

# IEEE

# NEWSLETTER



## ELECTROMAGNETIC COMPATIBILITY GROUP

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## AdCom News and Views

### Senator Goldwater and Ten Engineers

are Recognized With Awards at

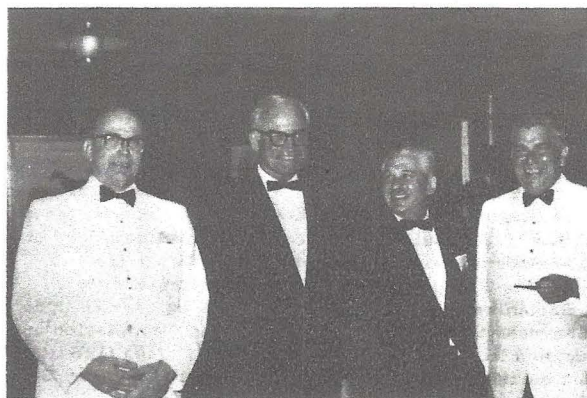
1969 G-EMC Symposium at

Asbury Park, New Jersey

The Group on Electromagnetic Compatibility made its show of gratitude to Senator Barry M. Goldwater and ten of its members during the banquet program and at special services on the closing day. Senator Goldwater, the banquet speaker, has been interested in electromagnetic compatibility since his early days as an amateur radio operator. He has especially followed with great interest the work being done by the Army at Fort Huachuca, Arizona. Because of his extensive background in Ham radio operation and more recently in the MARS system, he has been interested in the suppression of interference and the conservation of spectrum space. In his position on the Armed Services Committee and the Aeronautical and Space Sciences Committee, he has promoted the development of this highly specialized field because of his great desire to upgrade communications at all levels. The Certificate of Recognition presented to Senator Goldwater bore the citation "for his promotion of the field of Electromagnetic Compatibility in upgrading the quality of communications for the Armed Services and for Aeronautical and Space Sciences." The G-EMC is fortunate in having a proponent in Senator Barry M. Goldwater on these important Senate Committees.

The G-EMC Certificate of Appreciation was presented to Richard B. Schulz of Boeing who has served the Group as a member of the AdCom as Treasurer, Vice-chairman, and Chairman, and as a chairman or member of various committees over a period of ten years. In a surprise action by the AdCom the Awards Committee chairman, James S. Hill, of Genisco Technology also received the Certificate of Appreciation for outstanding and devoted service as a member of AdCom as Secretary and as Chairman of the Awards Committee and the International Affairs Committee during the past ten years.

### 1969 EMC SYMPOSIUM



The above picture was taken at the reception held for Senator Barry Goldwater prior to the Symposium banquet at which the Senator was the guest speaker. From left to right is Ned Nichols of LMI, G-EMC Chairman; Senator Goldwater; Maxwell A. Brown of Brown Assoc., Symposium Finance Committee Chairman, and John J. O'Neil of USAECOM, Symposium Chairman.

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Don B. Clark of the Naval Civil Engineering Laboratory was honored with the Certificate of Achievement "for technical accomplishments in the field of electromagnetic shielding and interference control on power lines".

Henry M. Hoffart was given a G-EMC Citation "in recognition of his accomplishments in achieving electromagnetic compatibility in the final checkout of the Apollo 10 vehicle". This action allowed NASA to meet the Apollo 10 launch schedule in spite of problems with relays and indicator lights which threatened a delay.

Certificates of Acknowledgement were presented to four G-EMC members for distinguished service. John Egli was recognized for his "outstanding service to the advancement of electromagnetic compatibility". J. Paul Georgi received a certificate for "outstanding service in coordination between the Department of Defense and the Group on Electromagnetic Compatibility". Herman Garlan was recognized for "outstanding service in coordination between the Federal Communications Commission and the Group on Electromagnetic Compatibility". John O'Neil received his certificate for service as Chairman of the 1969 G-EMC Symposium.

The Symposium Prize Paper Awards were made on the final day of the meeting. Each award carried a stipend of One Hundred Dollars. Horacio Mendez of IBM won the award for the best paper from the United States. The title of his paper was "Meaningful EMC Measurements in Shielded Enclosures." The best foreign paper award went to A. de Jong of the Netherlands Postal and Telecommunication Services for his paper "Methods for Measuring Radiointerference on Frequencies above 30 MHz".

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The following two papers received considerable comment and discussion after the conclusion of the Symposium and have been recommended for inclusion in the Newsletter.

The first is the opening address presented by the AdCom Chairman, Fred Nichols, and the other is an opening address of the adjunct DOD session presented by Mr. E. C. Wood of the Office of the Secretary of Defense. Both papers have been slightly condensed.

## IEE G-EMC CHAIRMAN'S OPENING REMARKS (CONDENSED)

FRED NICHOLS, PRESIDENT  
ELECTROMAGNETICS CORP.

Gentlemen:

I am pleased to have this opportunity to greet all of you and add my welcome to the 1969 International EMC Symposium. I also wish to express the appreciation of G-EMC AdCom for the excellent program and arrangements made by the Symposium Chairman, John O'Neil, and his committee.

At such an occasion as this Symposium it is a normal procedure to talk of past accomplishments and the challenges of the future. To some degree I will do the same thing, but the accomplishments are not so rosy and the challenges are outpacing our results to date. There are some areas where we have notable results; in other areas we are floundering.

In order that we may communicate the best, let me give you some examples:

### Spectrum Utilization/Conservation

The problems here are so numerous that it is even difficult to describe the problem at large. JTAC, ECAC and others are working in this area and excellent recommendations, corrections etc. are being made available. At the same time the spectrum is a victim of the "gloom-doom-there is no room" philosophy. Let me illustrate some of this....

In the May 1969 issue of Electronic Design News, and this is only one of many such examples, the front page is devoted to an illustration describing our crowded spectrum and headlines on the front cover state boldly "Our Crowded Spectrum". The lead article of a series of articles on these crowded conditions is entitled "We cannot Tolerate a Communications Breakdown". It quotes the Communications Chief of the Los Angeles Police during the Watts riots as follows: "The air was completely saturated and a large percentage of the messages were unintelligible or never did get through." The article continues that there were many problems of Government and commercial priorities for given spectrum usage and an additional complication is that in an emergency many messages are repeated endlessly which further restricts the use of given frequencies. The problems of priorities of Government versus Commercial uses were also mentioned. It must be considered that it is equally important to have communications with fire, police, ambulances etc. and gas, water and other commercial usages. Not only are land-mobile frequencies overcrowded but a pending duplicate crises appears in the immediate future as Richard Gifford, Chairman of JTAC stated: "It appears we have not yet learned the lesson. Recent regulatory action has resulted in worse, not better spectrum engineering.... It is time we made spectrum allocations subject to better engineering and management practices rather than a tool for administrative convenience."

(Continued)



Now for another view of the crowded spectrum, a recent publication of the Western Area Frequency Coordinator Office of the Military Communication Electronics Board describes their functions, responsibilities etc. The Western Area Frequency Coordinator, with headquarters at Point Mugu, California controls frequency allocations and related functions in an area on southern California south of San Francisco and the areas in Nevada in which the Nevada Proving Ground of the AEC is located. In this area, the publication states, there are over 1,000,000 licensed transmitters and this number is increasing approximately 20% per year. One of their major problems is, and I quote, "Currently a new program is underway to further electromagnetic compatibility between existing and new systems, which has been a particular problem to us."

Another view would be to review the publications of the National Bureau of Standards on the measured noise temperatures of the spectrum of various locations of the earth at specific frequencies and the predictions for the future. I believe that since the measurement started, the rise in noise temperatures due to both CW and broad band signals was in the order of 1,000 times. These reports clearly show that we are designing and building microvolt equipment to work in a millivolt ambient and in many cases, perhaps, a volt ambient.

Please pass these ideas through your mind and apply them to the first-hand experiences and needs that you have on DoD projects.

Over the years, and I see from my own current and countless repeated first hand experience, where within a given agency of DoD, such as the Air Force, Navy and/or Army, EMC is treated with complete neglect that leads to comments like "...we will fix it if necessary..." up through very well managed EMC from the proposal on through the completed contract.

Not only is there a major difference in applications within a given agency, but the differences among agencies are most difficult to understand.

This condition is also true in industry as industry well reflects what the customer wants and is willing to pay for. Many companies have an excellent EMC department while their competitors, suppliers and associated contractors have virtually no understanding of EMC and make no effort in that direction. This condition leads to the complete breakdown of EMC just as the examples of the overcrowded spectrum.

EMC programs are not magic. They do not eliminate the fixes. They do reduce them to minor levels, and they are parallel to some of the normal debugging any complex system is subject to. However, no amount of debugging can ever replace adequate design. This is one of the many reasons I compare this to reliability.

