IEEE

NEWSLETTER

ELECTROMAGNETIC COMPATIBILITY GROUP

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EDITOR:

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608 Gawain Rd.
Plymouth Meeting, Pa. 19462

LETTER

Dear Mr. Hill,

At the EMC-Symposium I promised to give you my impression on the conference at Asbury Park. It was very instructive for me to learn how EMC-problems are treated in the US and I was surprised to see how many experts in this particular field of electronics and radiocommunications are engaged in interference problems and how much knowledge and experience have been gained. I found that the problems under study in Europe are rather different from the work which is done in your country; perhaps I could summarize the different situation in the following way.

In Europe the protection of broadcast reception is strongly emphasized because this type of radiocommunication is rather sensitive for man-made interference. The national administrations are responsible for a good quality of broadcast signals by control of minimum signal fieldstrength and maximum interference level. Therefore the large groups of interference sources (household appliances, broadcast receivers, motorcars etc.) are more or less kept under control by standardized measuring methods and limits, which (in the ideal case) should be met by all manufacturers. The measuring methods are carefully considered by the CISPR with respect to a good representation of the disturbance effect, reproducibility and usability, in order to cover groups of interference sources as wide as possible. The according limits are adopted in national legal or administrative regulations. In general the other communication services are not protected separately, but protection for broadcast services is considered sufficient for other radioservices.

The EMC-Symposium covered a much wider field of problems. It seemed to me that in the US protection of broadcast services is considered of minor importance compared with more specific problems occurring in military and space applications. So there was a great variety of information on investigations, measurements and opinions concerning special cases of electromagnetic interference.

I enjoyed your interesting symposium very much and I appreciate the organization and the presentation of the papers in the Symposium Record. I hope there will be an increasing exchange of knowledge in the EMC field between our continents in the future.

With kind regards,
Yours sincerely,

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ADCOM STANDING nominations

Committee Chairman: James J. Krstansky
Assistant Director
Electronics Research Division
IIT Research Institute
Chicago, Illinois

Mr. Krstansky graduated from the University of Illinois in 1952 with a BSEE degree. He is presently an Assistant Director of the Electronics Research Division of IITRI. In this capacity he is directing the activities of the Electromagnetic Compatibility, Communications, and Field Theory/RF Devices Sections. These sections are concerned with RF technology and conduct analysis, specialized design and instrumentation programs in electromagnetic compatibility, nuclear electromagnetic pulse effects, and special RF devices. Mr. Krstansky served for two years as Assistant Manager and Manager of the Electromagnetic Compatibility Section. In this capacity he supervised and contributed to programs relating to broad aspects of electromagnetic compatibility including radar equipment analysis and measurement, ship hull structures interaction with electronics equipment, RF measurement instrumentation, EM shielding, grounding and cabling and other EM effects.

Since joining IIT Research Institute in 1957, he has been engaged in projects involving equipment design, shock wave instrumentation and electromagnetic compatibility analysis and measurements. He has published a number of papers on EMC, and holds a patent on an "Energy-Measuring Apparatus". Mr. Krstansky has also made significant contributions to MIL-STD-449. His experience prior to joining IITRI included the design of microwave apparatus and digital systems, in addition to three years of military radio experience. He is a member of the IEEE and has been very active in the G-EMC as both chairman and secretary of the Chicago Chapter, and as a member of the National Administrative Committee. In addition, Mr. Krstansky served as the Conference Chairman for the Tenth Tri-Service Conference on EMC.

COMMITTEE committee

activities

The Nominations Committee is organized for the main purpose of making the necessary arrangements for nomination and election of new AdCom officers each year. The duties of the Nominations Committee are explicitly spelled out in sub-part 4 of the Bylaws of the IEEE Group on Electromagnetic Compatibility (G-27) as follows:

Nomination and Election of the AdCom - The Nominating Committee shall be reconstituted by the Group Chairman on or before April 1st of each year. The Nominating Committee shall consist of a chairman and four or more members of the Group, not more than half of which may be members of the AdCom.

4.1 The Nominating Committee shall immediately after 1 April mail notices for the solicitation of Nominations for membership on the Administrative Committee to AdCom members, and to Chapter Chairmen. There shall also be published in the Newsletter prior to 15 April a call for nominations for AdCom membership. Such nominating petitions shall be received by the Chairman of the Nominating Committee by 30 May.

4.2 On or before 10 June the Chairman of the Nominating Committee shall mail to IEEE Headquarters the slate of at least twelve nominees for election to the six offices to be filled on the AdCom.

4.3 On or before 1 August IEEE Headquarters will mail ballots to Group members, with the request that the ballots be returned to IEEE Headquarters by 1 September.

4.4 IEEE Headquarters will have completed ballot count, and by 1 October will have notified the new AdCom members and the AdCom officers of the results of the election.

4.5 During the first AdCom meeting following 30 September, the new AdCom members will be introduced their duties in preparation for assuming their duties on 1 January.

4.6 A nominating petition shall carry a minimum of 15 names of Group members, excluding students, for the nominee to be placed on the slate.

4.7 The nominating committee may make nominations for the Administrative Committee in addition to those nominated by petition.

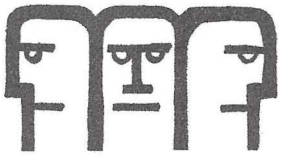
4.8 The AdCom may make contingent elections to be effective in case an elected member fails to accept the office, or a disapproval is received from Headquarters.

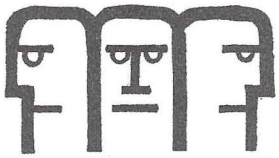
4.9 In the preparation of the slate of nominees, consideration shall be given to both geographical representation and technical interests.

4.10 Persons nominated and elected to the AdCom should have adequate resources and company backing to be able to attend meetings and actively contribute to the AdCom, including committee activities, correspondence, telephone calls, etc. The technical qualifications and the stature of the proposed nominee in the EMC community should also be taken into consideration.

The present Nominations Committee consists of James Krstansky (Chairman), Zig Grobowski and Ben Weinbaum (East and West Coast Chapter Representatives, respectively), Jim Toler and Paul Georgi. This committee structure has been in effect since 1964. The Nominations Committee was originally organized in 1958 when the PG-EMC was initiated and the bylaws established.

The Nominations Committee performs a critical function since the nominations must not only reflect the needs and wishes of the group membership regarding the representation they desire on the AdCom, but must also assure the quality and integrity of the AdCom leadership in order to maintain the technical vigor and stature of the group within IEEE. In order to do this, the Committee must rely heavily on the cooperation of AdCom members, other Committee members, Chapter Chairman and other leaders in the nominees each year for the AdCom elections. The committee welcomes participation each year from all of the G-EMC membership in the annual nominations.





