.
- (4) When favorable action has been taken on the application, the proposer will be requested (through special form provided by the IEEE) to invite the applicant to accept the proposed grade of membership. The transfer will be processed just as soon as this written acceptance is received.

- B. Mail intended for The Director of Administrative Services, or for any of the offices in the Administrative Department, or for specific individuals located at Piscataway, should be sent to IEEE Service Center, 445 Hoes Lane, Piscataway, New Jersey 08854. Telephone No. (201) 981-0060.



BOOK REVIEWS

BOOK REVIEW

by Jim Hill, RCA Service Company

My review of Buchsbaum's Complete Handbook of Practical Electronic Reference Data brought a quick letter of comment from Edward E. Wetherhold of Annapolis, Maryland. He has found a number of errors in Mr. Buchsbaum's book that should be brought to the attention of our readers. Mr. Wetherhold's comments are restricted to Chapter 5, "Filters, Attenuators, Rectifiers and Regulators" because this is his area of greatest competence. According to Mr. Wetherhold the statement in Chapter 5 to the effect that filter design using the modern network theory being fairly complex and best performed by specially designed computer programs----limited to filter design specialists is a gross misstatement of fact! Since 1963, Geffe's book, "Simplified Modern Filter Design", has made it possible for the average technician and engineer to use modern network synthesis in the design of filters without the need of "specially designed computer programs". The justification given in the text for discussing only the characteristic impedance method of filter design does not have sufficient merit to be used as an excuse for omitting modern filter design procedures.

A second comment has to do with an example of the calculation for a 50 to 300 ohm pad. The calculated values are in error by some 32 percent.

A third comment is in reference to a filter design example for a low pass filter using a constant-K section and an m-derived midsection. Although the calculated values of inductance and capacitance are essentially correct, these values are incorrectly applied in forming the m-derived matching sections. Because of this error, the component values of the combined filter schematic are wrong. Anyone following the procedure given by Buchsbaum will obtain an incorrect filter response with an undesired attenuation peak in the passband and the incorrect cut-off frequency. The error in Buchsbaum's filter design procedure will not become

obvious to the designer until after he constructs the filter and measures its response. Mr. Wetherhold makes the point that only after hours spent in designing the filter, selecting the components, and constructing the filter will he find that the filter is worthless, all because of using an incorrect procedure for the design of the m-derived matching sections. For this reason, it is imperative that this example be corrected as soon as possible by the publication of an errata sheet.

An additional major error in Chapter 5 is the voltage tripler circuit, as shown it cannot work. The figure should be replaced with a correct schematic diagram for either a half-wave or full-wave voltage tripler.

Mr. Wetherhold has listed a number of additional errors in his comments which make specific reference to details in the text and would be of interest only to someone owning or using the book. The foregoing comments are for the most part directly quoted from a communication from Mr. Wetherhold.

CORY AND O'NEIL RUN FOR IEEE POSTS

Two of our Groups most prominent members are running director posts in this years IEEE elections. Running are:

William E. Cory, Vice President and Director, Electronic Systems Division, Southwest Research Institute, San Antonio, Tx. for Delegate/Divisional Director, 1976-1977, Division III. Gene is both Chairman of the GEMC Administrative Committee and the 1975 International Symposium in EMC.

John J. O'Neil, Chief, EMC Technical Area, U.S. Army Electronics Command, Ft. Monmouth, N.J., for Regional Delegate/Regional Director, 1976-1977, Region 1-Northeastern Region. John is the past chairman of the 1969 IEEE International Symposium on EMC, and has been very active in AdCom functions.

Although our Group is relatively small (approximately 1500 members) it is good to see that two of the 22 candidates are Group members.

FARRELL NEW IEEE DIRECTOR
OF PROFESSIONAL ACTIVITIES

Leonard B. Farrell has been appointed Director of Professional Activities for the IEEE. He will be responsible for the IEEE Washington Office and will have staff responsibility for the Institute's United States Activities Committee as well as the task of developing a strong Industrial Relations Program.

Mr. Farrell's background has been that of an industrial relations executive with over 22 years of broad and senior domestic and international experience in all aspects of labor relations, employee relations and management development. His experience includes having served as Assistant Postmaster General of the United States for Labor Relations; Group Vice President of Industrial Relations for W.R. Grace & Co., where he was responsible for industrial relations in 36 multiplant companies in the U.S. and Europe; Vice President of Industrial and Public Relations with the Ruberoid Co., where he was responsible for all labor, employee and public relations; and a Division Manager of Industrial Relations with Continental Can Co., where he directed training and safety, management development and employee and labor relations activities.

IEEE PROTESTS PROPOSED
KEOGH REGULATIONS

IEEE has sent a strongly worded protest against a proposed Internal Revenue Service regulation that would severely restrict the opportunities for engineers and scientists to establish small Keogh plans. The Institute requested a hearing and an opportunity to testify on the subject. The protest was contained in a letter sent to the Commissioner of Internal Revenue by Washington, D.C. Attorney Frank Cummings on behalf of the Institute.

The main objection registered by IEEE centered on a proposed regulation which would limit an individual's contribution to a Keogh plan to the lesser of \$2,500 or 25% of the individuals compensation. The effect of this proposal would be to nullify the express provision and intention of Congress to allow a self-employed person to contribute up to \$750 per year, so long as the amount contributed did not exceed 100% of the employee's earned (self-employment income.) This regulation, if put into effect, would mean a person would have to have \$3,000 of self-employed income before he or she could put \$750 into a Keogh plan. Under the initial Congressional legislation, the first \$750 of income could all be put into a plan.

In its letter to the IRS, the Institute protested the proposed regulation on the grounds that it is unauthorized by the statute, violates the express mandate of Congress, and would be damaging to our members. In effect, then, your (IRS) proposed regulation would deprive our members of three-quarters of the benefit which Congress believed it was granting. This is a senseless result."

IEEE ISSUES MANPOWER REPORT
ON MID-CAREER PLANNING

The third annual report of the Manpower Planning and Member Employment Committee of the IEEE has been released. This year's book deals with "The EE at Mid-Career--Prospects and Problems." Hans Cherney, Chairman of the Institute's Manpower Planning and Member Employment Committee, notes that this report "focuses on a subject which--although it affects only a segment of the engineering population at any given time--should be of concern to every engineer, and specifically to the engineer employed in industry."

"Mid-career occurs when you begin to get just frightened enough to think that really if they had another company cutback you're the least likely to be missed," writes Harold Goldberg, Chairman of the IEEE United States Activities Board (USAB). To help prepare for the impact of this point in your career the book contains sixteen articles of subjects ranging from "The Demand for Electrical Engineers" to "Long-Range EE Educational Requirements--The Impact of Changing Demands." Other chapters include a look at age discrimination patterns, the effect of the recently passed pension legislation, and specialization --can it be a problem?

This 298 page report is available from the IEEE, 445 Hoes Lane, Piscataway, New Jersey 08854. The cost to Institute members is \$15, non-members \$25.

