PROFESSIONAL GROUP ON RADIO FREQUENCY INTERFERENCE

NEWSLETTER

Number 14 November 1960

NOMINATIONS FOR PGRFI ADMINISTRATIVE COMMITTEE MEMBERSHIP

At the meeting of the Administrative Committee in Chicago on October 4, 1960, the following Amendment to Article VI of the By-Laws was adopted:

"Section 1: On or before December 1 of each year all members of the Professional Group on Radio Frequency Interference shall be notified that nominations for members of the Administrative Committee are open. This shall be done either by notice in a Newsletter or by direct notification of each member by post card or letter.

"Section 2: Nominations shall be made by petition. The nominating petition for each nomination submitted shall contain at least 15 PGRFI members signatures together with a short (not more than 100 words) biography listing the affiliation and background of the individual nominated. All nominations must be in the hands of the Nominations Committee by January 1 of each year. If the Nominations Committee receives less than 10 names (two for each vacancy) or if the Nominations Committee sees fit to make nominations in addition to those received from the members, it shall be within the authority of the Nominations Committee to do so. Not less than 2 names for each vacancy shall be submitted by the Nominations Committee.

'Section 3: On or before February 1 of the year a ballot containing the names of all members nominated for vacancies on the Administrative Committee and their biographies shall be sent to all members of the PGRFI. The marked ballots shall be returned to the Nominations Committee on or before March 1. The candidates receiving the highest numbers of votes shall be deemed to have been elected to the Administrative Committee. In case of a tie for any vacancy the names of the candidates receiving the same number of votes shall be put in a container and the name drawn from the container shall be deemed to have been elected to the Administrative Committee. The names of the elected members shall be transmitted to the Chairman of the Committee of Professional Groups and through him to the IRE Executive Committee. Unless disapproval of such elected members is received within 60 days of such transmittal, the elections shall become final.

Section 4: At the Annual Meeting, the current Administrative Committee shall elect officers for the coming year from the held-over or re-elected members of the Administrative Committee."

Harold E. Dinger, U. S. Naval Research Laboratory, Washing-n 25, D. C., has been appointed Chairman of the Nominations Com-ittee of PGRFI for the 1960-1961 period. The primary functions of is committee are to prepare a slate of nominees for the Administra-ve Committee and to see that the election is carried out in accord-ace with PGRFI By-Laws. The present membership of the Admin-strative Committee with expiration date of membership is as follows:

W. Q. Crichlow	1961*	Milton Kant	1961*
Rexford Daniels	1962	Leonard Milton	1962
Harold E. Dinger	1963	O. P. Schreiber	1962
John J. Egli	1963	R. B. Schultz	1963
R. W. Fairweather	1962	H. W. Schwenk	1961*
Herman Garlan	1963	R. M. Showers	1961*
H. A. Gauper	1963	L. W. Thomas	1962
Z. V. Grobowski	1961*		

The terms of those marked with an asterisk expire at the next annual meeting, therefore, at least 10 names shall be placed in nomination from which 5 members are to be elected. Nominating petitions should be made in accordance with the Amendment to Articl VI of the By-Laws and forwarded (before 1 January) to the Chairman of the Nominations Committee: Harold E. Dinger, Code 5416, U. S. Naval Research Laboratory, Washington 25, D. C.

The above notice in this Newsletter complies with the requirements in Section 1 and will be the only notification for 1961 nominations which will be sent to members by the PGRFI Group.

SAN FRANCISCO FORMS PGRFI CHAPTER:

A petition has been received by the IRE for the formation of a Chapter of PGRFI in the San Francisco Section of the IRE. The organizer of this Chapter is Peter F. Spencer, Asst. Chief Engineer, Filtron Co., Inc., Culver City, California.

FROM PGVC NEWSLETTER, SEPT. 15, 1960:

Inland Empire Cooperative Interference Committee Formed to Combat Interference

"Secretary Donald A. Crisp of the Inland Empire Cooperative Interference Committee put out a 'news release' recently describing the formation of the CIC, operating in the Spokane, Wash. area to locate and eliminate radio interference problems. Mr. Crisp, of the Washington Water Power Co., noted that the purpose of the CIC 'is to bring together representatives of all the various services such as broadcasters, two-way radio people, manufacturers, amateurs, public safety people, military, in fact every group concerned with radio communications'.

"Since 'there is a large cross section of communications people represented in the committee, 'Mr. Crisp said, 'the committee will be able to advise the FCC in regard to rule making and frequency allocations'.

"He pointed out that the group was formed in response to letters distributed last December in Spokane area by the FCC, and has elected the following officers; Chairman D. N. Corbin, General Electric Company; First Vice-Chairman T. W. MacLean, Washington Water Power Co.; Second Vice-Chairman Milton S. Pierce, Public Utilities District #1 of Chelan County; Third Vice-Chairman Chester L. Brown City of Spokane; and Mr. Crisp as Secretary-Treasurer.

"Mr. Crisp said the coverage area of the committee extends from the Cascades in Washington and east of 120 degrees in Oregon to the Continental Divide in Montana, and from the Canadian Border

to approximately the 45th parallel.

"He said the group is currently working on a directory of radio users which lists pertinent information and geographical locations of stations within the coverage area."