Now what is the objective of these comparisons, examples etc?

It is my opinion, and I find this shared by a large number within the EMC community, that we lack a national policy on EMC. We need a policy and method of implementation on stray RF energy just as we have a national policy on licensed emitters and their frequency allotments. We need a national policy and methods of implementation on the intrasystem level.

Where can we, the EMC engineer and the G-EMC, help in this area?

First, in accomplishments, we have come a long way in obtaining a professional status rating among our fellow engineers. In a recent poll of the some 33-34 professional groups of the IEEE, the EMC group was in the top ten in most every category of evaluation and in many cases in the top three. Along with this, we are now some 1700-1800 strong and I feel that for every G-EMC member, there is at least one or more non member. Even if we assume one to two non members for the one active member we find a skilled professional manpower pool of some 5,000 engineers and I would guess each has a minimum of five years of experience. This is an amazing total of 25,000 man years of knowhow!

Our challenges arise from these accomplishments. The science and art that we have obtained is begging to be further utilized.

Some ten or more years ago, the present technical director of ECAC gave a speech at one of the first EMC symposiums at the Rand Corporation in Santa Monica wherein he outlined the four phases necessary to have true electromagnetic compatibility. For your reference, these are:

1. The component level.
2. The black box or subsystem level.
3. The system level.
4. The system to system, or the system to the environment level.

I feel that the G-EMC community knows the answers to the first three steps and we are equally desirous of applying this know-how to step four. I see our greatest challenges in phase four in the system to system, or system to environment compatibility. To achieve this we need direction.

I strongly feel that we need this national DoD policy on EMC so that this vast storehouse of manpower can be used. Since DoD is the one agent of our Government that determines our needs, budgets to meet these needs and acceptance criteria, I feel we must turn to DoD and advise them that we have these capabilities and that the scientific know-how that enables us to meet the first three phases of compatibility can also be used on phase four.

Collectively we need to advise DoD that the specifications we have today at the intra-system level and down are in an almost crisis level. We have a severe limitation in that virtually all EMC specifications are in terms of frequency domain while as system engineers we are in a digital world. A few examples of one of our major problem areas are that the various military specifications are not compatible with each other. MIL-STD-220A on filter measurements is not compatible with the filter use and test conditions of MIL-STD-460 series. Further, MIL-STD-460 series is not compatible with MIL-E-6051 or any end system requirements.

There are no military specifications on phase four, that is the system to system or system to environment. MIL-STD-449 was suggested as one in this area, but this is rather to define the environment after the fact.

We do have the know-how to keep systems and major subsystems within their assigned frequency on emitter equipment. Band widths, harmonics, broadband emissions etc. can be controlled on a system basis but what procedures exist that permit engineers from one system to work toward the same objectives on two systems

If we use this know-how on DoD projects, it will also give us the know-how that will allow us to hold the line on the increase of the noise figure of our spectrum for the first time and later we can direct our efforts toward reducing this noise level. This is also control of the RF environment, spectrum management etc. Since we are now in the "middle of the jungle" of RF spectrum crowding, we need to establish the avenue of escape. This we are most willing to do. As IEEE members, we are a group of individuals who, as engineers and citizens, wish to see avenues established so that we can assist our nation as a whole.

Therefore, I ask that those who are in attendance carry this message and plead for a national EMC policy and direction by the proper agencies and their personnel in DoD.

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ELECTROMAGNETIC COMPATIBILITY - INDUSTRY AND  
GOVERNMENT RELATIONS (CONDENSED)  
ERNEST C. WOOD, DEPUTY ASSISTANT DIRECTOR  
(COMMUNICATIONS AND ELECTRONICS)  
OFFICE OF THE DIRECTOR OF DEFENSE RESEARCH AND  
ENGINEERING, OFFICE OF THE SECRETARY OF DEFENSE,  
WASHINGTON, D. C.

It is a privilege and a responsibility to speak to you on a subject of concern to all of us. Out of necessity I must start with the assumption that in EMC we have the opposite of the so-called industry-government combine that we are so often accused of having established. Indeed it appears, in EMC, we have a loose connection with industry that is in need of repair. It might be likened to the proverbial "rusty bolt" problem common on Navy ships, because it is creating its own static and radio noise. The connection between government and industry has corroded from lack of use and become an EMC problem all by itself.

Right now, we are experiencing the results of two years under Department of Defense Directive 3222.3, "DoD EMC Program." The results are not fabulous and one could get discouraged. Rather, we would like to think of it as the first serious organized approach to our goal of placing EMC on a rational cost effective basis. You can be assured we do not want to have EMC just for the sake of scientific analysis. It must and does play an important part in our military systems. The plan we cherish right now is to do a better job of EMC in systems where it is a necessity to obtain the desired capability. One obvious result of our experience under 3222.3 is the need to reemphasize one of the main underlying objectives of the EMC program. We must attain specified and built-in design compatibility rather than resort to after-the-fact remedial measures. Why? Because the military have operationally observed that electromagnetic compatibility is a high risk condition if it is not designed into the system. After the fact suppression often leads to additional time and cost, and reduced reliability. One reason for this is simply added components. Therefore, we would like to go on record for the benefit of both the military and industry in support of scrupulous attention to the EMC design during the formulative design stages - at all levels of sub-system and total weapon system development. In addition, we support a test and evaluation process that includes a careful check out of system EMC performance. Except in extreme circumstances we do not like to see EMC design and performance bartered for schedule keeping. Indeed, the time saved is illusory. Delivery "on time" is meaningless if the equipment will not perform properly in its intended environment.

We know in defense how important it is to learn from experience. Our methods and practices are the outcome of our background in managing - programs, areas of technology and people. We also know that every year our electronic systems installed by the military services become more sophisticated and are introduced into a more polluted electromagnetic environment. The result is a problem, because our systems and the complications they introduce are constantly ahead of our background and experience. In particular, we constantly reach beyond our standards and specifications. Unless these standards and specifications are prepared with care and understanding of potential progress, they may become obsolete before they are placed into effect. In addition, we must improve our regulation of spectrum use or it will be forced upon us; just as regulations are being forced upon those who pollute our rivers and other natural resources. We are grateful for the part industry has played in helping the government achieve the standards we have today in the EMC area. Indeed, industry is our best sounding board and our best informed critic on standards and specifications.

My point about standards and specifications is clearly one of inviting justified criticism from industry in a timely and useful form and through the recognized industrial organizations. I should point out: We find it difficult to match up to a bunch of straws

blown by the wind, but we can and do find great help in receiving comments and criticism on our EMC standards and specifications in a well thought out and documented manner from the focal points in the industry.

This leads me to consideration of a point which may be of mutual help to both industry and government. Many times we feel frustrated in trying to communicate and I'm sure you feel the same apprehension about government. Industry has established focal points through the IEEE and the industrial organizations. Now it is up to us in government to indicate our focal points. To begin with, in DDR&E, we are placing more emphasis on EMC by unloading one of our staff positions to give EMC more time and effort. Colonel James Terrell, USAF, has recently reported in to fill this position. He will be assuming a greater load in EMC, including a closer tie with the Office of Telecommunications Management in the area of future plans for the management of the electromagnetic spectrum. Colonel Terrell is an EMC office of one, so it is essential for the Services to have similar focal points and we find that they actually have set up the following personnel:

Army	- Lt. Col. Dambrauskas (OCCE)
Navy	- Mr. Morelli
Air Force	- Mr. Porter

Captain Boyle identified and described eight broad areas specifically assigned to one or more of the Military Departments. Let us look at four of the more important areas:

Standards and Specifications  
Measurement Techniques and Instrumentation  
Data Base and Analysis Capability  
Test and Validation

These assignments were made, in each case, to a single Service for all of DoD; also, they are the functional areas where industry and the Services should have a good interchange of ideas. These focal points are considered successful and it is natural to recommend them to carry over as contacts with industry, because in each case they are specialized and prepared to coordinate with and speak for all the Services in their assigned function.

I can hear the loud and clear comment, "we have too many focal points." However, the question is: "Should we try to simplify it and do a poor job or make it somewhat more complicated and provide optimum coupling where it is important and can be effective?" We can look upon the nature of each Service focal point as more administrative and managerial and the functional focal points as more technical. For example, the Army is responsible for EMC/RFI Measurement Techniques and Instrumentation; they could solicit the comments of EMC engineers directly involved in the technology and use of the equipment. Between all the professionals involved in such a functional area we should be able to arrive at a well defined understanding and application. Likewise, the industrial organization and IEEE would be free to go direct to the Army in this instance with their ideas on Measurement Techniques and Instrumentation.