USAB has also announced the results of its second Unemployment Index of IEEE members. Using a random sample of approximately 2,600 members, those indicating they were involuntarily unemployed were 2.5%. This compares with an adjusted figure of 2.3% in the first survey. Over 70% of the unemployed group gave their age as 40 or over. Those reporting themselves as employed but available for work in the field of their primary technical competence was 4.2%. This was one percent lower than the initial survey.

The Institute will continue to track the Unemployment Index to gain accurate information about how the economy is affecting our profession.

STUDENT BRANCHES

TOP TEN STUDENT BRANCHES based on largest membership as of December 31, 1974 are listed below:

| | |
|---|-----|
| University of Illinois, Urbana | 345 |
| Polytechnic Institute of N. Y. | 300 |
| Massachusetts Institute of Technology | 283 |
| Stanford University | 256 |
| University of California at Berkeley | 243 |
| University of Colorado, Boulder | 239 |
| University of Missouri at Rolla | 219 |
| City College of the City University of New York | 215 |
| University of Texas at Austin | 211 |
| Purdue University | 209 |

NOTES FROM SEQUENCY UNION

by
G.R. Redinbo



HOW ACTIVE IS THE EMC TRANSACTIONS IN WALSH FUNCTIONS?

The EMC transactions has been involved with the regular publication of papers pertaining to Walsh and related functions since January 1973. Since then, fifteen papers have been published in this area. Several more have been accepted for publication and others are in the process of being reviewed. It has been encouraging to note that there is a great deal of research interest in the area of Walsh function applications.

The Associate Editor for Walsh Function Applications would like to take this opportunity to thank all the reviewers who have given their time so generously. Of course there is a continuing demand for competent, conscientious, and punctual reviewers for papers in this area. Remember that the quality of the papers is maintained by the quality of reviewers. All volunteers are urged to drop a line or a post card to Dr. Ahmed.

If prospective authors should have any questions, they may feel free to call or write the Associate Editor for Walsh Function Applications, N. Ahmed, Department of Electrical Engineering, Kansas State University, Manhattan, Kansas 66506 (AC 913-532-5600).

WALSH FUNCTIONS REACH SIBIRIA, AND THE IEEE TRANSACTIONS ON EMC HELPED THEM GETTING THERE

In 1971 the IEEE Transactions on EMC published a special issue on Walsh functions (EMC-13, No. 3), which caused some financial strain. You will be glad to hear that your money was not spent in vain but helped Walsh functions and sequency theory to reach Siberia. The Novosibirsk Electrical Engineering Institute published in 1973 a collection of papers under the title "Control and Measuring Systems," edited by M.P. Tsapenko. This book references the special issue ten times. Here are a few quotations: "We are convinced that it is of great interest to use Walsh-Fourier and Haar expansions in approximate measurement devices" (M.P. Tsapenko, Head of the Department of Information Measurement Technology, in the Foreword). "Systems of Walsh and Haar functions which possess a number of advantages are inadequately used in our own development of approximating devices" (E.P. D'yakov, Ya.I. Kapitskii, L.A. Min'kovskii in paper 2). "The experimental investigations have shown that approximating devices in sequential mode based on Fourier-Walsh expansions possess good metrological characteristics and can be constructed using mass produced components already in production, in particular integrated circuits" (Ya.I. Kapitskii in paper 7).

Novosibirsk is located on the other side of the world from North Dakota, but some 600 miles further north. It is the place of "Academictown," the largest research establishment in the world with some 12,000 scientists and engineers.

SYMPOSIUM PLANNED FOR 1976

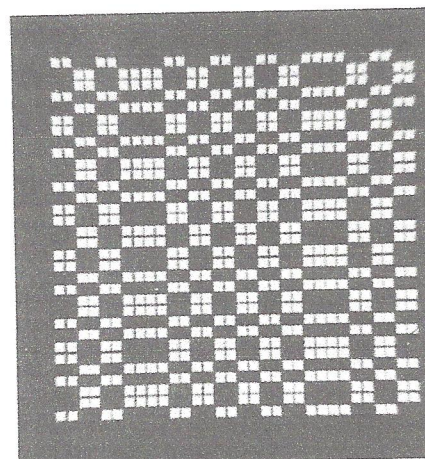
A Symposium on the applications of Walsh and other nonsinusoidal systems of function is tentatively planned for the fall of 1976. It is to be held at the Technische Hochschule (Technical University) of Aachen in West Germany. The Chairman of the Steering Committee is Professor H. J. Tafel of that institution. Mark your calendar now. Authors, here is a show-and-tell opportunity so plan ahead. We will keep you abreast of exact dates and schedules as they are developed.

The Technical University will be an interesting place for a symposium. Workers at this institution have been deeply involved in Walsh function work for some time (see notes below). In addition Aachen is a beautiful city to visit. It was the capitol for Charles the Great of the Holy Roman Empire.

WALSH TRANSFORMS OF IMAGES VIA LIQUID CRYSTALS

The Technical University of Aachen has developed a technique for transforming images using the DAP effect of liquid crystals (a polarization effect). The image to be transformed is focused upon the crystal face which is divided into a matrix of subsquares. Each subsquare can be made either transparent or opaque by external electrical control applied to the rows and columns of the matrix. This pattern corresponds to a two-dimensional Walsh function and effectively multiplies the image by a pattern of ± 1 's. The amount of light transmitted through the face is then summed; the total is proportional to the two-dimensional Walsh coefficient corresponding to the pattern on the face of the crystal.

A scanning pattern with 32x32 subsquares is shown in the following picture of the face of a DAP crystal (white = transparent; black = opaque).



This scanner is a generalization of the flying spot scanner. The flying spot scanner, in our terminology senses and sums the effects of light through each subsquare in a sequential manner.

THE EMC SYMPOSIUM IN MONTREAUX

MAY 21 TO 23, 1975

by DR. F. L. STUMPERS

This first international open EMC Symposium in Western Europe was cosponsored by the International Union of Scientific Radio (U.R.S.I.), the International Special Committee on Radio Interference (C.I.S.P.R.), the Convention of National Societies of Electrical Engineers in Western Europe (Eurel), Region 8 of IEEE and the IEEE GEMC, the Committee on EMC of the SAE, and the Association of Polish Engineers. Mr. Locher, director-general of the Swiss P.T.T. was patron of the Symposium and Professor F. Borgnis chairman of the Symposium Council. Professor F.L. Stumpers was chairman of the Program Committee. Dipl. Ing. T. Dvorak edited the Symposium Record (562 pages) and performed many other duties as Secretary-General.

The keynote address was given by Professor R. Showers: "Electromagnetic Compatibility Comes of Age." He stressed the primary importance of standardization and commented on the work of IEC TC77 and CISPR. There were prizes for the best papers, two of which carried a monetary reward, and three certificates for excellent contributions. A jury, consisting of members of the program committee awarded the first and second prize to the papers by R.W.P. King and G.S. Smith: "Electrical Field Probes and Their Application in EMC" and by V.P. Pevnitzky and L.V. Tigin: "A Stochastic Model of a Cumulative Process of Man-made Radio Interference and Objective Evaluations of Signal Distortions Produced by These Interferences."