PEOPLE in the NEWS

Hollice Favors Goes Independent

Hollice A. Favors has recently left the employ of Litton Data Systems Division early this year to become an independent EMC consultant. He has been very active and generous in his services to the IEEE and the G-EMC in particular. He is a Senior Member of IEEE (1958) and has presented many papers. Mr. Favors is a past chairman of the Los Angeles G-EMC Chapter (1965) and was Head of the Technical Papers Review Committee for the 1964 EMC Symposium held in Los Angeles.In 1966 he served with the Technical Papers Review Committee for the San Francisco G-EMC Symposium. He resides at 5154 Chimineas Ave., Tarzana, Calif. 91356.

Henri Busignies Receives IEEE Award in International Communication

The IEEE announced here today that its Award in International Communication is being given to Henri Busignies, senior vice-president and chief scientist of International Telephone and Telegraph Corporation. In bestowing the Award, IEEE cited Dr. Busignies "for his outstanding leadership and technical contributions in the fields of electronic technology and communication techniques."

An inventor, a scientist, and an authority on radio navigation and radio direction finding, Dr. Busignies holds more than 140 patents in the air navigation, radar and communication fields. He has been associated with the ITT System for 40 years.

Ira M. Berman Joins Fairchild

Ira (Marty) Berman recently left the Re-entry and Environmental Systems Division of General Electric Company to join Fairchild Electro-Metrics, 100 Church Street, Amsterdam, N.Y. 12010. Marty is known to our Newsletter readers as the editor of Chapter Chatter, as well as other special features. As a result of many complications in changing jobs and location, Marty's column does not appear in this issue of the Newsletter. Chapter Chairmen will be notified of the change so that we can again keep our members up to date on the Group activities throughout the country. All persons wishing to report on local or chapter activities are invited to correspond with Marty at his new address.

NEW BROCHURES and PUBLICATIONS

EMC Yearbook Available

Looking for a way to keep up-to-date on recent developments in Electromagnetic Compatibility? Communications Designer's Yearbooks could be the answer. Prepared by the Editors of COMMUNICATIONS DESIGNER'S DEGEST, the Yearbooks will be available in five volumes covering EMC, Circuit design, System design, Antennas and Propagation technology and techniques for Frequency Selection and Control. In each area, the Yearbooks provide a fast and convenient way to locate new design techniques, products, conference highlights and other recent developments. Material for the Yearbooks is compiled from the various sections of COMMUNICATIONS DESIGNER'S DIGEST, edited and fully indexed so that you can quickly put your finger on the information you need.

Each Yearbook costs $5.00---$20.00 for the complete set of five--but at a pre-publication offer, you can now order the books at $4.00 each, or $16.00 for the set. Send orders with check or money order to: Communications Designer's Yearbook, 386 Park Avenue South, New York, New York 10016.

150 Page Comprehensive Filter Brochure

A new 150 page Comprehensive Filter Catalog is now available from R. F. Interonics. This catalog includes sections on cylindrical and rectangular filters, subminiature ceramic filters, multi-circuit filter assemblies, high power shielded room filters for secure areas, signal and telephone circuit filters, and both standard and custom engineered feed-through capacitors. In addition, a special section includes reference data for EMC engineers. Free copies will be sent to those requesting a copy on their company letterhead from R. F. Interonics, 100 Pine Aire Drive, Bay Shore, L.I., N.Y. 11706.

Noise in Cable Systems

A technical paper with the above title has been written by Mr. E. Trompeter of Trompeter Electronics, Inc. The paper includes discussions on coax cable, ground loops and common made returns, radiated fields, guarded twinax cable hookup, quadrax guarded circuit, and bonding and grounding. Free copies of this paper are available by writing to Trompeter Electronics, Inc., 8936 Comanche Ave., Chatsworth, Calif. 91311.

EMI/RFI Shielding and Conductive Materials

A completely new eight-page color brochure from Technical Wire Products, Cranford, New Jersey, entitled "EMI/RFI Shielding and Conductive Materials", is now available. Divided into four sections, it offers a wide range of shielding and conductive products and materials from conductive silver/silicone to shielding and ventilating panels.

Technical information including shielding capabilities and application photos assist the design engineer in selecting or specifying the right conductive material or product to solve his specific design problem. Each brochure contains two FREE Reader Service reply cards which can be used in requesting additional information.

A free copy of the brochure may be obtained by writing to Tecknit, 129 Dermody Street, Cranford, N.J. 07016, or calling (201) 272-5500 or (815) 963-1867.

Nonionization Radiation Publication

The first issue of Nonionizing Radiation has been published on June 10, 1969. It covers the effects, uses, and safety of electromagnetic radiation from r.f. through microwaves and infra-red to the visible region. The first issue includes papers from the University of Surrey symposium on r.f. and microwave radiation-applications and potential hazards.

It is available by subscription direct from the publishers at Iffiffe House, 32 High Street, Guildford, Surrey, England. Subscription rate: $25.00 per year.

1970 IEEE Directory

The IEEE has announced that prices for the 1970 Directory have been set at $7.00 for members, and $30.00 for non-members.

Do-it-yourself Shielded Chambers

Eccoshield KCP Shielded Chamber Kits are offered by Emerson & Cuming, Inc. to customers who prefer to plan and erect their own shielded rooms.

The complete set includes metal-clad panels, electrically conductive tape for joints, a magnetic area seal door, an electrical kit for filtered power outlets, grounding stud, electrical load center with circuit breakers, lighting fixtures, and a ventilating kit.

Catalog data includes component lists and prices, so arranged as to permit the customer to eliminate or add items to the standard kit, thus providing complete versatility in planning. Also included are complete instructions and data both as to construction and performance to be expected from completed chambers.

The basic shielding element in these kits, Eccoshield CP Clad Panel, is top quality plywood to one side of which is bonded a single sheet of zinc coated heavy gauge steel. The shielding performance of this panel has been measured (according to the manufacturer) at 100 db for electric fields from 15 kHz to 100 MHz, 80 db for magnetic fields from 200 kHz to 1 MHz, and 80 db for plane waves from 100 MHz to 10 GHz.

For additional information, contact Mr. E. J. Luoma, Canton, Mass. 02021 (617) 828-3300.