I have indicated a clear need for and methods of communication between government and the industrial professionals in the EMC field. In recent months we have seen two events putting increased consideration on the electromagnetic spectrum: One was the publication and distribution of JTAC report "Spectrum Management - The Key to Progress," and the second was passage of Public Law 90-602, "Radiation Control for Health and Safety, Act of 1968." This is all a part of our increased scope in improving management and education of EMC. Added to EMC is the question of radiation hazards to life. Again we are reaching out, new fields, new concepts, and new faces coming into the scene. I am glad to say that a big part of our educational process in EMC involves such pub-

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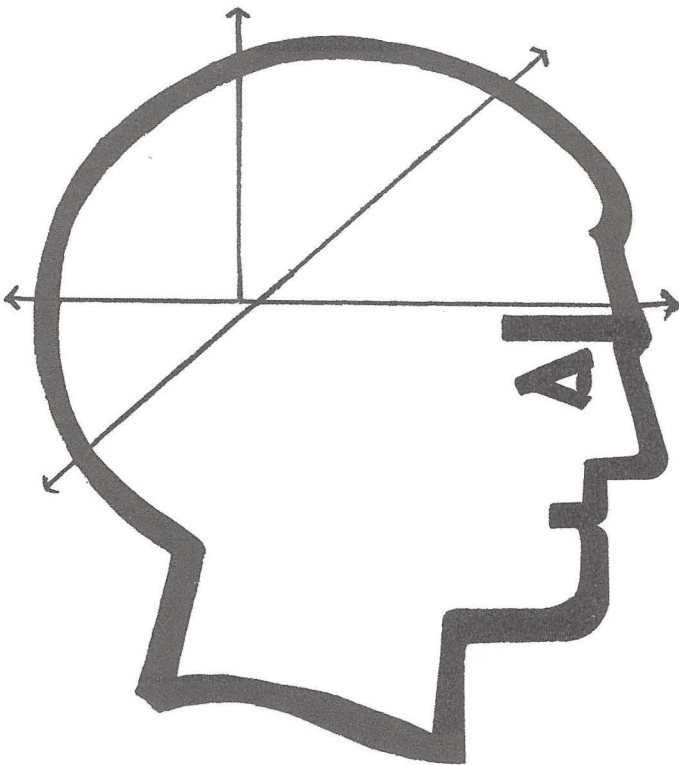


lications as the IEEE G-EMC Transactions, Newsletters, Abstracts, Symposium Records, etc. It is encouraging to know that military personnel as well as industry have access to these documents. I would suggest an even further distribution either through the recommended focal points or maybe someone has a much better suggestion.

There is still one interesting facet of this problem left uncovered. Industry builds these complex wonderful systems but the military man in the field uses them. In between industry and the user is a complex chain of men and events. We might call it the process of turning technology into weapon systems. Fortunately we are not interested in the total process today. Rather, we are interested in events at specific points in the total overall process. We have discussed design, test, standards and specifications for the procurement and we have briefly mentioned education. The point I wish to discuss last concerns the test point and then the post procurement life of the system when it is in the sole hands of the user. Fred Nichols, Chairman of IEEE Administrative Committee on EMC, wrote a letter to Dr. Foster, Director of Defense Research and Engineering, a couple of months ago and described it as "...the technical area of inter-system EMC." Farther on in the same letter he said in part "...but I feel we are now approaching technological advances where EMC will be the limiting environ-

ment..." I am quoting him out of context to bring out forcefully the dominance of a problem we all know about and have done something about, but not enough. EMC environment limiting of our activity has occurred before and we have accepted it. This is the very complex problem of inter-system, system to environment and environment to system. It is the problem that faces the user when he fields a new system using the electromagnetic spectrum.

Fred suggests that the combined technical capability at the intra-system level can be applied to the inter-system and higher levels. I believe this is right and I would like to suggest that industry help us to address: first, what the problem is -- let's define it because right now the total problem appears to defy resolution into fine grain detail; then, let's discuss the approaches to a solution or set of solutions. How should we go about this activity? A suggested means is an Ad Hoc Group set up by industry through IEEE G-EMC organization with invited participation by the Services. There are other ideas and other possible approaches. We, in government, are open to your suggestions.



## L.A. STUDENT ACTIVITIES

PREPARED BY I. M. BERMAN

Those of you who have been worried about a lack of young blood in the EMC field can rest a little easier tonight. The Student Activity Committee is off to a flying start. If the interest shown by the students in the Los Angeles area is any sample of the rest of the country - and there's every reason to think that's so - the G-EMC should experience its greatest growth ever.

The Los Angeles Chapter sponsored a most successful Student Activities Night on April 24, 1969. The area location was a natural, for Jim Spagon, the LA Chapter Chairman, is also the G-EMC Chairman of the Student Activity Committee. The host company was TRW Systems (Jim's employer), in Redondo Beach, adjacent to Los Angeles. TRW is quite deeply involved in EMC and has extensive laboratory and test facilities. Support was also received from a number of other industrial firms in the area.

Attendance reached a total of 160, 80 of whom were students and faculty members from 10 engineering schools in the Southern California area. The attendees had a full program planned for them, starting with dinner (provided at no charge to the guests), continuing with welcoming remarks, a Panel Discussion, Tours and Group Discussions, and concluding with Group Reports.

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The Panel consisted of Joe Fischer, Genistron; Paul Georgi, ECAP; Herb Mertel, General Dynamics; Jim Senn, Lectro Magnetics; George Ufen, Fairchild; and Ed Winters, USN. The panel defined EMC, discussed its relation to other engineering fields, described their particular function within EMC, discussed the academic background best suited for an EMC career, and presented the role of the IEEE in the professional life of the engineer.

Following the panel discussion where EMC was defined, the attendees broke up into groups of about 15 each, with students, faculty members, and EMC engineers in each group. Two groups started on a tour of the EMC facilities, while the others held round table discussions. Other groups followed at 10 minute intervals, breaking their discussion period into 2 segments. During the group discussions, questions were asked that would tend to stimulate group responses. Some of these questions were:

Which was the most interesting and informative - panel discussion, tours, or group discussions?

What type of prize would be motivating for a student paper contest in the 1970 EMC Symposium?

What do you expect to get from engineering?

How can professional groups such as G-EMC be more effective?

The tour was worked out with some care, partly because of the security aspect involved. Five EMC Lab personnel were on hand to make presentations to the tour members. Some of the highlights of the tour were:

30'x30'x110' Anechoic Shielded Enclosure

EMC System Analysis

EMC Display - Introduction to EMI & Typical EMI Sources

EMC Display - Intermodulation/Capacitor Effects

EMC Lab

EMC Display - Common Impedance Coupling

Lunar Module Descent Engine

The tour instructions provided to the leaders were worked out in almost military-like detail, with time for each stop noted, as well as the name of the presenter and the subject to be presented. Obviously, considerable effort was expended to insure that these tours would run smoothly and show off TRW's EMC operations to the best advantage.

To conclude the evening, summary Group Reports were made, with a Student acting as the spokesman for each group. These reports summarized what each had seen and discussed that evening. Having one or more students make these presentations was ideal, as it requires the student to distill the evening in his mind and focus

on what he thinks are the high points of EMC. In this way, the student is stimulated to think further about EMC on his own. It also enables the committee to review the evening and make changes if required, for further Student Evenings.

As a final fillip, each Student Member of IEEE was offered a free membership in G-EMC.

From all reports, it was a most successful evening. The response from all participants was quite enthusiastic. It takes a lot of planning and a lot of work, but the results can be spectacular. If G-EMC is to grow and prosper, this is one of the finest ways we can insure this growth and prosperity.

Most of the "leg work" was performed by members of the Los Angeles Chapter in their positions as University Coordinators. The Student Activities Chairman in this Chapter appointed a group of members to these positions. Each Coordinator maintained direct contact with his corresponding school and was responsible for communicating G-EMC activity to the school, organizing study paper efforts, and providing technical assistance to the student through direct contact with industrial EMC specialists. The Coordinator's job is the backbone of the Student Activity Committee in each Chapter. It is expected that the Coordinators will work on a continuing basis with their schools to keep the EMC interest alive and active.

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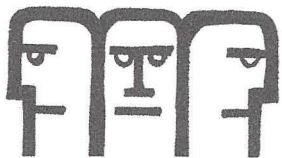
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## Back Issues of Newsletters Available

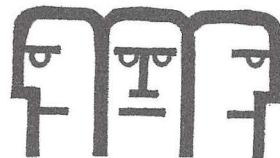
Copies of back issues of G-EMC Newsletters are available from the Newsletter Editor. Anyone interested in receiving copies can obtain additional information from the Editor.