Both these papers showed another aspect of the coming of age of EMC, the change from a mostly pragmatic point of view to a science with a strong base in electromagnetic wave theory and statistics. King and Smith calculated impedances and field responses for short or resonant linear probes, bare or insulated in different media, and found excellent correspondence with experimental results. Pevnitzky and Tigin assumed a gaussian distribution of the logarithms of elementary interfering pulse amplitudes, a Poisson distribution of their time intervals, and a uniform distribution of their initial phases. On this basis they calculated the average effective value, the quasi-peak value, and the disturbing effect on analog and discrete signals. One still looks forward to more experimental checks on these results. Though the senior authors could not be present, the prizes were certainly also a mark of appreciation for their lifelong work in EM wave theory and statistics respectively.

In the EM wave theory area, we also mention Ari (The Radiation Fields and Induced Voltages in High Voltage Test Arrangements) Cake (Aspects of the Design of Screened Rooms) Smith (Load Current Spectrum of a Two-Wire Transmission Line Excited by a Nearly Dipole) Sevat (A Method

for Calculating the Shielding Effect of Solid-Shell Enclosures Against EMP) Shah (The Transient Electromagnetic Field Susceptibility of Multiconductor Lines Embedded in a Circular Dielectric Near A Ground Plane) Castellini (A Deterministic Propagation Model for the Rough Earth) Stasierski (EMC and Antenna Systems in Radio-Communication Centres) Klimkiewicz (Compatibility of the Transmitting and Receiving Antennas Located on a Common Mast) Adams, Strait, Schuman and Chou (On the Coupling of Electromagnetic Energy Through Apertures) Siarkiewicz (Antenna Near Field Coupling) Graves, Crow and Taylor (On the Electromagnetic Field Penetration Through Apertures) Babić (Analysis of Several Magnetic Probes With Omnidirectional Pattern).

With regard to statistics, the honorably mentioned paper by Struzak (Electromagnetic Compatibility, Urban Electromagnetic Environment, Facts, Models, Trends) was again stronger in theory than in experimental data. A much more direct relation between theory and experiment is given in Southwick's pleas for the Weibull distribution (An Investigation of Impulsive and Noise Radio Signal Measurements). The papers by Rymarowicz (Noise Propagation in Urban Areas in Medium and Short Wave Range), Moron and Rymarowicz (Urban-Man-Made Noise in Highly Industrialized and Lowly Industrialized Regions in the Medium Wave Range). Polozok (Statistical Characteristics of Broadband Interference from Contact Devices) Egidi, Galliano and Nano (Measurements of hf and vhf Ignition Noise of Real Traffic) all give interesting experimental data as a basis for a statistical interpretation.

Several papers were devoted to EMC in avionics. Last year's prize winning paper in San Francisco by Kampinsky (ATS Spacecraft, an EMC Challenge) was invited here again. Bull and Jackson (Interference Survey in Military Transport Aircraft) well deserved to be honorably mentioned for its sound experimental work on emission of interference and immunity to it. Other good papers in this area: Hanover (EMC Assurance Tests for Airborne Systems Controls in an RF Polluted Environment). Rubin and Tagnola (Automatic Testing of Avionics Systems for Electromagnetic Compatibility) Perini (Experimental Measurements of Fields Excited Inside the Fuselage of an Aircraft) Wahlgren and Gustavson (Crosstalk Analysis and Design Rules for Wiring Installation in the Saab 37 Viggen Aircraft).

In the measurements area the paper by Cortina, Demichelis and Serravalli (A New Type of 500 kHz Measuring Instrument for Long Term Recording of Radiation Interference Produced by the Conductors of High Voltage Lines) was honorably mentioned. Other good papers in this domain: Galliano and Angelotti (New Version of a Pulse Amplitude Classifier) Evans (Broadband Measurements in EMC Control) Groenvelt (A Radio Interference Measuring Method for Fluorescent Lighting Equipment).

(continued)

by Charles C.W. Anderson

The special requirements for computers were stressed by Sauer and Statt, representing the European Computer Manufacturers Association, (Computers, Their Problems and a Measuring Method for Conducted Interference Produced by a Computer). They stressed the susceptibility of computers to pulse type disturbances. Rode (EMC Aspects in Digital Data Transmission) mentions the unsuccessful launching of an Europa II rocket due to static discharge spikes with rise times in the 10 to 20 nsec region. Later, a new working group of CISPR was formed to study interference by computers, but not yet immunity. Analogous papers by Audone and bolle (EMC Requirements for Airborne Digital Data Transmission) Jaeger (Application of Mil Stds 461, 462, 463 as a General EMC Specification for Equipment), Naito and Shah (Influence of Transient EM Disturbances on Digital Electronic Systems).

There were many interesting papers in the sections: EMC and the Hospital, Biological Aspects of EMC, Legal Aspects and Standards, Nuclear Electromagnetic Pulse, Ships and Transport, Spectrum Management, Suppressors, Screening.

A special Forum was devoted to the EMC figure of merit and its first application to voice communication systems. The Forum was chaired by Mr. Gromov (IFRB) and several American experts, led by Mr. Lustgarten, explained and defended this new idea against European panel members and comments from the audience. One evaluates the following: parameters: Receiver spurious responses (SR) Receiver adjacent signal (AS), Receiver intermodulation (RIM), Transmitter Spurious emissions (SE), Transmitter intermodulation (TIM) and Transmitter noise (TN). Each parameter gets a figure between 0 and 100 (0-20 poor, 80-100 good, 50 average). From these figures one calculates the figure of merit for receiver, transmitter and system:

$$\text{Receiver } S_R = 0.3 S_{AS} + 0.1 S_{SR} + 0.6 S_{RIM}$$

$$\text{Transmitter } S_T + 0.6 S_{TN} + 0.25 S_{SE} + 0.15 S_{TIM}$$

$$\text{System } S_S + 0.7 S_R + 0.3 S_T$$

The number of denied channels in a congested environment is the main criterion. The average weighting factors were set up by a panel of experts on the basis of experience and ratings of 27 hypothetical receivers and transmitters. The American committee has done a very useful piece of work. If all ratings can be well defined objectively, as one would hope, this could be the base of a CISPR recommendation under study Question 29 (Communications other than broadcasting).

At a banquet, the prizes for the best papers were given, and the IEE EMC group honoured the organizers (Dvorak, Stumpers, Borgnis) by a speech of Mr. Hill and certificates of appreciation. Mr. Mills gave a very entertaining after dinner speech on his many years of experience in the EMC domain.

Will legislation be necessary to assure a reasonable degree of freedom from susceptibility for home entertainment equipments? Could cooperation accomplish the desired objectives? What contributions could be made by the numerous interests involved? Is there any data base on which to establish even tentative standards on susceptibility for TV and broadcast receivers, high fidelity systems and other consumer electronic equipments? Are there any relatively simple and economical means of reducing susceptibility? These were some of the major questions discussed by eight speakers representing legislative, regulatory, professional, industrial and technical entities during the RFI Symposium held on September 12 at the ARRL National Convention in Reston, Va. Chaired by FCC's John Johnston (just named Chief of Amateur and Special Services), the meeting was attended by over 300, many of whom were from non-amateur circles. Session organizer was Ted Cohen, Secretary of the ARRL RFI Task Group.