ADCOM NEWS and VIEWS

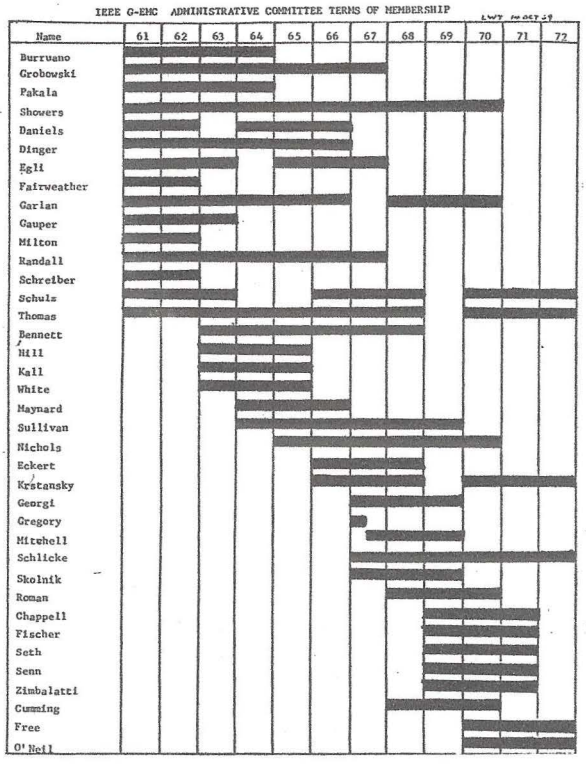
Results of AdCom Election Ballot

The ballot for the election of five EMC Group AdCom members was issued on July 25, 1969. Constitutional amendments since issuance of the ballot permit the election of six AdCom members. The ballots returned have been counted and the following six members have been elected for a three-year term beginning January 1, 1970.

W. R. Free
J. J. Krstansky
J. J. O'Neil
H. M. Schlicke
R. B. Schulz
L. W. Thomas, Sr.

We wish to congradulate those elected and to thank all nominees for their willingness to serve.

IEEE G-EMC ADMINISTRATIVE COMMITTEE TERMS OF MEMBERSHIP



JTAC Changes Its Name

JTAC changes its name after 21 years to Joint Technical Advisory Council(formerly Committee). This cooperative endeavor of IEEE, an engineering society, and Electronic Industries Association (EIA), a trade association, is a prime example of how engineers can pool their knowledge and give unbiased opinions in a social sphere, namely, conservation of the natural resource which is the electromagnetic spectrum.

IEEE Career Guidance

Career Guidance, by IEEE at least heretofore, has been the art of persuading qualified youth to secure an education leading them to careers in the electrical and electronics engineering. It has had its primary pre-college incidence in the high schools (although there is a school of thought which looks at anything later than junior-high as too late). IEEE has produced multi-hued pamphlets of persuasion, and has encouraged its Sections to use them in benign proselyting.

The Engineers' Council for Professional Development (ECPD), of which IEEE is a constituent, also has a program in guidance of youth into careers in engineering, but not necessarily into electricity-electronics. One phase is its sponsorship of the Junior Engineering Technical Society (JETS), with local units of which IEEE Sections have been encouraged to cooperate.

There is now a trend toward accommodation of our objectives, to avoid fractionating, within engineering itself, the promise held out to career-seekers; and to obtain any advantages inherent in attracting youth to engineering-and-science as a package, at that impressionable stage of their course-planning.

Our EAB's Pre-College Guidance Committee, for example, favors coordinating IEEE's approach with ECPD's; having our guidance program look to a supply of skilled craftsmen and technicians as well as engineers-by-profession; continuing the promotion, by Sections and Groups, of distribution of brochures and films giving accurate information, especially to high school students and guidance counselors, on career opportunities in engineering as we know them.

Samples of IEEE's 4-color, 16-page brochure addressed to high school students: "Your Challenge in Electrical Engineering," are available.

Continued

Power Group Defines Surge Device Committee

The August 1969 issue of the IEEE Power Group Newsletter described a newly organized committee concerned with surge protective devices. This item is extracted and condensed as follows:

In 1968 the Protective Devices Committee was reorganized into four subcommittees, and given a new name more characteristic of its scope; i.e. the Surge Protective Devices Committee. The officers for 1969 are Mr. R. S. Gens, Bonneville Power Administration, Chairman; Mr. A. G. Yost, Ohio Brass Company, Vice-Chairman; and Mr. G. G. Auer, General Electric, Secretary. The new revised scope is: "Treatment of all matters in which the dominant factors are the design, construction, safety, preparation of guides, installation, and operation of devices and equipments to prevent damage to electrical power generation, transmission, distribution, and utilization systems, and associated equipment due to (1)transient overvoltages, (2) transient currents, (3) excessive power frequency overvoltages during faults or fault-free conditions. Excluded are interrupting devices with or without current limiting ability."

Included in this scope are: (1) Overvoltage surge protective devices, such as arrester gaps, or surge protective capacitors; (2) Lightning and switching surge investigations (joint with the T & D Committee); (3) Neutral reactors and grounding transformers (joint with the Transformer Committee); and (4) Promotion of studies, technical papers, ---updating bibliographies and standard revisions, preparation of guides.

The new subcommittees are: (1) Administration and Standards; (2) Overvoltage Protective Devices; (3) Neutral Grounding Devices; (4)Surge Protective Device Application Guide; and (5)Bibliography Subcommittee.

The Committee, Subcommittees and Working Groups meet twice yearly at various locations throughout the United States. In each case the local sections are advised and the section members are invited to visit the meetings.

TAB Approach to New Technologies

During 1969, the Technical Activities Board appointed a Technical Planning Committee, which was given responsibility for new technologies, i.e. those which properly belong within IEEE, but might be overlooked by our present 31 specific technical Groups. The new Committee, under TAB's Vice Chairman, Edward W. Herold, includes John R. Whinnery, Hubert Heffner, David M. Hodgin, Ralph E. Armington, and William O. Fleckenstein. Two meetings have now been held with objectives a(to identify the most important new technologies, b) to act on those in which delay is inadvisable, and c) to propose a permanent and effective mechanism by which IEEE will exercise continuous leadership in new subject matter. The word "new" in this context is intended to include both the scientifically new, and that which is new to IEEE, but might have a substantial past history.

Among the topics considered were the following:

- Computer Aided Design
- Cable TV
- Electric Printing
- Holography and Electro-Optical Systems
- Plasmas and MHD
- Oceanography
- Acoustic Waves and Filtering
- Manufacturing Technology
- Cryogenics
- Applied Mathematics
- History of Electrical Engineering
- Social Systems (transportation, education, pollution, crime detection, data networks, urban planning, hospital systems)

In several of these, activity was already under way before the Committee was formed. For Cable TV and for Electric Printing, two Ad Hoc Committees were formed to undertake specific publication and conference actions and to recommend a permanent home for the technology in the IEEE structure.