R. D. Goldblum  
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## People In The News



### W. C. GREEN ELECTED PRESIDENT OF NSL

William C. Green has been elected President and Director of National Scientific Laboratories, Inc., Westgate Research Park, McLean, Virginia. The promotion was announced by J. J. Bokan, Group Vice President of Keene Corporation, New York City, parent company of the Virginia firm. Mr. Green has been associated with National Scientific Laboratories since 1952 and previously held the positions of Project Manager, Director of Engineering, and Vice President. National Scientific Laboratories is engaged in research, development, and consulting engineering in the fields of communications, electronics, and physical sciences. He is a member of the IEEE G-EMC and has also served as chairman of various committees on the Steering Committees of the EMC National Symposia in 1961, 1962, and 1967.

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### J. W. MCDONALD JOINS STODDART ELECTRO SYSTEMS

Gardena, California - John McDonald, formerly Product Line Sales Manager for EMC Instrumentation, Inc., a subsidiary of Singer Instrumentation, recently joined Stoddart Electro Systems as Western Regional Sales Manager.

According to Del Black, General Sales Manager, John will be responsible for the marketing of Stoddart's products and services west of the Mississippi River.

John has been in the EMC field for approximately twenty years. Prior to joining EMC Instrumentation, Inc. he was President of McDonald Associates, a firm specializing in the marketing of RFI/EMI instruments, components, and services. He formed McDonald Associates in 1962 after resigning as President of Shielding, Inc.

## Meetings and Events

### G-EMC TO SPONSOR SESSION AT 1970 INTERNATIONAL CONVENTION

Mr. F. H. Blecher, Vice Chairman of the IEEE Technical Program Committee has announced the acceptance of the AdCom proposal to organize a session on "Progress in the Electromagnetic Compatibility Field" at the 1970 International Convention to be held on March 23-26 in New York. Authors will be invited to present papers by September 25, 1969.

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### EMC AdCom MEETINGS

The next AdCom meeting is scheduled as follows:

Date: 8 December 1969  
Time: 1:00 P. M.  
Place: Conrad Hilton Hotel  
Room 419, Fourth Floor  
Chicago, Illinois

The election of 1970 officers will take place at this meeting. There will also be a pre AdCom meeting in the morning of December 8 of all Committee Chairmen and the Chairman and Vice Chairman to further cooperation between AdCom officers and committee needs. Chapter Chairmen will also meet at a morning session with Mr. Herman Garlan, Committee Chairman on Meetings.

This AdCom meeting will be concurrent with the NEC at which G-EMC is presenting one of the technical sessions.

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### NBS MEASUREMENT SEMINAR

Seminars and workshops have been announced for the 1969-1970 series of NBS Measurement Seminars. They are one of several NBS activities that provide advice and assistance on measurement and calibration problems to the growing number of standards laboratories in tracing to NBS standards the accuracies of measurement needed for research work, factory production or field evaluation. Participation is open to a limited number of persons from measurement and standards laboratories who meet appropriate prerequisites relating to education, work experience and current professional activity.

Laboratory directors who wish to have members of their staff attend any of these courses are urged to send as soon as possible a letter of application to the individual named in the course description. Letters should include details of the candidate's qualifications in terms of the stated prerequisites. Applications should also be accompanied by a check, billing authorization or purchase order for the stated fee.

#### Field-Strength and Antenna Measurement

**Brief Description:** This 4-day seminar will cover topics of interest in the general area of field-strength and antenna measurements from very low frequency through the microwave range. The following topics will be discussed: Antenna calibration techniques, calibration of field-strength and power density meters, compact ranges for antenna measurement and calibration, high-accuracy horn gain measurements including swept-frequency techniques, high accuracy prediction of gain and vectorial far-field patterns from near-field data, basic concepts and preliminary work pertaining to the development of radiation hazards probes.

**Prerequisites:** Bachelor's degree in engineering or physics or equivalent experience, and currently engaged in professional work in antenna or field-strength measurements.

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Arrangements: Attendance may have to be limited. If so, applicants will be accepted on a first-come basis. Fee: \$300. Tentative dates: April 7-10, 1970. Apply to: Harold E. Taggart, NBS Electromagnetic Field Standards Section, Boulder, Co. 80302.

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#### TRAINING COURSE ON MIL-STD-462 TESTING

WEI Technical Services offered a one-week training course on September 8-12, 1969 at their Rockville, Maryland facilities. Mr. William L. Cipperly of EMI Consultants, Inc., Hackensack, New Jersey, prepared the course material and was the main instructor. Although WEI provided the physical facilities, other EMI equipment manufacturers were invited to supply their equipment for demonstration and use by the attenders. The 40-hour course consisted of approximately 20 hours of laboratory work, 13 hours of lecture, 3 hours of films, 2 hours each of review and test. The homework required was estimated at 12-16 hours dependent upon the attendee's background which dispensed with empty evenings.

Since the course was over-subscribed, it will be repeated in the first week of December. In addition, there are plans for a two week course in EMC System Design for February 23-27, 1970. Future plans also include the presentation of major courses in EMC System Design, EMI and Susceptibility Analysis, Packaging for EMC, Pulse Design and Synthesis for Minimum Harmonic Content, Grounding, Wiring and Cabling, Shielding, and EMC Documentation. These courses will be prepared and tailored to meet the specific requirements of the industry in response to the suggestions and indications of interest that are received. Mr. Cipperly would welcome all expressions of interest and suggestions on courses to be given or course material to be included. His address is Suite 206, 214 Main Street, Hackensack, N.J. 07601

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#### SYMPOSIUM ON BIOLOGICAL EFFECTS OF MICROWAVE RADIATION:

The first Symposium on the Biological Effects and Health Implications of Microwave Radiation, sponsored by the Department of Biophysics, Medical College of Virginia and the Bureau of Radiological Health, was held at Richmond, Virginia on September 17 through September 19, 1969. Four technical sessions were devoted to invited and contributed papers on various aspects of the biological effects and health implications of microwave and radio frequency exposure as well as pertinent technical aspects of generating equipment, microwave measurements, and monitoring of radiation fields. The final two sessions consisted of panel discussions of current problems in the evaluation of microwave and radio frequency exposure effects. Some of the papers presented were as follows:

THE ROLE OF THE U.S GOVERNMENT IN CONTROLLING MICROWAVE RADIATION EXPOSURE--John J. Hanlon, Deputy Administrator, Consumer Protection and Environmental Health Service, United States Public Health Service, Washington, D.C.

STUDIES OF THE EFFECT OF 2450MHZ MICROWAVES ON HUMAN IMMUNOGLOBULIN--Gopel P. Kamat and David E. Janes, United States Public Health Service, Rockville, Maryland

EFFECTS OF MICROWAVE AND RADIO FREQUENCY RADIATION ON THE CENTRAL NERVOUS SYSTEM--Allan Frey, Randomline, Inc., Glenside, Pa.

BEHAVIORAL EFFECTS OF LOW LEVEL MICROWAVE IRRADIATION IN THE CLOSED-SPACE SITUATION--Don R. Justesen, Director, Neuropsychology Research Laboratories, Veterans Administration Hospital, Kansas City, Missouri, Nancy Williams King, Assistant Professor of Education and Psychology, University of Missouri at Kansas City.

BEHAVIORAL EFFECTS OF LOW INTENSITY UHF RADIATION--Susan F. Korbel, Department of Psychology, University of Arkansas, Fayetteville, Arkansas.

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#### 1969 IEEE SOUTHEASTERN EMC SYMPOSIUM REGENCY HYATT HOUSE, ATLANTA, GEORGIA OCTOBER 27-29, 1969

The 1969 Southeastern EMC Symposium in Atlanta is the third in a series of annual Electromagnetic Compatibility symposia held in the Southeastern United States. It is the purpose of this symposium to continue in the in-depth dissemination of technological EMC advances which are quickly bringing electromagnetic compatibility from art to science.

#### The Program

An outstanding program has been planned for the Symposium with three days of morning and afternoon sessions. Session topics will review the latest developments in the traditional areas of Interference Prediction, Measurement and Suppression Techniques as well as providing coverage of the Electromagnetic Pulse, Lightning and Radiation Hazards, and Cable Coupling fields. The session on cable coupling is worthy of special note. Four recognized authorities in the field have been invited to present papers. These authors and other experts will further participate in a panel discussion which is intended to unite service and NASA-supported activities in this area.

#### Hotel Accommodations:

Should be arranged by sending the enclosed card and the proper remittance directly to the Regency Hyatt House.