Mr. Johnston's opening remarks included reference to the more than 42,000 interference complaints handled by the Commission in fiscal 1974. Over 38,000 of these involved home entertainment items.

Mr. W. Brendan Harrington, of Congressman Charles Vanik's staff, presented a summary of the steps which H. R. 7052, the so-called "RFI" bill, must go through before it could become law. He quoted Will Rogers' famous comment to the effect that "There are two things which the public should never see being made - laws and sausage". Congressman Torbert McDonald's Subcommittee on Communications is now trying to see if hearings on the bill can be scheduled for later this year. (See below) Mr. Frank Rose, Chief of FCC's Technical Standards Branch, discussed regulatory aspects of susceptibility problems. He stressed cooperation between all sectors concerned, mentioning that we are all the public. Among major points which he developed were:

- (a) Differences between signal-to-signal interference and signal-to-nonsignal interference (the latter representing cases in which items other than receivers are involved).
- (b) Importance of good design practices in reduction of susceptibility.
- (c) The fact that present standards apply only to emitters (except in a few cases, such as the aeronautical services).
- (d) The adverse consequences of the reduction of shielding and the use of solid-state technology in recent consumer electronic equipment design.
- (e) The touchy public relations aspects of handling of interference complaints.

(continued)

(continued)

Mr. Rose concluded his remarks with a plea for "regulation by cooperation" if at all possible.

Editor's Note: Regardless of your views on Congressman Vanik's bill (HR 7052), if you feel that hearings on this proposed legislation should be held as soon as possible, write to:

Congressman Torbert McDonald
Chairman, Subcommittee on Communi-
cations
Room B331, Rayburn House Office Bldg.
U.S. House of Representatives
Washington, D.C. 20515

Letters to your own Congressman, with a copy of your letter to Congressman McDonald, might help too.

G-EMC ADCOM President Gene Cory outlined the IEEE organizational structure and our Group interfazes. Gene exhibited his chart showing the intricate relationships between sources, susceptors, and the many other factors involved in interference situations. He stressed impedance considerations, particularly with regard to conducted interference and susceptibility. Gene also pointed out the large discrepancies (up to ± 40 dB) which can be encountered between open-space (real-world) radiated measurements and shielded enclosure tests of the same item. In closing, he emphasized G-EMC's wealth of expertise in this area and its availability to those needing assistance.

Mr. Harold Richman, formerly of the FCC and now a Technical Advisor to the ARRL RFI Task Group, reported the results of a survey of electronic equipment manufacturers regarding their approaches to interference complaints from purchasers. On the basis of about 55% reply to his mailing to 108 companies, he feels that the overall response was on a plus side. Many electronic organ manufacturers have done extensive work in the field in cases of interference to their equipments. The importance of adequate indoctrination of service technicians was mentioned. Several TV set manufacturers were stated to be actively pursuing investigations on new sets and to provide field service on complaints. In the audio field, one manufacturer (who requested anonymity) stated that susceptibility tests using 2 V/m fields over the 0.5 to 7.0 MHz range were being made by his organization. Some of the other audio manufacturers who test units under simulated interference conditions are Radio Shack (Tandy) and Tandberg. KLFH, it was stated absorbs costs of units needing susceptibility fixing at the factory when the problems cannot be solved in the field. A list of specific people to contact with susceptibility problems at 44 of the replying companies was distributed. (Note: This will form a part of the revised ARRL RFI Task Group info packet. See below).

Mr. Don Gerue, of the Santa Barbara Electronic Interference Assistance Committee, presented a well-documented report on a project in which field strengths of typical HF transmitters were measured. Tests were also performed on telephone lines, power lines and CATV cables. Some of the more interesting information obtained was:

(a) For comparable power levels, close-in fields for transmitters using vertically-polarized antennas were significantly higher than for those using horizontal polarization.

(b) Levels as high as 100 V/m were observed at a distance of 8 m from the dipole antenna of a transmitter operating in the 80-meter amateur band.

(c) Telephone line induced currents of over 20×10^{-3} ampere were detected at a distance of 8 m from the transmitting antenna. Even at 30 m distance, levels as high as 10^{-3} were observed.

(d) Levels on TV set power/inout cords, with transmitters operating on the amateur 20-meter band, varied considerably. Over 0.1 ampere was measured in one case at a distance of about 100 m from the transmitting antenna.

(e) On CATV cables, levels as high as 50 dBmV were measured at 8 m from the antenna when operating on the amateur 80- and 40-meter bands. At approximately 52 m from the antenna, levels of about 30 dBmV were observed when operation was on the 15- and 20-meter bands.

(Note: All measured values normalized to a 500-watt power amplifier input level.)

The Committee has developed a set of guidelines for designers of consumer electronic equipment. They recommend that such items be able to operate with no perceptible audible or visual evidence of interference under the following conditions:

Radiated Fields 0.5 to 10 MHz: 40 V/m
10 to 250 MHz: 20 V/m

Induced Currents: AC powerlines, speaker leads, etc. 0.5 to 250 MHz: 25 mA

Induced Currents: telephone lines
0.5 to 15 MHz: 15 mA
15 to 250 MHz: 5 mA

Induced Voltages: CATV coaxial input lines
0.5 to 250 MHz: +60 dBmV

(Editor's Note: Considering the results of the Grundig TV receiver tests, there should be no great difficulty in designing to the above criteria. For those interested, I still have a few copies of the article and translation available for 50¢ in stamps - CFWA).

Perhaps the most significant feature of these investigations is that they were performed cooperatively - by a group made up of CATV, Citizens' Band, Amateur and other representatives. Funding was pro-

(continued)

some specific hardware recommendations can be made.

(a) Use ferrite beads and 0.01 bypass capacitors on speaker leads inside the chassis (Amidon beads w/ permeability of 950 specified). This approach resolved all fundamental overload problems remaining after installation of an adequate highpass filter at the input and an AC powerline input filter.

(b) Low-level audio leads (e. g.: pre-amp to amplifier, or tuner to amplifier) to be wound onto toroid cores about one inch in diameter (core material similar to above).

(c) Phono/pickup leads to be bypassed with about 470 pF, directly at the cart-ridge.

For obstinate cases, bandpass and high-pass filters built on PC boards have been developed. It was announced that ARRL headquarters is taking over the job of printing and distributing the RFI Task Group information packet, formerly handled by Dr. Ted Cohen. It is anticipated that an updated version of the info packet will be available about mid-October. Order from: ARRL, 225 Main St., Newington, Ct. 06111, enclosing a self-addressed, stamped 9-inch x 12-inch envelope with postage for five ounces to your address, or the equivalent in IRC's.