The most important action of the Technical Planning Committee was to cooperate with TAB to see that the future technical organization of the IEEE would be flexible enough, alert enough, and resourceful enough to absorb new technologies. Language has been put in the general principles of organization of the Group structure, and detailed responsibilities to be developed, whereby it becomes possible for IEEE to remain the leading professional society in electrical and electronic fields. Whether it actually does will depend on the enthusiasm and participation of present members in adapting to change.

In many cases, responsibility for action ultimately lies within the Group. IEEE Groups are expected to alter and/or enlarge their technical sphere of influence as conditions change.

STATIC and NOISE

Static Inverter Power for Induction Heating

A brief news item with the above title appeared in the Sept. 1969 issue of Electro-Technology. Three paragraphs are excerpted as follows:

The induction heating industry has introduced a new high-frequency power source--the static frequency converter. The converter uses solid-state, low-loss, thyristors to guide currents to the induction load generating high-frequency power at high efficiency.

The operational features and advantages of static inverters for induction heating are described in a paper by William Frank, senior engineer, Industrial Equipment Div., Westinghouse Electric Corp., Sykesville, Md. He notes that European manufacturers have long recognized the usefulness of static inverters for induction heating and adopted them years ago.

Schematic circuits, performance characteristics, and detailed advantages of these static inverters are given in Frank' s paper titled "New Developments in High Frequency Power Sources."

Beware High-Flying Aircraft

An article with the above title appeared in the August 1969 issue of Explosives and Pyrotechniques, the newsletter of explosives, pyrotechnics and their devices published by the Franklin Institute Research Laboratories in Philadelphia. The three paragraph article is excerpted as follows:

Angstrohm Precision, Van Nuys, Calif., delivered a shipment of 5,000 precision, thin-film resistors to TRW's Systems Group. The resistors were tested and documented and were packaged in paper envelopes. At TRW the resistors were 100% tested again and then placed in plastic envelopes. The shipment was then put aboard a commercial airliner and flown to S.E.L. in Germany. S.E.L. again tested the resistors and found approximately 2.4% of the devices had drifted beyond the 0.1% allowable limit. Some units had drifted down by as much as 6%.

As an aircraft flies through air, very high electrostatic charges are generated. From the Angstrohm report: "The combination of loose resistors in plastic envelopes, together with the vibration caused by the motion of the plane during shipment, developed high-voltage electrostatic fields. This was aggravated by the low humidityassociated with high altitudes.

In short, W.E. Bolling of Angstrohm was able to reproduce the effects by subjecting new devices to electrostatic fields of 50,000 v for 30 sec. The change in resistance is permanent. The solution to the problem is straightforward and the recommended action is: "Loose packaging in plastic envelopes should be discontinued immediately unless a nonstatic generating bag is used, such as the antistatic nylon and polyethylene bags manufactured by the Richmond Corp., Redlands, Calif., or a foil-lined envelope." Excerpted from Electronic Prods.,Vol.11, #12, Mar. 15, 1969,p 15.

Spark Gap Simulates A-Bomb EMP

A one-page article with the above title appeared in the Sept. 1969 issue of Electro-Technology. Several paragraphs are excerpted as follows:

Security wraps were peeled off a hush-hush Army nuclear simulation project in mid-August revealing the existance of a "super" electromagnetic pulse (EMP) facility at Orlando, Fla.

The facility was designed and built by Martin Marietta Corp.'s Orlando Div. under the guidance of Dr. Carl D. Pierson Jr. and Elliott R. Valkenburg, both members of the research and engineering dept. at the Orlando Div.

The facility consists of a 1000-ft. dipole antenna with a spark gap at its center. High-voltage power supplies, generating 250 kV, charge the antenna within 0.1μs through 20 Mq resistors. Upon discharge, up to 20,000 A flow across the spark gap.

While the Martin Marietta installation apparently is the most powerful in the U.S. right now, a site is being built at Albuquerque, N.M., by EG&E Inc., Bedford, Mass., that will produce even stronger EMP radiation.

Huge Faraday Cage Cleans up LA Power

A brief news item with the above title appeared in the Sept. 1969 issue of Electro-Technology. Paragraphs of interest are excerpted as follows:

Electromagnetic pollution caused by increased use of heavy electrical equipment is filling radio and television channels with noise, particularly around large industrial cities. Los Angeles, however, is taking a step which should quiet at least one possible noise source. The potential offender is a power grid intertie station at the southern end of 750,000-V dc lines bringing hydroelectric power to the city from dams on the Columbia river. To contain the electromagnetic radiation emitted by the station, LA is erecting a huge Faraday shield around the entire complex.

Design specs for the shield indicate that the radiated energy in the range of 150 kHz to 300 MHz should not exceed 50 uV/m outside a perimeter 1,500 ft. from the intertie station. Without the Faraday cage, this isoelectric perimeter would occur at a distance of about 2 miles from the station and would enclose nearby suburban homes. Radio interference attenuation is planned to be approximately 30 dB. Among the components being shielded are the mercury-arc inverters, damping resistors, dc/ac transformers, reactors, and filter capacitors. Experience with similar type installations indicates that radiation of RF from power lines should be negligible, but that radiation could be expected from the converter station and its auxiliary facilities.

Continued

However, additional filters--at a cost of $4½-million are required for suppression of expected low-frequency ac harmonic interference to telephone lines running parallel to, and within 1 to 2 miles of, the cross-country dc power lines. Separate suppression of ac harmonics on other phone lines--at a cost of $1-million--also is planned. In addition to enclosing the equipment on top and sides, the shield wraps inward underground for a distance of 50 ft. Electrical and RF grounding is to ground mats and wells. The Faraday shield--the largest in the world--is made of 2-in.-square steel mesh. It is 65 ft. high and has a 300 x 350 ft. base. Two similar units of the same dimensions enclose equipment at each side of the station. Cost of the station complex is $50-million, of which $1¼-million is going for the Faraday screen and its supporting steelwork. Thus, the cost of the "anti-pollution" equipment amounts to about 7% of the overall project cost. The Pacific Intertie project is the largest in the free world, and will have a capacity of 1.3 GW.

The intertie station being shielded is located at Sylmar, Cal., (at the northern edge of LA), and is a key link in a section of the $700-million Pacific Intertie project. Part of this project--the dc lines leading into LA--is being done under the direction of the LA Dept. of Water & Power.