#### Exhibit Hours:

9:30 A.M. - 5:30 P.M. daily

#### Technical Sessions:

Start at 9:30 A.M. and 2:00 P.M. on Monday; 9:00 A.M. and 2:00 P.M. on Tuesday and Wednesday. Sessions will cover the areas of:

Shielding and Filtering  
Cable Coupling (Featured Session)  
EMC Measurements and Instrumentation  
EMP, Lightning and Radiation Hazards  
EMI Prediction  
EMI Suppression Techniques

#### Registration:

To register send your name, address and affiliation. Fill out the enclosed form and mail with your remittance to: 1969 IEEE Southeastern EMC Symposium (Third), P. O. Box 331, Smyrna, Ga. 30080. Advance registration fee is \$20.00 which includes the price of the symposium record. Registration at the door is an extra \$5.00. There is no charge for the ladies' program. An additional \$5.00 is added to the above for non-IEEE members. For additional information contact David Vrooman, (404) 424-7864.

#### Symposium Record

The record can be purchased by non-attendees for \$10 (including handling and postage).





## Chapter Chatter

BY IRA M. BERMAN

Some folks say that summer is summer everywhere, and where you are it's the worst. I disagree, and not only mildly. Philadelphia does not have to take a back seat to anywhere else when it comes to muggy, uncomfortable summertime weather. I've spent summers in New England, the South, the Midwest, and even the Mojave Desert, but the mid-Atlantic states sort of outdo them all.

Summer is also a time of almost zero activity in the Professional Societies as well. Most of what little news we have this issue is what arrived too late for release at Symposium time.

First - an omission. In my zeal to describe the lush surroundings on the January joint New York - New Jersey Coast meeting, I left out the name of the speaker: Mr. J. D. Osburn of the Electro-Mechanics Company.

Okay - ready for Chapter News. Roll 'em!

### ATLANTA

DATE: May 13, 1969

PLACE: not available

SPEAKER: Mr. A. T. Cline, Sixth District FCC,  
Atlanta, Georgia

TOPIC: The FCC's Role in EMC

ATTENDANCE: 18

For those of you who may not know, the FCC has been a pioneer in EMC since its inception in 1934.

### CENTRAL TEXAS

Just a bit of news from San Antonio: The April 16, 1969, meeting about Measurements of Field Strength Attenuation at Points Close to the Source had an attendance of 20.

### CHICAGO

Would you believe news from Chicago? It's been so long since we heard from the Windy City that they seemed to be only a zephyr.

DATE: March 13, 1969

PLACE: Not available

SPEAKER: Mr. Donald R. J. White, White Electromagnetics,  
Rockville, Md.

TOPIC: Recent Advances in Automating EMI Susceptibility Testing

ATTENDANCE: 21

Perhaps more news next season? We know you're there.

### NEW JERSEY COAST

Could it be the 1969 Symposium is now history? The three days in Asbury Park just flew by. It is always such a pleasure to meet people face to face that I see only in print during the year. Perhaps the best times were the coffee breaks at poolside (sorry I didn't bring a bathing suit along). The 15 or 20 minutes of informal EMC (and non-EMC) chatting was really stimulating. What's left to say, except hats off to John O'Neil and the New Jersey Coast Chapter.

New Jersey Coast finished with two meetings in the Spring. The April 8, 1969 meeting discussed the Lunar Module (Apollo 8 & 9) EMC Problems, with an attendance (check this) of 75! The May meeting was well attended, too, including myself.

DATE: May 13, 1969

PLACE: Gibbs Hall, Ft. Monmouth, N. J.

SPEAKER: Symposium Committee

TOPIC: Final Plans for Symposium

ATTENDANCE: About 60

The meeting was enlivened by ringing bells and running feet as a small fire was discovered in the basement of Gibbs Hall. The speakers merely spoke a little louder and the meeting proceeded.

### PHILADELPHIA

Here's the first Chapter to announce a meeting for the new activity year, and the speaker will address himself to a topic that I know has interested me as well as many others.

DATE: September 17, 1969

PLACE: General Electric Space Technology Center,  
Valley Forge, Pa.

SPEAKER: Mr. J. P. Jones, Vice President, Navigation  
Computer Corp.

TOPIC: Designing Compatible Digital Equipments

A tour of the spacious EMI and anechoic facilities in the Center will precede the business portion of the meeting.

### SEATTLE

Another precinct reports in with the results of elections. Best wishes to Richard K. Donohue, Chairman, William C. Cooley, Vice Chairman, and Francis A. Beauchamp, Secretary on their election.

The Chapter planned a social meeting in July, but no news on that yet.

### WASHINGTON, D. C.

The Washington Chapter usually holds their meetings in a place called Blackie's House of Beef in the District. For some obscure reason, that name conjures up visions of mammoth steaks served sizzling on a plank. Let us know when your Fall meetings are, fellows, so we can see for ourselves.

The last reported meeting was in May.

DATE: May 15, 1969

PLACE: Blackie's House of Beef, Washington, D. C.

SPEAKER: Mr. Edwin J. Schafer, General Attorney, FCC

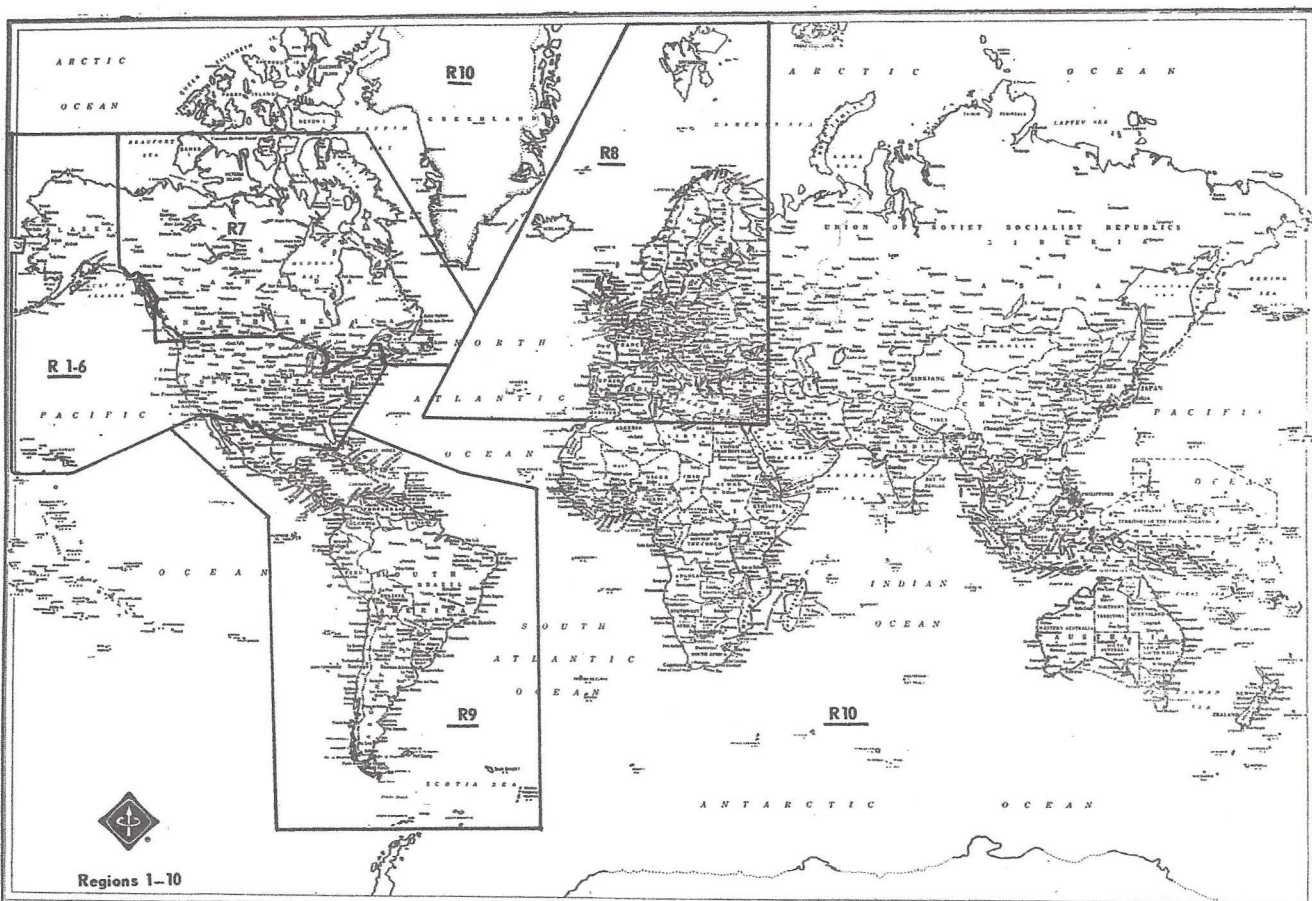
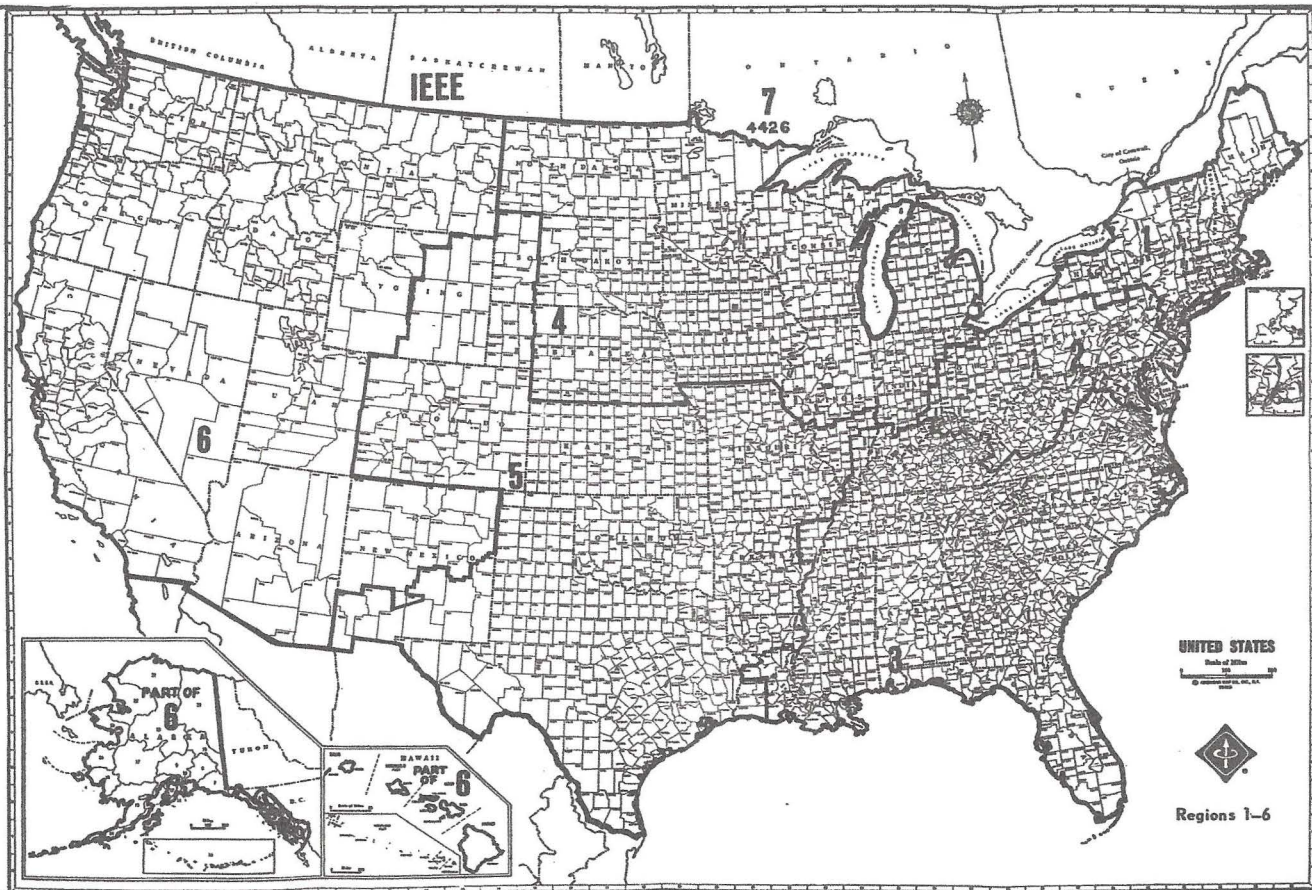
TOPIC: Recent Interference Legislation and FCC Method of Implementation