The last presentation was by Mr. Doug DeMaw, Technical Editor of QST, the official journal of the American Radio Relay League. He first described the laboratory research program which has been implemented at the ARRL headquarters in Newington, Ct. Initial efforts are directed at TV set susceptibility, with an RCA XCL-100 solid-state color set as the susceptor. This unit seems to be among the more vulnerable receivers. A typical amateur single-sideband transceiver with a 1 kW linear amplifier is being used as the source. Testing has progressed to the point that

vided by both Citizens' Band and Amateur sources. For availability of copies of the report, contact: Santa Barbara Amateur Radio Club, Box 3232, Santa Barbara, Ca. 93105.

Mr. John Nagle, representing the Amateur Radio Research and Development Corporation (AMRAD), reported the results of field tests of susceptibility of police speed-measuring radars to emissions from typical amateur mobile transmitters operating in the HF and VHF ranges. Two police departments in the Washington metropolitan area cooperated in these checks. Several different types of 2-meter band FM transceivers were evaluated. It appeared that false readings (higher than true speed) could occur only with output levels of the order of 50 W or more. With an HF single-sideband unit of about 150 W output using a center-loaded vertical antenna, no problems were detected.

ARRL is also preparing an RFI handbook, aimed at amateurs, which will probably be ready for publication early next year. (We'll keep you advised.) Proceedings of the Symposium will be distributed by ARRL to those who attended. (It's possible that additional copies may be available - check ARRL).

1976 CONFERENCE ON PRECISION ELECTROMAGNETIC MEASUREMENTS

The 1976 Conference on Precision Electromagnetic Measurements (CPEM) will be held June 28 through July 1, at the National Bureau of Standards (MBS) Laboratories in Boulder, Co. CPEM is a biennial forum for the discussion of recent advances in the technique of precise measurement of all electromagnetic quantities, at frequencies from DC through the visible. Topics include measurements of fields and signal characteristics such as power, current, voltage, field strength, and frequency; transfer characteristics of devices and networks, such as impedance, attenuation; and the electromagnetic properties of materials.

The emphasis on precision is tempered by the degrees to which various quantities can be defined and controlled, but should generally reflect the best attainable. Papers will cover traditional topics, such as the realization and maintenance of SI units, as well as progress in applying newer technologies, such as digital instrumentation, cryogenic devices, and lasers.

Noise, interference, and electromagnetic radiation hazards will also be appropriate topics. The special theme of this conference will be the close and complex interdependence of all electromagnetic measurements with more than a minimal degree of sophistication.

The conference program comprises both contributed and invited papers. Authors wishing to contribute papers should contact Dr. R. A. Kamper, CPEM '76 Technical Program Chairman, National Bureau of Standards, Boulder, Colorado 80302.

ELECTRO/76 ISSUES 'CALL FOR SESSIONS'

A "call for sessions" has been issued for the program for ELECTRO/76, the IEEE Show in Boston next May 11-14. It will be the first IEEE international convention held outside of New York City. In the new format, ELECTRO will be presented in alternate years in Boston and New York. The call for sessions also represents a major first for the convention. Proposers are asked to send a "letter of intent to propose" to the committee, suggesting the session topic, scope of material to be presented, and suggested author-participants. If the proposal is

selected by the committee, the proposer moves on to the next step--a more detailed proposal, which will include firm paper titles, authors' names, and a detailed outline of the session chronology.

This "session unit" system, very similar to that used in organizing Wescon programs, sets up a competition among proposals, provides a two-step quality-control review, and insures that all papers within a session will be complementary to one another. Technical Program Chairman Anderson and his committee have set 28 half-day sessions as their goal for ELECTRO/76. All will be presented in the Sheraton-Boston Hotel, which is adjacent to Hynes Memorial Auditorium, scene of the concurrent ELECTRO product exposition.

First-round deadline for letters-of-intent is October 10. Further information and copies of the call may be obtained by writing Anderson, c/o ELECTRO/76, 31 Channing Street, Newton, Mass. 02158, or telephoning 800-421-8526.

CALL FOR PAPERS

1976 Carnahan Conference on Crime Countermeasures. Principal emphasis will be placed on engineering developments as applied to law enforcement, security and crime prevention. Papers are solicited in the areas of EDP security, police systems, automatic vehicle monitoring, contraband detection, alarm systems, personnel identification, security equipment standards and progress reports of current research and development work. Papers, emphasizing human factors will be included in featured sessions. Topics include integrated emergency communication, EMS 911, citizens alarms, social implications of technology, man-machine interaction, and privacy.

MAIL ABSTRACTS TO:

John S. Jackson, Conference Chairman
Dept. of Electrical Engineering
University of Kentucky
Lexington, Kentucky 40506
Telephone: (606) 257-3926 or 258-5949

IEEE 1976 INTERNATIONAL SYMPOSIUM ON ELECTROMAGNETIC COMPATIBILITY

FOCUS ON SPECTRUM USER PROBLEMS

WASHINGTON, D.C., JULY 13 TO 15, 1976

CALL FOR PAPERS

This symposium will direct attention to the problems of the users of the radio spectrum, and the problems of those affected by spectrum use. It will take a hard look at the electromagnetic compatibility aspects of our total environment and ecology.

Some of the areas to be included in the technical program are:

- System compatibility problems
- Consumer product compatibility
- Radio spectrum utilization
- Medical/biological aspects of RF energy
- Airborne and space system compatibility
- RF compatibility in electric power devices
- New approaches to user problems—fiber optics, Walsh functions, figure of merit, etc.

Paper summaries (500 words or less) are due by November 30, 1975. If accepted, authors will be notified by December 31, 1975. Complete manuscripts, suitable for publication in the Symposium Record, are due by March 1, 1976.

There will be monetary awards for best papers (\$100) and runners-up (\$50).

Please submit three copies of summaries to:

William G. Duff
Chairman, Technical Papers Committee
c/o Atlantic Research Corporation
5390 Cherokee Avenue
Alexandria, Virginia 22314



P.O. Box 2118
Arlington, Virginia
22202

Make Your Reservations Early!

Shoreham Americana Hotel
2500 Calvert Street, N.W.
Washington, D.C. 20008

IEEE PUBLICATIONS

Since IEEE Headquarters is so often asked for advice on disposing of old AIEE/IRE/IEEE publications, the following is an attempt to bring together in one place the information and suggestions that may be helpful.

In the past, many publications had a high market value and could fairly easily be sold to back copy bookstores. Libraries and schools were eager for donations. Now, however, the situation has changed radically and the demand is very small. The main reason for this change is that, for the last several years, IEEE has made available all of its technical periodicals (including those from AIEE and IRE) on microfilm. Another apparent reason is that so many members with extensive publication collections have already saturated the market by selling or donating them.

On the negative side, and in answer to the questions most frequently asked: 1) Neither IEEE Headquarters nor the Engineering Societies Library is in a position to accept donations of back publications; 2) It isn't feasible for Headquarters to provide a clearing house service; and 3) Because of the extremely difficult-to-know and shifting nature of the market value of back issues and the number of variables involved (completeness of a collection, physical condition, etc.), IEEE cannot assess or verify the value of a collection.