Wire Size and Electrical Discharges

The following item appeared in the October 1969 issue of Explosives and Pyrotechnics, a newsletter published by the Franklin Institute Research Laboratories:

Negative corona onset and sparkover voltages in air are shown to be affected by temperature, density, and the pipe-to-wire ratio of radii when using concentric cylindrical electrodes. Use of large wires at high temperatures demonstrates that onset of electrical discharge occurs at voltages significantly less than those predictable by earlier theory and that sparkover occurs at voltages considerably greater than those anticipated. Theory is presented to account for the results obtained. "The Role of Wire Size in Negative Electrical Discharge at High Temperature," by C.C. Shale and J. H. Holden, IEEE Trans. on Industry and General Applications, Vol. IGA-5, No. 1, Januray-February, 1969, pp. 34-39.

OBITUARY

Haraden Pratt Dead at 79

Haraden Pratt, a distinguished pioneer in the field of radio communications died at Pompano Beach on August 18. Mr. Pratt was also a leader for many years in the affairs of the Institute of Electrical and Electronics Engineers (IEEE) and one of its two predecessor societies, the Institute of Radio Engineers (IRE).

Haraden Pratt (A'14-M-'17-F'29) was born in San Francisco, Calif., on July 18, 1891. He began his radio career as an amateur in 1905, and from 1910 to 1914 was a wireless telegraph operator and installer of equipment for the United Wireless Telegraph Company and Marconi Telegraph Company of America.

In 1914, he received the B.S. degree in electrical engineering from the University of California, and thereafter became a construction and operating engineer for the Marconi Company's trans-Pacific radio stations in California.

As Expert Radio Aide for the Navy Department from 1915 to 1920, he was concerned with the construction and maintenance of its high-powered radio stations. In 1928 he became Chief Engineer, and later Vice President of Mackay Radio and Telegraph Company. He constructed its world-wide communication system.

For his work during World War II as Chief of the National Defense Research Committee's Division 13 on Communications, Mr. Pratt was awarded a Presidential Certificate of Merit. In 1951-1953 he served as Communications Adviser to Presidents Truman and Eisenhower. For a period of twenty-four years he was a member of the United States delegations to international radio and telecommunications conferences.

Mr. Pratt served as President of the IRE in 1938; Secretary, from 1943-1962; and Director from 1935-1962. At the formation of the IEEE in 1963 he continued as Director and Secretary until his appointment as Director Emeritus in 1966. As life member of Veteran Wireless Operation Association, he was awarded the Marconi Medal of Achievement in 1951. He was a Fellow of the IRE, the IEEE, the American Institute of Electrical Engineers, and the Radio Club of America, an Associate Fellow of the American Institute of Aeronautics and Astronautics (formerly the Institute of the Aeronautical Sciences) and an honorary life member of the Institution of Radio and Electronics Engineers, Australia. In 1944, he received the IRE's Medal of Honor and in 1960 its Founder's Award. (Also, he was the guest banquet speaker at the 1968 EMC Symposium in Seattle.)

AIR WAVES and REGULATIONS

Future Needs of Telecommunications

The future needs of telecommunications technology in three vital areas are discussed in a report* published by the Committee on Telecommunications of the National Academy of Engineering.

Reports on Selected Topics in Telecommunications

(*Available at $3.00 from NAS-NAE-NRC Printing and Publishing Office, 2101 Constitution Avenue, N.W., Washington, D.C. 20418)

Examines national requirements in the areas of satellites and other long-haul transmission modes, use of electromagnetic spectrum, and urban communications.

The section on satellites and other long-haul transmission modes presents an economic comparison between satellites and submarine telephone cables in the Atlantic Basin for the decade 1975-1985 and discusses problems encountered in the sharing of frequencies by satellite and terrestrial facilities. It is concluded that satellite communication facilities have a cost advantage over submarine cables for the case studied; however, the benefits of a mixture of new facilities may be had at a fairly modest cost premium. The report also briefly treats the applicability of satellites to telecommunications in lesser-developed countries.

Explored in the section on electromagnetic compatibility are present and future spectrum requirements, including modern high-frequency radio as an example of how technical progress enables more intensive spectrum use. It is concluded that the world is facing a shortage of bandwidth that will make it necessary to view bandwidth as an economic good.

Frequency and Time Publication Revised

The 1969 edition of NBS Frequency and Time Broadcast Services--Radio Stations WWV, WWVH, WWVB, and WWVL,[1] NBS Spec. Publ. 236 (14 pages, 25 cents), has recently been published. It describes the eight vital broadcast services NBS provides through its radio stations WWV, WWVH, and WWVL. The eight services are: standard radio frequencies, standard audio frequencies, standard musical pitch, standard time intervals, time signals, UT2 corrections, radio propagation forecasts, and geophysical alerts.

To provide users with the best possible services, occasional changes in broadcasting schedule are required. NBS Spec. Publ. 236 is revised annually to reflect these changes. This edition shows the schedules in effect on January 1, 1969.

The major development of the past year affecting the accuracy of the NBS broadcasts was the introduction of an improved method for coordinating the master clock at Fort Collins, Colo., with the atomic clock at the NBS laboratories in Boulder. This new method makes use of broadcasts from local TV stations, which become key elements in the chain of controls for the precision and accuracy of NBS standard frequency and time broadcasts. With this new system the clock that controls the broadcasts from station WWV in Fort Collins may be kept within one millionth of a second of the atomic clock in Boulder.

([1]Available from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402, for the price indicated.)

Standard Frequency and Time Broadcasts

High-frequency radio stations WWV (Fort Collins, Colo.) and WWVH (Maui, Hawaii) broadcast time signals on the Coordinated Universal Time (UTC) system as coordinated by the Bureau International de l'Heure (BIH), P aris, France. These NBS time signals, UTC (NBS), are maintained within 5 microseconds of the corresponding time signals of the U.S. Naval Observatory, UTC(USNO). The UTC pulses occur at intervals that are longer than one coordinate second by 300 parts in 10^{10} during 1969, due to an offset in carrier frequency coordinated by BIH. To maintain the UTC scales in close agreement with the astronomer's time, UT2, phase adjustments are made at 0000 hours Greenwich Mean Time (GMT) on the first day of a month as announced by BIH. There will be no adjustment made on November 1, 1969.

The low-frequency radio station WWVB (Fort Collins, Colo.) broadcasts seconds pulses without offset to make available to users the standard of frequency so that absolute frequency comparisons may be made directly, following the Stepped Atomic Time (SAT) system. Step time adjustments of 200 ms are made at 0000 hours GMT on the first day of a month when necessary. BIH announces when sugh adjustments should be made in scale to maintain the seconds pulses within about 100 ms of UT2. There will be an adjustment made on November 1, 1969. The seconds pulses emitted from WWVB will be retarded 200 ms.