ATTENDANCE: 26 (including 9 guests)

I haven't had such a short column in months. Of course, there hasn't been much news since June.



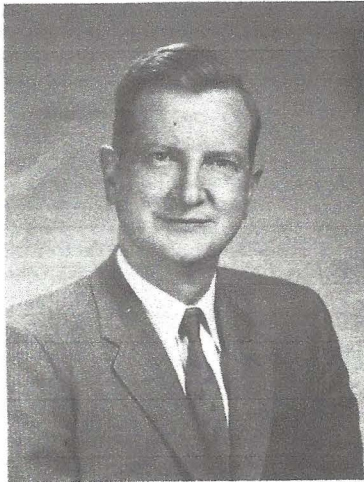
# IEEE REGIONS





# AdCom Standing Committees

## TECHNICAL ADVISORY COMMITTEE WORKSHOP ON STANDARDS ON SYSTEMS EMC



Committee Chairman:

Dr. Ralph M. Showers  
Professor of Electrical Engineering  
Moore School of Electrical Engineering  
University of Pennsylvania

Dr. Ralph Showers is the Chairman of Technical Advisory and the Workshop in Standards on Systems EMC Committees. He is a Fellow of the IEEE and has been active on various other committee efforts.

Dr. Showers received the Ph.D degree in 1951 from the University of Pennsylvania, where he is a Professor of Electrical Engineering.

In 1940 and 1941 he was with the General Electric Co. in Philadelphia, Pa. and Schenectady, N. Y. During World War II he was temporarily with the Office of Field Service of the Office of Scientific Research and Development in connection with research in the general field of short-range communications.

His responsibilities at the Moore School include teaching of graduate courses in physical electronics and communications, and supervision of research in the areas of microwaves, systems engineering, physical and solid state electronics and radio interference. He is active with the CISPR (International Special Committee on Radio Interference) in which he is a member of the Steering Committee and Chairman of Working Group 1, Interference Measuring Equipment, and Subcommittee B, Measurements. Dr. Showers is also a member of the Joint Technical Advisory Committee of IEEE and EIA, Subcommittee 63.1 on Spectrum Utilization, and is Chairman of USASI C63, Radio-Electrical Coordination.

### TECHNICAL ADVISORY COMMITTEE

The charge to the Technical Advisory Committee is as follows:

"a) Study the needs of the Group regarding such matters as fall within the field of interest, including, but not limited to, terminology, definitions, specifications and standards, measurement procedures, guidelines and workshops.

"b) Recommend to the Administrative Committee those areas where further effort if necessary. In making these recommendations, work of outside groups (EIA, AIA, SAE, AIS, USASI, CISPR, DOD, etc.) in these areas shall be taken into consideration. Insofar as is possible, recommendations of this committee shall be specific."

In carrying out its responsibilities, the Technical Advisory Committee has replied to certain letters of inquiry from other technical organizations on matters concerned with electromagnetic compatibility. In addition, it has kept apprised of activities of particular organizations in IEEE such as the Technical Activities Board and the various technical groups. More recently, it has

established formal liaison with a new committee on Electrical Contacts which is organized under the Group on Parts, Materials and Packaging. In addition, it has performed a liaison function with the Transmission and Distribution Committee of IEEE in matters related to electromagnetic compatibility aspects of high voltage transmission line operation, and more recently has been establishing liaison with the Inductive Coordination, Electrical Interference and Protection Subcommittee of the Communication Technology Group.

A major function of the Technical Advisory Committee is to make suggestions to the Administrative Committee on how progress can be further advanced through group activities. Because the technical areas covered by the electromagnetic compatibility field are so extensive, the inadequacies of a small committee to carry out this function were recognized. A result of considering this problem was the formation of specialist working groups. The function of these groups is to examine the technical state of the art in each of the specialist areas, and make recommendations for new standards, seminars, special sessions at the National Symposium, and special issues of the Transactions. This activity is just getting underway, and five groups, namely, Power Transmission, Interference Control, Shielding, Measurements and Instrumentation, and Interference Prediction and Propagation, conducted sessions at the recent annual Symposium at Asbury Park. In addition, it should be noted that on May 21, specialist working groups operating within the Southern California Chapter of G-EMC held a one-day meeting. The groups which have been organized there are the following: Shielding, Grounding, Filtering, Interference Generation, Measurement Techniques and Instrumentation, Propagation, and Interference Prediction.

Members of G-EMC who are interested in these activities are cordially invited to participate. All contributions will be welcomed, and we trust that through the activities of these groups, which are relatively informal in their organization and operation, the science of EMC will be developed at an accelerated rate. Further information may be obtained from the chairman of the Technical Advisory Committee, Dr. Showers.

### WORKSHOP ON STANDARDS ON SYSTEMS ELECTROMAGNETIC COMPATIBILITY

Several years ago, the Technical Advisory Committee organized a Workshop on Standards on Systems Electromagnetic Compatibility. An informal report on the initial effort was prepared and distributed to group leaders. In the past year or so, there has been relatively little activity in this group because of changes in the positions of some of the more active personnel, and for other reasons. More recently, however, EIA has organized a Systems Effectiveness Workshop in which EIA Committee G-46 has pursued the electromagnetic compatibility aspects of this subject. A number of possible continuing efforts are under consideration, either independently on the part of G-EMC or on the part of other organizations such as EIA.