On the positive side, before committing a good collection to the shredder, we certainly recommend exploring the possibility of selling or donating publications locally. (A brief list of occasionally and/or tentatively interested back copy organizations in the New York City area is available on request from the IEEE office.) A few phone calls or letters to back copy book stores should reveal what, if any, interest there is locally and whether there is a willingness to offer a quotation. Similar inquiries to libraries, schools, company libraries, etc. may elicit information on where a collection could be donated.

Ideally, it should be possible to donate publications to a worthy recipient and take a suitable tax deduction. This is certainly possible if a firm quotation has first been obtained from a reputable commercial book dealer or the organization receiving the donation is willing to state formally the value they place on the collection. Unfortunately, several organizations we used to recommend (one, for example, which supplied publications to developing countries) no longer function.

Feedback is welcome from anyone who knows of any organizations which would consistently accept any and all donations or which have at least a reasonable interest in buying back copies. Any such will be added to our list.

PUBLISHING OPPORTUNITY

Arrangements have been made by the Student Activities Committee and with the G-EMC to publish in our Newsletter student authored papers (or condensed versions thereof) which were presented in an IEEE Student Paper Contest at a Branch, Section, Area, or Region level. Here is how it works:

1. Send a reproducible copy of your paper to : IEEE, Manager, Student Services, 345 East 47th Street, N. Y. N. Y. 10017.
2. On a separate sheet accompanying your paper, list your name, address, IEEE membership number, highest degree earned, school you are attending, and graduation date. Include a statement of the Contests in which the paper was entered and how it fared. (This information will be considered proprietary and will not be forwarded or published.) Also, provide a biography and photograph of yourself.
3. When received, papers will be classified to determine their area or areas of applicability and will be forwarded to the appropriate Group or Society, which has expressed interest in receiving student papers, for publication consideration. Final decisions regarding publication will be made by the IEEE Group or Society.
4. Papers will be acknowledged when received and authors will be notified to which Group or Society the paper is sent.

Here is a great opportunity to have your paper disseminated and discussed in the technical forum to which it applies and to receive the acclaim of a published author. Don't wait . . . submit your paper today!

IEEE POSITION PAPER

President Ford has also been asked by IEEE President Stern to comment on the Institute's Position Paper, "Science, Technology and America's Future," for publication in Spectrum. This document, adopted by the BofD at its April meeting, was prepared at Mr. Stern's request by IEEE Executive Consultant Don Fink. Using government figures, it shows that the real value of R & D in the United States, in the public and private sectors combined, has declined 10 per cent in the past two years, when expressed in constant 1967 dollars. To correct this dangerous falloff, the Position Paper recommends specific actions by the government to maintain R & D support at 3% of the Gross National Product, including a depreciation tax credit and contract allowance for industrial R & D. In a response from James Cannon, Assistant to the President for Domestic Affairs, he noted that "there is no question as to the importance of science and technology R & D in pursuing national objectives." (Copies of the Position Paper may be obtained by writing HQ.)

IEEE MEMBERSHIP PROPOSALS

The IEEE Bylaws provide that "Admission or transfer to any grade except Fellow may be proposed by any member or organizational unit of the IEEE acting as sponsor by supplying to the Admission and Advancement Committee a completed application form and testimonials as to the applicant's qualifications from the prescribed number of references. When favorably acted upon by the Admission and Advancement Committee, election to this membership grade shall be effective upon receipt at IEEE of the candidate's acceptance of the proposed membership grade and payment of any necessary dues and fees."

An individual member, a Section, or other IEEE organizational unit may submit an application for admission or transfer to Member or Senior Member grade with or without the knowledge of the applicant.

- (1) The proposer will fill out the application. Most members already have a resume which can be used for this purpose. Mail the completed (and unsigned) application with a letter to Miss Emily Sirjane at IEEE Headquarters stating that you are proposing the candidate for admission/transfer.
- (2) The proposer is responsible for soliciting the required three references on the application which are to be mailed direct to the IEEE office.
- (3) Upon receipt of the three references, the application will be reviewed in the usual way by the Admission and Advancement Committee.
- (4) When favorable action has been taken on the application, the proposer will be requested (through special form provided by the IEEE) to invite the applicant to accept the proposed grade of membership. The admission/transfer will be processed just as soon as this written acceptance is received.

IEEE PENSION PROGRAM STATUS REPORT AVAILABLE

The IEEE, through its Pension Committee, continues to explore all possible avenues which might lead to a comprehensive program of pension offerings to its members. The committee is using a double pronged attack on the problem of portable pensions by attempting to provide a basic five-element package of plans to cover as many members as possible while simultaneously working with the legislative branch of the U.S. Government to both maintain the gains achieved in the ERISA-74 legislation and provide input for future legislation.

The five-element pension package and Status Report are delineated on a 4 page flyer available from the editor.

INSTITUTE CONSIDERING NEW SERVICES TO ITS MEMBERS

The Board of Directors (BoD) and staff executives of IEEE are making a major study of all the services which should be offered to Institute members and how to finance them. The context of the study is how to better serve all IEEE members as individuals and the membership as a whole in order to further the scientific, educational, and professional missions of the Institute.

In order to meet these commitments, and to take care of the increased costs of necessary services brought about by double digit inflation, the April 10th BoD meeting considered the proposal of a dues increase. This would be a \$5 increase in 1976 general dues and an increase in U.S. Regional assessments of \$5. The Board will reconsider the whole problem at its next meeting in September.

What are some of the possible new services being considered?

1. Direct telephonic access for members to the IEEE Service Center for immediate action on membership and publication needs through a special 800 WATS line and use of credit cards.
2. Direct Financial assistance to its Sections for Professional Activities Committees (PAC's), expansion of the Congressional Fellows program, a vigorous Washington lobby with the USAB staff member headquartered in Washington, accelerated manpower activities and an expanded public relations program aimed at nationwide member participation in issues affecting its public interest.
3. Formation of an IEEE Midcareer Academy. This will enable IEEE members who have been away from college for several years to update their technical knowledge in several areas such as telecommunications, instrumentation and control, power, computers and logic design, applied electronics, and industrial applications. This objective will be to improve the overall quality of electrical and electronics engineers by technological updating and skill revitalization.
4. New communications tools to aid the IEEE member including expansion of the newly-formed "Annals of the IEEE" for selective dissemination of scientific information, the introduction into "IEEE Spectrum" of a regular series of feature articles on applications techniques.

And, in general, a beefing up of all Institute activities to provide economical, efficient, and direct services on an expanded scale for the entire membership. To accomplish the foregoing the Directors will be considering various alternatives including some deficit financing as well as dues increases that vary in size and timing.