NBS obtains daily UT2 information from forecasts of extrapolated UT2 clock readings provided by the U.S. Naval Observatory with whom NBS maintains close cooperation.

Continued

FCC Amends Part 15

In a Report and Order dated October 20, 1969 (Docket No. 18260) the FCC discussed petitions and discussions on amending Part 15, Subpart E, and actions related to Part 18 of the FCC Rules. Excerpts from this Docket are as follows:

Since the question of regulation under Part 18 has been raised in the comments submitted by Owens and Microwave Controls, we reiterate our discussion concerning Parts 15 and 18. It should be observed that Part 15, in general, deals with devices which emit a relatively low level of signal and which fall into the general area of communications. Moreover, by definition in §15.4(f), "a restricted radiation device . . . used for the transmission of . . . intelligence of any nature by radiation of electromagnetic energy" is a "low power communication device." Part 18, on the other hand, deals with devices involving the generation of a substantial amount of RF power which is not used for communications. Neither measuring device described in the Notice nor the proximity control discussed above uses RF energy to do work or produce physical, biological, or chemical effect on material; the devices proposed by the petitioners are utilized merely in the transmission of information as to the magnitude of some quantifiable property of material. It is with this view that the Commission has characterized the function of such RF operated measuring devices as the Owens glass thickness gauge and the GE moisture detection system.

Although AT&T alleges that Part 15 does not contain the safeguards against harmful interference included in Part 18, the Commission believes that Part 15 is designed to provide adequate protection for the licensed communication services and that the possibility of measuring devices causing harmful interference is remote. Part 15 devices are permitted to operate only to the extent that no interference is caused to the licensed services. If any interference is caused, the operation of the Part 15 device must be terminated. Moreover, the Commission agrees with Owens' observation that AT&T has not presented any specific showing or data to document alleged interference possibilities. Conversely both Owens and GE present engineering data showing that their measuring devices operate within the field strength limits prescribed for Part 15 devices.

Like all other Part 15 devices, these measuring devices may be operated within the specified frequency bands on a sufferance basis provided specified radiation limitations and other operating conditions are met. Furthermore, to provide an additional safeguard against harmful interference, tamperproof construction is required and antenna substitution is prohibited by the rules being adopted.

Notice is given that the regulations adopted herein are subject to such changes as may be required as a result of the reallocation of the frequency band 806-960 MHz, now pending in our rulemaking proceeding in Docket No. 18262.

An out line of the Part 15 amendments is as follows:

The text of §15.201 is amended to add paragraph §15.201 Frequencies of operation.

A new §15.214 is added to read as follows: §15.214 Alternative provisions for measuring devices.

New §§15.251 - 15.254 are added to read as follows: §15.251 Certification of measuring device operating pursuant to §15.214. §15.252 Content of certificate required by §15.214.

§15.253 Report of measurements for a device operating pursuant to §15.214.

§15.254 Identification of a device certificated under §15.214.

FCC Proposes to Revise Radiation Limit in 470-1000 MHz Band

A notice of proposed rule making was released by the FCC on October 9, 1969. Excerpts from this Docket No. 18689 are as follows:

Notice is hereby given that the Commission proposes to revise the limit for radiation of electromagnetic energy in the band 470-1000 MHz from television receivers. Rules governing the emission of electromagnetic energy from receivers were adopted by the Commission on December 21, 1955. Among other things, that Report and Order provided that after February 1, 1956, emissions of electromagnetic energy in the band 470-1000 MHz would be limited to 500 uV/m at 100 feet. A note to the applicable rule (then §15.62) stated that the Commission would review the table of radiation limits from time to time "with a view to reducing the radiation limits as the radio art develops". Over the years since that time, upon repeated petitions from television receiver manufacturers, the Commission has periodically delayed the effective date for the above 500 uV/m limit; and has permitted, on a temporary basis, a limit of 1000 uV/m at 100 feet. The next to last of such extensions was scheduled to expire on April 30, 1969.

Continued

Just prior to the latter expiration date two rule making petitions relating to the matter were received by the Commission. One petition, filed by Sarkes Tarzian, Inc. on February 17, 1969 requested still another extension for 1000 uV/m limitation, this one to January 31, 1970. In the other, filed on April 11, 1969, the Consumer Products Division of the Electronics Industries Association made two requests: (a) that the limit of 1000 uV/m be permitted until January 1, 1970; and (b) that after that date, a television receiver be regarded as complying with the 500 uV/m limit if ten measurements, taken on ten frequencies uniformly spaced over the band 470-1000 MHz average to no more than 500 uV/m, and show no measurement exceeding 750 uV/m. By letter of April 16, 1969, Sarkes Tarzian informed the Commission that it would regard its request as granted were the Commission to grant the EIA petition. The above petitions were before the Commission on May 2, 1969, on which date the Commission adopted an order permitting the 1000 uV/m limit until January 31, 1970, thereby effectively granting the Sarkes Tarzian petition and the (a) portion of the EIA petition (17 F.C.C. 2d 521).

The Commission's further study has led to the instant proposal to amend §15.63 (c); namely, to reduce the field strength limit for energy radiated by television receivers 2/ in the band 470-1000 MHz from 500 uV/m at 100 feet to 350 uV/m at 100 feet, and to provide that the field strength shall be determined by the average of ten measurements taken on ten frequencies to be specified in the fule with no individual measurement to exceed 750 uV/m. In proposing a statistical or averaging approach, the Commission is persuaded as to the merit of taking account of the fact that the actual performance of the hundreds of mass produced components comprising a television receiver follow normal distribution curves, with a number of individual components falling well away from anticipated levels of performance. However, to thus make allowance for production tolerances is acceptable only if the basic standard (average of the ten measurements) for the fully assembled units is set at a level which will assure that receivers placed in use would not be likely to become a source of harmful interference as a result of an excessive number of measurements at the upper limit permitted by the proposed regulation.

The continued use of the limit of 500 uV/m would not provide adequate assurance to the Commission that the television receiver in question would not become a source of interference since it can at once be seen that a particular set could have up to five measurements at the 750 uV/m level provided that the average of the other five measurements did not exceed 250 uV/m -- a condition which, as will be shown below, could be readily satisfied in the present state of the art. On the other hand, the Commission's proposed figure of 350 uV/m would assure the automatic rejection of any set with five readings of 750 uV/m, and thereby lessen the probability that a particular set would be troublesome from an interference standpoint.