# Air Waves and Regulations

## ANTENNA PATTERN RANGE AND OPEN-FIELD LABORATORY

WEI maintains a 144 acre Electromagnetic Test Facility (EMTF) located in Frederick County, 35 miles from its Rockville, Maryland plant. This facility is situated for the conduct of far-field antenna pattern and spectrum signature measurements and for performing protected open-field RFI/EMI measurements on large test specimens. Storage facilities and available utilities make this remote facility an ideal site for the conduct of many electromagnetic experiments and tests. The following outlines in more detail the features of the WEI EMTF.

### 1. Location, Terrain Features, and Housekeeping

Located 35 miles North of Rockville, Maryland, the EMTF is situated 2 miles from Maryland Route 75 in Johnsville. State maintained, hard-surfaced roads permit access to the 144 acre facility. Yet the final approach on the farm terminates in a small valley protected by hills all around enjoying heavy vegetation. This results in natural shielding between electromagnetic emanations originating on the EMTF and the outside world. In fact, with the surrounding woods and near-in vegetation, it behaves as a large open-air, combined shielded enclosure and anechoic chamber.

A large barn provides all local housekeeping functions and storage for electronic test instruments and customer test specimens. An adjacent 2-acre lake allows testing of small submerged or surface craft requiring electromagnetic measurements.

### 2. Antenna Pattern Range

Three knolls, located within the EMTF, give mutual line-of-sight access with heavy vegetated valleys in between. Far-field separation of 800', 1300', and 2,000' is available. Thus, good Fresnel-Zone clearance and natural outside world shielding are simultaneously available for antenna pattern and spectrum signature measurements.

### 3. Open-Field Laboratory

Ambient EMI tests in the valley areas of the EMTF disclose almost no detectable emanations above about 30 MHz. Even broadcast and HF signal levels are unusually low especially considering the facility's proximity to Greater Metropolitan D. C. (55 miles from Downtown Washington).

## PROGRESS IN SPECTRUM ENGINEERING SEEN BY THE JTAC

The Joint Technical Advisory Committee, marking its 21st anniversary as of June 17, took note of the many programs now underway in the offices of the DTM, the FCC, and elsewhere in industry, governmental and research institutions that are supportive of its major recommendations made in the recently published JTAC report SPECTRUM ENGINEERING--THE KEY TO PROGRESS. The report culminated a comprehensive four-year study by over 200 of the nation's leading experts on the use of the radio spectrum.

One of the JTAC's prime recommendations in this report was to establish a modern spectrum engineering and system-design philosophy for the technical procedures relating to the allocation and assignment of the radio spectrum. Adoption of such a philosophy would be essential in order to establish the "next genera-

tion" spectrum engineering system. To implement this recommendation, JTAC outlined a pilot project which would put the new frequency selection concept into experimental operation in a trial region. Results obtained from the project would provide the basic information required to proceed further with development of a flexible full-scale system.

Many steps have been taken on the part of numerous private and government entities which will ultimately provide the much-needed data required to fulfill the JTAC recommendations. Among them include the following:

The Office of Telecommunications Management and the Electromagnetic Compatibility Analysis Center (ECAC) have been studying the role they could play in data collection and analysis of specific problem areas. Planning effort is now moving forward for the creation of a Nationwide Electromagnetic Compatibility Analysis Facility (NECAF). The OTM plans to seek funding for this new facility in the fiscal 1971 budget.

Some work has also been done on defining and expanding the parameters needed for the data base which will be required for the new spectrum engineering system.

Meetings among representatives of the Department of Defense, Electromagnetic Compatibility Analysis Center and Office of Telecommunications Management on the design of the data base are underway.

Some preliminary work has been done among users in the Los Angeles area as a potential pilot project trial region. A Southern California Land Mobile Users Committee, representing non-government users, has been organized. This organization has volunteered to do initial work on the pilot project until an adequately funded entity is established by the government. The FCC is considering recognition of this body as an interim agency to handle preliminary pilot project work. Government users would join in later, after funding is available.

In addition, the OTM has initiated a study of spectrum usage in the L band telemetry services (1435 - 1535 MHz), including government and non-government users, which will provide information for use in developing the new spectrum engineering system.

The FCC has invited bids for a study contract for the development of spectrum utilization criteria and frequency assignment procedures for the frequency range of 1.85 to 15.25 GHz; they also request consideration of frequencies above this range.

An interdisciplinary advisory council, advisory to the OTM and called the Electromagnetic Radiation Management Advisory Council (ER MAC), has been established by the OTM. Rex Daniels, Chairman of the section of the JTAC report dealing with "side effects," has responsibility for writing a report on the results of work in this field to date. The first volume, "General Considerations," is complete; the second volume, "Technical Considerations," is now being reviewed.

(Continued)



A public Safety Study, under the direction of IIT Research Institute, has been made for Association of Police Communications Officers (APCO) under the Law Enforcement Assistance Program with regard to the present use and future needs of police frequencies in the Great Lakes area. The study showed that already there was a need for additional channels to meet current load.

The National Academy of Engineering (NAE) has a Telecommunications Committee which, in turn, has a panel, sponsored by the OTM, looking into the technical, economical, and social considerations involved in a value-based, decision-making process for spectrum allocation.

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## New Products



## and Brochures



### MILITARY TO SET TOUGHER SPEC. ON MICROWAVE RADIO

A two-page article with the above title appeared in the June 1969 issue of Microwaves. It was written by Peter Franklin, News Editor. The first two paragraphs are extracted as follows:

"Two manufacturers of microwave radio equipment say they can meet 'Change 8' in the Defense Communications Agency (DCA) specification DCAC 330-175-1. The toughest part of the Change 8 is a new white noise test-loading spec calling for 5 db more white noise of test load.

The drive to create a global digital defense communications net is at the heart of the matter. The old spec was suitable for multi-channel microwave links handling primarily voice traffic since the composite signal could be expected not to exceed the system limit more than 1 per cent of the hour of heaviest traffic--the so-called 'busy hour.' The composite signal was usually well within limits since the use of the average channel in large voice systems is usually only 25 to 30 per cent."

### CHROMIUM COMPOUND FOUND FERROMAGNETIC

An article with the above title appeared in the July 1969 issue of the NBS Technical News Bulletin. Paragraphs of interest are excerpted as follows: "A New Chromium Compound was recently found to be ferromagnetic in a study at the NBS Institute for Materials Research. While investigating ferromagnetism superconductivity and diamagnetism in beryllium and some of its compounds, N. M. Wolcott and R. L. Falge, Jr. of the Institute's Metallurgy Division discovered that  $\text{CrBe}_{12}$  is ferromagnetic below 50 K.

This discovery was unexpected for two reasons. First, chromium compounds are usually antiferromagnetic, as for example chromium-iron compounds where the chromium decreases the magnetic moment of the iron. Secondly, the only beryllium compounds known to be ferromagnetic are the beryllium-iron compounds  $\text{FeBe}_2$  and  $\text{FeBe}_5$ .

Ferromagnetism is a phenomenon of some solids in which all the magnetic moments of the atoms are aligned in the same direction, producing an overall magnetic moment for the solid. Many common materials can be magnetized; that is, they have within them domains or regions where the atomic moments are all parallel. By placing such a material in a magnetic field, these domains are easily aligned producing an overall magnetization. When the field is removed a net magnetization may remain. Materials possessing such domains are called ferromagnets. Iron, nickel, and cobalt are typical ferromagnetic materials.

A group of materials called antiferromagnets appear to have no magnetic moment. This lack of magnetic moment is caused by the alignment of atoms with equal magnetic moments in opposite directions. Chromium and chromium compounds usually fall in the antiferromagnetic group. Thus the ferromagnetic  $\text{CrBe}_{12}$  is considered unusual.

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### PANORAMIC RECEIVER

A one-page article with the above title appeared in the June 1969 issue of the Microwave Journal. Excerpts from the article are as follows:

"Model PN1013 plug-in panoramic receiver developed by Electro/Data (Garland, Texas) displays the entire 1.8 to 25 GHz frequency band in a single sweep. Figure 1 shows a display of 1 GHz marker harmonics across the 2 to 25 GHz range using the receiver. Unlike common spectrum analyzers, the PN1013 panoramic receiver

(Continued)



eliminates intermodulation spurious products and images by the use of an electronically swept yttrium iron garnet preselector. A sensitive tunnel diode detector and low noise video amplifier follows the YIG as shown in the receiver block diagram, Fig. 2. This yields moderately high sensitivity in broad bands of frequencies as shown in Fig. 3.