The new segmented diverter strip technology has attracted considerable interest because of improved radar transparency; however, information made available at the April 1975 Lightning and Static Electricity Conference recently held at the Culham Laboratories in England indicates that there are several serious problems with these stripes that have not been previously reported. The conclusion of an Air Force attendee was that additional research and development work was needed to verify the effectiveness of the segmented strips and to demonstrate that these problems have been solved. The data presented indicates problems in the following areas:

- a. Significant erosion of the buttons can occur with one high ^{alt} test waveform. (US Government test facilities have observed severe erosion at low currents of 20,000 amperes.)
- b. During high coulomb tests, the intense heat can destroy the strip and cause significant damage to the radome.
- c. If the strip should not ionize, then breakdown of the conductive portion of the strip occurs, which can blow the strip from the radome.
- d. Rain erosion tests at one inch per hour have shown the life of the segmented strip to be only a few minutes.

Recent analysis of the lightning tests performed during development of the segmented strips has shown that many short cuts and improvisations in test procedures were made, without any apparent authorization or documentation. Because of the many uncertainties, the electrical tests are questionable and some may have to be repeated under more carefully controlled conditions. At this time, the electrical performance of the strips is uncertain and cannot be verified.

It is recommended that any project office considering the use of the segmented strips take precautions to ensure that the problems listed above will not degrade the safety of the system.

Anyone who has information that will clarify these problems or who desires to comment may contact: Chairman, Air Force Lightning Hazards Advisory Group, Aeronautical Systems Division, Attn: ENAEA, Wright-Patterson AFB, Ohio 45433.

The above information will be included in the next revision of AFSC DH 1-4, Revision 1 dated 5 July 1975.

A modern corona testing facility for The Okonite Company, one of the industry's leading suppliers of high voltage cable, has just been completed at its West Coast production plant. Prominently featured in the new corona (or discharge) test installation are an "RF clean" Ray Proof (Div. of Keene Corp.) shielded room to prevent electrical interference and a complete final test system of Hipotronics (Brewster, N.Y.)---both of which assure Okonite of a continuous capability for testing solid dielectric high voltage cables with ratings varying from 5 to 138 kilovolts.

The Okonite Company was among the first to promote the idea of corona testing. The new shielded rooms and equipment are necessary because the older testing methods--performed in open surroundings by link chain fencing--do not keep out the many forms of plant interference that will alter test results.

Hipotronics, supplier of the test equipment, indicates that with the advent of lighter walls and tighter specifications, modern test equipment and shielded rooms are essential to manufacturers such as Okonite. Just as important as the environment is the corona test system, and at Okonite, Hipotronics has supplied a complete testing system. This consists of a series resonant test set, comprising a high voltage reactor, exciter and controls, as well as the detection equipment which includes an oscilloscope for visual readout and an x-y recorder. The company specializes in this type of equipment for the wire and cable industry and offers the most complete system obtainable today.

In the 1967-69 period, the utility and cable industries began seeking tighter controls to insure cable integrity. Several technical papers were presented at the time, which caused all companies to reassess their test facilities. During this period, the AEIC and IPCEA specifications were developed to essentially the same levels they are today. Now, testing methods have become stabilized.

PEM NOTES

The following Nuclear EMP Protection Engineering & Management (PEM) Notes have been released in 1975. Copies are available from the U.S. AEC Technical Information Center, P.O. Box 62, Oak Ridge, Tenn. 37830.

- PEM-30 "Bulk Current in an Insulated Cable Lying on the Surface of the Earth" by Glenn L. Brown, Feb. 1975.
- PEM-33 "Voltage Clamping Levels for Several Transzorb Transient Suppression Devices" by O. Melville Clark, Mar. 1975.
- PEM-34 "Transient Current Estimates for Finite Length Surface Cables" by Monti R. Wilson, Feb. 1975.
- PEM-38 "Key Suppression Device Parameters for EMP Hardening" by D.L. Durgin & R.M. Brown, Mar. 1975.

SHORT COURSE

TELECOMMUNICATIONS POLICY PROBLEMS

JANUARY 19-23, 1976

This course is designed to provide to both non-technical and technical personnel an understanding of the political, economic, social and technological issues inherent in formulating U.S. policy, as well as other topics of vital concern in the telecommunications area. Fundamental to the discussions will be the potentials and limitations of the domestic, mobile and international telecommunications systems. Costs related to development and operations of these systems and how costs are allocated will be covered. Social issues will be examined, focusing on those factors which bear heavily on industrial and political decisions relative to the adoption of particular services. For further information, please write to the Director, Continuing Engineering Education, George Washington University, Washington, D.C. 20052, or call (202) 676-6106.

NEW EMC AND RELATED SEMINARS

In addition to its continuing seminars this Fall, Don White Consultants, Inc. offers for the first time the following new comprehensive short training courses: EMI Control in Medical Electronics and Hospitals, Shielding, Microwave Solid-State Circuits, HP-65 EMC/EMI Programs & Applications, and Vibration and Shock-Vehicular & Seismic. Interested persons should contact Mrs. Muriel Moeller, Don White Consultants, Inc., 14800 Springfield Rd., Germantown, Md. 20767. Phone: 301-948-0028 or TLX 89-2766 DWCI GTWN.

VENABLE RECEIVES AWARD

Thomas L. Venable, president and founder of Spectrum Control, Inc. of Fairview, was honored recently as Small Businessman of the Year for Pennsylvania. The award is made annually by the Small Business Administration. Leaders from business, banking and professional fields joined with Federal, State and Local government officials at the Kahkwa Club to make the award.

Venable founded Spectrum in 1969 as a new manufacturer of electromagnetic filters, capacitors, trimmers and small devices used in communication technologies. Today the company employs more than 200 people and at year's end, 1974 recorded net sales of \$2.6 million dollars. Spectrum has won numerous citations as "Vendor of the Month" from such large companies as Boeing and Magnavox. Such citations are given in recognition of product quality and timely delivery. Currently, about 65 per cent of Spectrum's production is in connection with Defense Department contracts.

KNOWLES-BEAUCHAMP FORM EMCOM

Gene Knowles and Frank Beauchamp have begun a EMC consulting service for Northwest users, known as EMCOM-Northwest. They offer EMC design and problem solving to hospitals and others in need of EMC/EMP services.

Gene has been very active in G-EMC activities. He has served as Vice President of the AdCom for several years, and is a prominent member of the Symposium Committee for the 1977 International Symposium on EMC to be held in Seattle. Gene recently left Boeing after 19 years of service in the EMC and EMP field. For further information, contact EMCOM-Northwest, P.O. Box 3235, Bellevue, Wa. 98009.

DYNAMAGNETIC ACQUIRES QUEST

DynaMagnetic Engineering procured the total entity of Quest Electronic Development, Inc. (Quest) (Q.E.D.) a Guide Scientific subsidiary, out of the chapter 11 Bankruptcy Court. In July, the DynaMagnetic Engrg. and Quest operations were combined and all products can be obtained from 620 East Dyer Road, Santa Ana, California 92705, Phone (714) 540-2081.