Small-zone Approach Suited for Large Mobile Radiotelephone System

A brief artical with the above title appeared in the September 1969 issue of Communications Designer's Digest. The first paragraph is extracted as follows:

Solution for the cities.
Deliberations by the Federal Communications Commission on the frequency spectrum for mobile communications have again focused attention on the feasibility and practicality of a high-capacity mobile radio telephone system. From his work with such systems, R. H. Frenkiel of Bell Telephone Labs in Holmdel, N. J., feels there are many advantages to the small-zone approach over and above spectrum economy, including flexibility in growth, the ability to use low-cost transmitters of only a few watts output, the need for fewer land receivers and eased requirements on receiver selectivity and dynamic range. All these, in Frenkiel's view, make the coordinated small-zone approach the logical choice for a high-capacity mobile radiotelephone system. Also, the BTL engineer points out, the potential use of common equipment at mobile and base stations should permit substantial economies, resulting in better service at less cost with far less spectrum per user than current systems.

60 V/M at 10 kHz

The Electro-Magnetic Compatibility Center, Standard Electronics Division of Gulton Industries has announced the capability of generating field strengths as high as 60V/M over the frequency range of 10KHz and 11GHz. The announcement states that:

Presently, Gulton has the "off the shelf" capability of producing the following field strengths in a shielded enclosure environment:

Frequency Range	Field Strength
10KHz - 25MHz	15 - 20V/M (Note 1,2)
25 - 150MHz	at least 60V/M
150 - 190MHz	15 - 20V/M (Note 2)
190 - 2.7GHz	at least 60V/M
2.7 - 5.4GHz	18 - 40V/M (Note 2)
5.4 - 11GHz	at least 60V/M

Note 1: In the frequency range 10KHz - 25MHz, the test specimen must be tested in a strip line.

Note 2: Field strengths at these frequency ranges can be extended to at least 60V/M at special request and at least 1 month's notice.

The entire spectrum from 10KHz to 11GHz is continuously tunable. In some frequency ranges, it is possible to develop fields greatly in excess of "at least" levels.

For additional information, contact Mr. Lawrence V. Golimski, Director of Engineering, 3012 West 77th Street, Chicago, Illinois 60652.

MISCELLANY

Are You Listening?

Most white-collar workers spend at least 40% of their workday listening-so nearly half their pay is earned in that way. Yet tests show that most of them have only 25% efficiency at this task.

A student in college spends over 80% of his time in class listening to lectures-because this is considered the most effective and cheapest method of spreading one man's knowledge to many learners at once.

But the method isn't efficient unless the listening is as good as the lecturing.

Even in a simple, two-person conversation, few of us can really listen without tuning out while we decide what we should say in response. The worst part is that the more important the person you're talking with, the likelier you are to stop hearing properly: your concern about having a good comment ready is likely to devour an even larger part of your attention.

All these troubles stem from these three main causes:

(1) A mistaken belief that you can relax and listen at the same time.

(2) A desire to break into the act with your own thoughts or works.

(3) An emotional reaction to certain words or ideas that blots out the rest of the message.

There are ways to overcome these human frailties:

First, make up your mind that listening is hart work. If you relax, slump and let your eyes wander, you end up with nagging frustration of having missed the point. Sitting up and looking the speaker in the eye is not just a courtesy to him; it is the best way for you to take in what he's saying. Relaxing is for later, when you can enjoy the feeling that your half of the communication job was well done.

Next, learn to overpower distraction. Here are some useful tools for keeping your mind tuned in:

Listen for evidence that the speaker uses to support his point.

Mentally summarize as he comes to the close of each part of his presentation. But be sure the summary is of his thoughts, not your own reactions to them.

Chomerics Files Suit

(CAMBRIDGE, MASS.)--Chomerics, Inc., an Arlington based manufacturer, has filed suit in Massachusetts Superior Court against Ercon, Inc. and one of its employees, a former Chomerics' corporate officer, both of Massachusetts. Also named in the suit were Technical Wire Products, Inc. (Technit) of New Jersey and the Parker Hannifin Corporation of Ohio. The suit concerns the misappropriation of Chomerics' confidential information.

The dispute involves electrically conductive plastic gasket and sheet materials. The suit requests an injunction to prevent the further use of Chomerics' confidential information.

THE DECLINE OF AEROSPACE ENGINEERING
BY WENDELL E. BARD

C. Northcote Parkinson said that "Any enterprise with more than 1000 employees becomes a self-perpetuating empire, creating so much internal work that it no longer needs any contact with the outside world." The work, eternal, may be substituted for internal without disburbing the rule's validity. Equally valid is another new law: An engineering laboratory with a staff of more than 1000, subsisting on defense work, can dispense with the engineering department after its initial project. Here, eternal work truly is the order of the day.

The new law was demonstrated recently when a group of consultants performed a cost improvement audit for a midwestern aerospace firm. After intensive analysis it discovered that the products of the Flywell Dart Company are:

Conceived	by	Marketing
Designed	by	Management
Financed	by	Cost Control
Scheduled	by	PERT
Fabricated	by	Technicians
Regulated	by	Configuration Management
Modified	by	Cost Reduction
Inspected	by	Quality Control
Assembled	by	Production and
Delivered	by	Transportation

Continued

MISCELLANY

Searching in vain for a clue to Engineering's responsibility, the Chief Inquisitor finally asked Management: "Just what does Engineering do?"

"It supports Engineering Services!"

One reason for the decline in Engineering's importance is the demotion of Engineers to robot status. In these days of spherical corporate organizational structure and the dominance of Engineering by Management - aptly called Manageering - there's little domain left in which the engineer is permitted to think or decide. Pushing and pulling from all sides are Systems Management, Configuration Management, Project Management, Program Management and ultimately, mismanagement.

Rise of the computer and its adoption by Management has done much to squeeze out the engineer. The computer is a device that permits him to make more mistakes in 10 minutes than he'd make by himself in 10 years. But since the computer by itself makes no errors, it's a favorite tool of theoriticians. Computer prediction of improved reliability by Monte Carlo methods is as certain as one's winning at Monte Carlo. The computer is a favorite, too, with Configuration Management. The one-inch thick listing of parts, materials and processes enables anyone to assemble an ICBM in no time, even at home. Engineering, once again, is not needed.

Test Engineers, though, still retain some suthority in judging test data. But even here engineers must exercise careful selection in performing crucial tests, for successful tests remain more popular with Management than others. It is wise for the engineer to remember that there is one, and only one, reason for rejecting test results. Test data should be rejected whenever it voids the validity of the image of the population statistics that is required by the remaining test results. The problem of discriminating against bad data, therefore, always reduces to determing whether or not a particular test result favors the pre-test objective. Such a policy will be backed to the hilt by Management.