The sensitivity, broad dispersion, and absence of images and spurious in these panoramic receivers make them suitable for use in RFI survey, transmitter field-strength checkout and other similar applications. A prime feature of the unit is the absence of mixer intermodulation spurious, images and harmonically related spurious responses.

The PN1013 is available as a plug-in unit for Tekronix letter series scopes or with an optional carrying case/power supply."

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#### BROADBAND RECEIVER AND MEASURING SET

An Engineering Bulletin detailing performance characteristics of Stoddart Electro Systems new Model 533 Broadband Receiver and Measuring Set is now available.

The 533 will detect and measure conducted and radiated signals within the frequency range of 1 to 1000 MHz. The system contains detection facilities for both amplitude and frequency (or phase) modulated signals as well as impulsive types.

Selectable bandwidths are available up to 30 MHz. The system can be electronically swept or manually operated. Appropriate signal input devices, calibrators, and other accessories are readily available.

For additional information, contact Stoddart Electro Systems, 2045 W. Rosecrans Avenue, Gardena, Ca. 90249; Attention Dept. EMCN.

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#### COLLIMATING LENS FOR ANECHOIC CHAMBERS

There is available from Emerson & Cuming, Inc. a collimating microwave lens. The primary use of such a lens is to achieve far-field performance in an antenna or back scatter test range where the length of the range, wavelength and aperture or target size do not meet the familiar  $2d^2$  criterion.

The dielectric constant and shape of the  $2d^2$  lens are so chosen as to minimize reflections from the lens surfaces while at the same time producing the desired energy focusing to produce an excellent approximation to a plane wave immediately in front of the output aperture. Dielectric constant uniformity is stressed in the manufacturing method to minimize aberrations. Effective stretching of nominally near-field ranges in anechoic chamber to 10-times actual length has been achieved. Phase variations at the output aperture may be reduced by an order of magnitude or more over that which would exist without the lens.

This is not a standard line of lenses; rather it is a design and manufacturing capability. Each lens is designed and built to meet the requirements of a specific application. Minimum lens diameter should be on the order of 20 wavelengths.

For additional information, write to Mr. E. J. Luoma, Emerson & Cuming, Inc., Canton, Ma. 02021.

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#### POWER METER KEEPS ITS HEAD:

A one-page article with the above title appeared in the July 1969 issue of Microwaves. Paragraphs of interest are excerpted as follows:

A single thermocouple mount and meter measure a 55 dB dynamic range from 10 MHz to 18 GHz.

The input voltage from the thermocouple is fed through a chopper and a high-turns-ratio transformer to a FET amplifier. This set-up gives a 55 dB dynamic range providing full scale readings from 3 uW to 100mW in a single mount. Noise and drift are less than  $\pm 1\%$  on the 3 uW range and correspondingly lower on the higher ranges. The wide dynamic range combines sensitivity for low level measurements with protection against high power burn-out.

For further information, contact Hewlett-Packard, Palo Alto, Ca. 94304 (415) 325-7000.

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#### AN APPLICATION GUIDE FOR ELECTROMAGNETIC COMPATIBILITY

A new brochure with the above title has been released by Chomerics Inc., 85 Mystic Street, Arlington, Ma. 02174. The brochure contains figures and directions for applying chomerics gaskets to electronic enclosures, subassemblies, cables, connectors, switches, and other applications. Copies of the brochure are available by writing to Chomerics.

#### MEASUREMENT OF SHIELDED ENCLOSURES

The proposed IEEE recommended practice for Measurement of Shielding Effectiveness of High-Performance Shielding Enclosures has been issued by the IEEE. The publication, Document Number 299 dated June, 1969, was prepared by the Industrial Subcommittee of the Standards Committee of the IEEE G-EMC. The membership of the Subcommittee was:

J. E. Bridges, Chairman  
E. W. Chapin  
C. W. Frick  
J. C. Klouda  
R. B. Schulz  
C. E. Smith  
L. W. Thomas

Copies of this publication may be obtained for \$4.00 per copy for non-members and \$2.00 per copy for members from the Standards Order Department, The Institute of Electrical and Electronics Engineers, 345 East 47th Street, New York, N. Y. 10017.

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#### THE EFFECTS OF LINE IMPEDANCE ON FILTERS

A paper entitled "The Effects of Source and Load Impedance in the Operation of an Interference Filter" has been written by William F. Johnson, of the Potter Company, Wesson, Miss. 39191.

The paper discusses the operation of a power line filter under varied conditions such as when testing with LISN's and 10 micro-farad capacitors. It also presents sample calculations for filter attenuation, and general rules for the use of filter circuits. Copies of the 21 page paper are available by writing to Mr. Johnson.

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# TRANSFORMER MEASUREMENTS OF LOW FREQUENCY CURRENTS

Application Note AN 622001 entitled "Using the 6220-1A Transformer for the Measurement of Low Frequency EMI Currents" has been released by Solar Electronics Co. It describes a new low frequency conducted measurement technique part of which is excerpted as follows:

## "USE OF THE TYPE 6220-1A TRANSFORMER IN GENERAL:

Since the transformer is connected in series with each undergrounded power input lead (sequentially) for performing the audio susceptibility tests, it can be used for two additional purposes while still in the circuit. First, the secondary winding can act as the series inductor suggested for transient injection tests to prevent the transient from being short-circuited by the impedance of the power line. In this application all other windings are left open. See Fig. 1. Secondly, the transformer can be used for measuring EMI current as described herein. See Fig. 2. At other times, if it is not needed in the circuit, short circuiting the primary winding will effectively reduce the secondary inductance to a value so low that the transformer acts as if it isn't there."

Solar has been inviting EMC engineers to call them "collect" on questions about specification interpretation, how to predict EMC problem areas, how to use instrumentation, or any other question related to the EMC field as a free advisory service. For a free copy of the application note write to Mr. A. T. Parker, Solar Electronics Company, 901 North Highland Ave., Hollywood, Ca. 90038, or call (213) 462-0806.



## MEMBERSHIP APPLICATION

### IEEE ELECTROMAGNETIC COMPATIBILITY GROUP

Send to: IEEE Headquarters, 345 East 47th Street, New York, N.Y. 10017

NAME \_\_\_\_\_ IEEE MEMBERSHIP NO. \_\_\_\_\_

MAILING ADDRESS \_\_\_\_\_

COMPANY \_\_\_\_\_

FIELD OF INTEREST \_\_\_\_\_

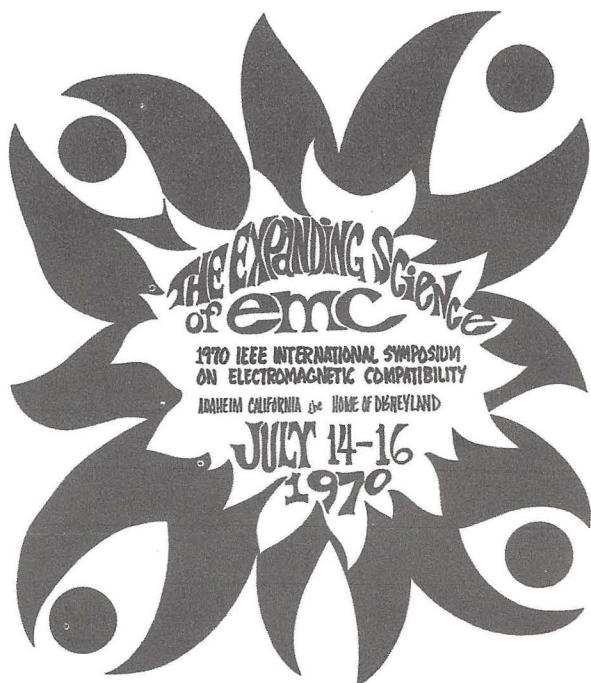
☐ I am a \_\_\_\_\_ member of IEEE and hereby apply for membership in G-EMC.  
(Grade)

☐ My fee\* is enclosed.

☐ I am interested in joining IEEE and the G-EMC. Please send information.

\*Fee: \$4.00 for IEEE members of all grades except Student.  
Student fee is \$2.00.





DON'T FORGET TO BRING THE FAMILY!

6014849 M  
EDWIN L BRONAUGH  
6024 CAMMIE WAY  
LEON VALLEY  
SAN ANTONIO

TX 78238

699 \*

## Acknowledgements

The editor would like to thank the following individuals and their employers for their contributions to this issue of the Newsletter.

Al W. Dimarzio  
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Bill Cipperly  
Len Thomas

Fairchild Electro-Metrics  
LectroMagnetics  
RCA Service Corp.  
Solar Electronics  
Omnionics Vercon  
EMI Consultants  
ECAC

FIRST CLASS MAIL