EXPANDED DIRECTORY OF ENGINEERING

SOCIETY MANAGEMENT

A new and expanded Directory of Engineering Society Management, designed as an aid in the communications process with and between engineering societies, was published on September 19. Engineers Joint Council, its publisher, is now taking orders. The Directory will allow easy identification of the chief elected officials and staff management personnel in 28 major engineering societies and federations. Names, addresses and telephone numbers will be provided, together with position titles and functions where applicable. A special feature of the 60-page booklet will be the inclusion of photographs of all persons listed. Originally published as a special edition of the EJC Newsletter in November, 1974, the Directory at that time included first and second level society staff personnel only. Owing to the success of that publication, it is now being revised and expanded to include elected officials, and published as a separate document. Seventy-five elected officials have been included, together with 153 key staff persons.

The Directory may be purchased for \$10 per copy, and a 10% discount may be taken on orders of ten or more. To obtain it, write to Engineers Joint Council, Department P, 345 East 47th Street, New York, N. Y. 10017 or call (212) 644-7840.

RADIO SERVICE SSB TRANSCEIVERS

The Electronic Industries Association Engineering Department announces the development of RS-424, "Minimum Standards -- Citizens Radio Service SSB Transceivers Operating in the 27 MHz Band." This new standard, which was developed by the TR-32 Committee on Citizen's Radio Equipment, details definitions and methods of measurement of characteristics of SSB transmitters and receivers or SSB/AM transmitters and receivers, operating in the SSB mode, intended for operation in the Class "D" Citizens Radio Service as defined in Part 95 of the FCC Rules and Regulations.

Since its inception until 1975, the FCC did not require Type Acceptance for Class D Citizens Radio equipment, and therefore, did not have minimum specifications or procedures defined for Single Sideband measurements.

When in 1973 mandatory Type Acceptance for all Citizens Radio equipment was adopted by FCC, it became obvious that test procedures and minimum standards needed to be developed. The EIA Engineering Department's Committee on Citizens Radio Equipment established a subcommittee in 1972 to work on this subject, and through the diligent efforts of Steve Snell at Linear Systems, the first draft of RS-424 was produced. A year later, the FCC issued proposed rules, which required significant revisions to the original draft, and through liaison work between the FCC and the Electronic Industries Association, the Committee was able to revise and get industry agreement on RS-424 as it is now written.

RS-424 will formalize the testing procedures that the industry felt were necessary, and thereby allow the industry to supply Type Acceptance documents to the FCC that are uniform in procedure and format.

RS-424 will formalize the testing procedures that the industry felt were necessary, and thereby allow the industry to supply Type Acceptance documents to the FCC that are uniform in procedure and format.

The TR-32 Committee has done additional work on proposed new systems such as the Class E Citizens Radio, the ATIS (Automatic Transmitter Identification System) that the FCC has proposed, as well as technical input for the proposed changes in the Class D Citizens Radio covered in Docket 20120.

RS-424 is available at \$4.25 per copy from the Standards Sales Office, Electronic Industries Association, 2001 Eye Street, N.W., Washington, D.C. 20006. A free Index of EIA & JEDEC Standards and Engineering Publications is also available upon request.

NOVEMBER 1975 ISSUE

PAPERS

MEASUREMENT TECHNOLOGY

1. Attenuation Measurements in the 1 MHz to 1000 MHz Frequency Range in Wet Granite Tunnels ...
M. R. Gillette and A. S. Gilmour, Jr.
2. Electric Field Probes in Material Media and Their Application in EMC ...
G. S. Smith and R. W. P. King

EQUIPMENT EMC

3. Light Transmittance and RF Shielding Effectiveness of a Gold Film on a Glass Substrate ... S. Y. Liao
4. Microwave Interference Effect in Bipolar Transistors ...
R. E. Richardson, V. G. Puglielli and R. A. Amadori
5. The RF Pulse Susceptibility of UHF Transistors ... J. J. Whalen

SYSTEM EMC

6. ATS-6 Spacecraft Surface Treatment for the Control of Electrical Discharges ...
B. E. Keiser
7. The Effect of Cylindrical Ferromagnetic Shells on the Self and Mutual Inductance of Parallel Wires
8. Computation of the Capacitance Matrix for Systems of Dielectric-Coated Cylindrical Conductors ...
J. C. Clements, C. R. Paul and A. T. Adams

SPECTRUM UTILIZATION

9. Computability and the Frequency Selection Problem ...
R. A. Frazier

EMP

10. Analysis of Crossed Wires in a Plane-Wave Field ...
R.W.P. King and T.T. Wu

SHORT PAPER

WALSH FUNCTIONS

11. Walsh-Fourier Spectral Conversion for Periodic Waves ...
R. Kitai

LEGISLATION OF INTEREST TO ENGINEERS

A cooperative project by the Washington Offices of the IEEE and ASME has produced the second edition of the "Legislation of Interest to Engineers" covering the period February 21-May 28, 1975 of the 2nd Session, 94th Congress. Copies may be obtained by writing: IEEE, Washington Office, 2029 K Street, N.W., Washington, D.C. 20006.

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.

ELECTRO-METRICS, Div. of Penril Data Communications, Inc.

100 Church Street, Amsterdam, N.Y. 12010

Interference Analyzers and EMI Test Systems, MIL-STD and CISPR, Semi-automatic, Automatic, or Computer-Controlled, with complete accessories, 20 Hz to 12.4 GHz.

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

SINGER INSTRUMENTATION, 5340 Alla Rd., Los Angeles, Calif. 90066

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

An Institutional Listing recognizes contributions to support the publication of the IEEE Newsletter and TRANSACTIONS ON ELECTRO-MAGNETIC 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.

WHAT GOES WHERE

If you don't know where to write now that IEEE is in two locations, correspondence concerning membership records, orders, subscriptions and payments should be addressed to the IEEE Service Center, 445 Hoes Lane, Piscataway, N.J. 08854, Tel. 201-981-0060. All other correspondence should continue to be directed to Headquarters at 345 East 47th Street, New York, N.Y. 10017; Tel. 212-752-6800.

AEROSPACE JOBS DECLINE

Employment of engineers and scientists in the aerospace industry is expected to decline from a current 165,000 to 163,000 in June of 1975, says the Aerospace Industries Association. After peaking at 221,000 in December 1968, employment bottomed out at 159,000 in December 1971. In "aircraft and parts," employment of engineers and scientists is expected to rise from 72,000 to 73,000 in June 1975, while employment in "missiles, space vehicles and parts" drops from 50,000 to 48,000. Employment in "other related products" should remain level.

AFFIRMATIVE ACTION IN AGE

DISCRIMINATION

As part of its continuing appraisal of the socio-economic conditions facing engineers and scientists, the Executive Committee of the IEEE has adopted a position on age discrimination which was approved by its Board of Directors at their meeting in mid September. One of the key elements of the proposal is the encouragement of industry, government, and educational institutions employing electrical/electronic engineers to adopt Affirmative Action Programs within their organizations to: "insure the efficient, proper, and humane utilization of experienced, middle aged and older engineers.

The age discrimination position, was incorporated into an ongoing industry relations program of the institute. Part of this program consists of meetings between officials of the Institute and officials of corporations in industry at which many facets of the Institute's concerns for the engineering profession are discussed. The question of age discrimination and affirmative action would thus become one of the high priority items in their discussions.