Acceptance testing is another function in which engineers may exercise some judgement. Even here standard rules exist from which no deviation is permitted. They are:

1. If the acceptance tests show any sign of not suceeding:

    a. change the test procedure,
    b. short out failed components,
    c. remove all malfunctioning circuits from the acceptance program,
    d. use batteries to light lights,
    e. improvise.

2. Someone in Top Management was responsible for the original decision to build the machine. If the acceptance tests do not prove successful, the original decision by someone in Top Management to build the machine was wrong.

3. The machine will be accepted.

Technical writers got in the act, too, and mangled the engineer's literary output. Their intrusion is unfortunate. Editing an engineering composition removes much of the colorful language. Engineers so seldom commit their results to paper; alterations should not be allowed. Consider this gem. "As a result of this initial study phase, if the cost and/or system reliability, as well as the supportability, survivability, and maintainability characteristics, appear to suffer appreciably, then it will be appropriate to plan, initiate and implement preliminary trade-off studies to determine whether alternate guidance/autopilot system configurations could utilize components that are more suited in general and are less sensitive to the supersonic carry environment in particular."

Engineering data processing systems modify reports during their tortuous path from draft to published copy. What comes out the pipe at the end of the journey bears faint resemblance to the input. Like thesis writing, the main criterion is: Make sure the margins are correct.

There are times when the engineer wonders if it's worth it. He asks himself, "Why is it that there's always enough time to do it over again, but never enough time to do it right in the first place." Still there is much left to challenge him. Though his design talents aren't needed, his literary capability is much in demand. He can propose changes via Zero Defects (ZD) suggestions, Value Engineering (VE) and cost Improvement Proposals (CIP). Clear eyes lock on his mandate, a poem tacked to the windowless wall above his desk.

With VE you can make it cheap
No matter what the price is,
With ZD write a wrong away
And thus avert a crisis.

But when the products's price goes up
And bosses start to holler,
A CIP is all that's left
To help you save a dollar.

With a firm grip on his pencil, he starts to write.

It is worth it!

(From EM Newsletter)

MEETINGS and EVENTS

Two EMC Sessions At March Convention

When it rains, it pours, After the void of last year, there will be two technical sessions concerned with EMC at the 1970 IEEE Convention (March 23-26 in New York City). One will be sponsored by the Group on Electromagnetic Compatibility and will be entitled "Progress in the Electromagnetic Compatibility Field". The other will be sponsored by the Technical Applications Committee entitled "How to Reduce Interference in Electronic Equipment".

Mr. Fred J. Nichols, President of LMI will serve as Organizer and Mr. A. H. Sullivan, Jr., office of Asst. Chief of Naval Operations, will serve as Chairman of the AdCom sponsored session. Mr. M. M. Morris is the Organizer of the TA Committee sponsored session.

The G-EMC Session (No. 48) will emphasize progress in the EMC field. These advancements will be shown in progress reports of actual applications that utilize the state of the art in engineering computer techniques and management, plus a two part paper on the future needs in the military and commercial areas. The following papers will be presented:

1. "Intra-Systems Compatibility in Large Aerospace Systems" by James A. Spagon, TRW /Redondo Beach California

2. "EMC Management Techniques in Complex Electronic Systems" by A. G. Zimbalatti, Grumman Aircraft Corp/Bethpage, N.Y.

3. "Electromagnetic Compatibility in Modern Computer Systems" by W. P. Tohner, IBM Corp./San Jose, Ca.

4a. "Progress Report and Future Needs of DOD in EMC" by J. P. Georgi, ECAC/Annapolis, Md.

4b. "Report Legislation and Future Requirements of the FCC and Industry in EMC" by H. Garlan, FCC/Washington, D.C.

The list of technical papers for the session on "How to Reduce Interference in Electronic Equipment" is not available at the time of this printing. It will be included in the next issue of this Newsletter.

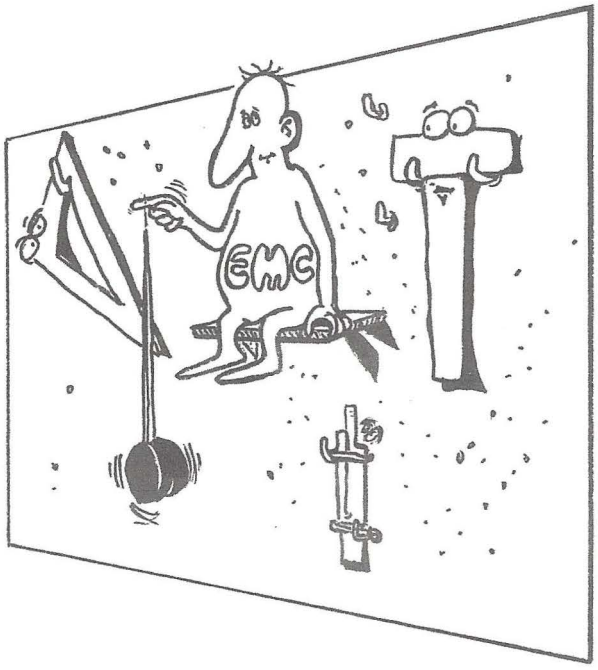
Precision Electromagnetic Measurements

The 1970 Conference on Precision Electromagnetic Measurements will be held June 2-5 at the NBS Boulder (Colo.) Laboratories. This is the seventh conference in the biennial series begun in 1958.

The aim of the Conference is to advance electromagnetic measurements at levels of precision and accuracy appropriate to national standards laboratories. The traditional fields of direct current, low frequency, high frequency, and microwave measurements together with related physical studies provide the core of the Conference subject matter. The rapidly developing field of precise measurements at very low temperatures will be emphasized. Methods for automated measurements will also receive special attention.

WEI Training Courses

Due to the unexpected overwhelming response to the MIL-STD-462 Training Course which is currently scheduled for the week of 8-12 December, 1969, WEI/Technical Services Division announced the addition of another 462 testing course to be given the week of 1-5 December, 1969. In addition, a new course on EMC System Design is being offered during the week 26-30 January, 1970. The 8-12 December course is full and reservations are no longer accepted. The closing date for the 1-5 December course is 24 October 1969, and 19 December 1969 for the January EMC Systems Course. For additional information, write to Mr. H. D. McKay, Director of Technical Services, 670 Lofstrand Lane, Rockville, Md. 20850.



PREDICTION IS A DESIGN TOOL

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