INTERFERENCE AND SPECTRAL MEASUREMENT INSTRUMENTATION:

Under the above title, a paper was given by Benjamin Lindeman, RADC, GAFB, N. Y., before the National Symposium on Global Communications, 3 August 1960. The preface states:

"The operational compatibility of new equipments or systems using high powered transmitters and sensitive receivers is in serious trouble unless a broad comprehensive attack is made on the spurious behavior of these components. Unintentional man-made interference is most amenable to reduction if we make a concerted effort in this direction. The first step is to obtain measured data on the spectral and spatial characteristics of the radiations of transmitting systems and similar data on receivers. This article discusses the limitations of available instrumentation and techniques for performing spectral measurements and peers into the future for new approaches and requirements.

"To indicate that the Department of Defense means business, several large scale efforts are being implemented involving the establishment of an Interference Analysis Center, a three year instrumentation program and the promulgation of a spectral characteristic standard. Future efforts involve interference prediction, specifications with teeth in them,and specification compliance testing of a high order.

"The ultimate goal is to require equipment or system designers to regard interference reduction a vital part of the design function, thereby eliminating, to a large extent, the so-called 'quick fix' emergency measures in common use today."

Inquiries for a copy of the paper should be addressed as follows:

RADC(RCUAC, Mr. Benjamin Lindeman)
Griffith AFB, New York

8¢ postage would be appreciated.

ITEMS OF INTEREST IN ELECTRONIC INDUSTRIES, OCTOBER '60:

On page 86 - "The FCC Controls Man-Made RFI" by Edward W. Allen, Chief Engineer, and Herman Garlan, Chief, R. F. Devices Branch, Office of Ch. Eng., Federal Communications Commission, Washington, D. C. The sub-head states:

"The FCC is the official U.S. agency responsible for controlling RFI that disturbs the reception of desired transmissions. How this is accomplished, their enforcement procedures, and what they actually regulate are given in detail along with some of their problems".

Page 109 - "Radar Noise Figures - An 11-page application note, No. 43, describes latest techniques for the 'Continuous Monitoring of Radar Noise Figures'. It reviews the theory of automatic noise figure measurements and outlines radar system requirements for integral noise figure meters. It also describes a new noise figure meter (Model 344A) and its various applications in operating radar sets. Hewlett-Packard Co., 1501 Page Mill Rd., Palo Alto, California."

Page 186 - "Atmospheric Noise Structure Measuring Equipment for 15 kc/s-20 mc/s, C. Clarke. 'El Tech.' May 1960. 8 pp. Equipment is described for measuring parameters of atmospheric radio noise as received on an omnidirectional aerial. (England.)"

Page 188 - "Two Methods for Determining the Field-Strength Values of the Signal and the Noise for Television Reception in Regions with Multipath Reception, H. Bodeker. 'Nach. Z.' May 1960. 6 pp. Germany)."

NEW CANADIAN REPORTS AVAILABLE:

"Order Respecting The Limits of Radio Frequency Noise", Circular SII-13-29 (Revised September 16, 1959). Describes the control of radio interference from Industrial, Scientific and Medical Equipment.

"Interesting Investigations & Suppression Cases", Circulars SII-11-16, 17, 18, 19, 20 and 21. These six circulars contain many cases of interference and the methods used to obtain proper suppression.

"Quarter Wave Stubs for Suppressing TV Interference", Circular SII-13-50.

The Department of Transport, Ottawa, Ontario, Canada, will be glad to send copies of the above on request. Inquiries should be addressed to Director, Telecommunications and Electronics Branch Department of Transport, Ottawa, Ontario, Canada, and refer to file No. 2262-309.

AIEE Subcommittee on Induction and Dielectric Heating Asks for Help:

A letter from Harold A. Gauper, Jr., a member of our PGRFI Administrative Committee, sent in the following request for assistance

"About a year ago the AIEE Subcommittee on Induction and Dielectric Heating set out to make a study of the radiation properties of radio frequency dielectric heaters. The objective of this study is to see if it might be possible to establish a simplified certification procedure for this equipment under Part 18 of the F.C.C. rules.

"The AIEE Subcommittee has circulated the attached letter requesting measurement information. As there may be others with this kind of data that could be reached through our PGRFI Newsletter, would you be so kind as to include a notice to this effect in the next issue.

"Thank you."

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS

August 16, 1960

To: Members of the Induction and Dielectric Heating Subcommittee and Others Interested

From: H. A. Gauper, Jr., Chairman, Task Group on Radiation Data
C. W. Frick, Vice Chairman, Task Group on Radiation Data

Subject: Attenuation Properties of RF Dielectric Heaters

Early in 1959 the Federal Communications Commission requested the assistance of the Institute in obtaining certain technical information pertaining to radiation produced by RF heating equipment, especially attenuation properties and the like. At Meeting No. 53 of this Subcommittee, it was agreed to "procure existing data on tests already made (or now being made) on the close in (less than 1000 feet) attenuation properties of RF Dielectric Heaters". This project was set aside temporarily to give attention to other matters and it is now urgent that something be done.

The Task Group needs any attenuation data you may have at 3.0 megacycles and above. We need only relative field strength vs. distance in feet, the actual frequency, polarization (if known) and general information on the terrain. The identity of the equipment, actual location actual field strength, etc., need not be revealed. Since it has been customary to refer field patterns to 1000 feet, please take the value at that distance as 1.00 and refer other readings to it. Please include all the measurements you have made, whether at less than or at more than 1000 feet. Data may either be tabulated or plotted to log-log scale. Be sure to indicate the frequency. General information on the terrain, kind of soil, presence of buildings, etc., would be helpful.

Just recently the Subcommittee has been asked to cooperate in obtain-

ing data for a meeting of the International Special Committee on Radio Interference. (CISPR). The above information is included plus much more, such as effect of polarization, effect of location of equipment in buildings, effect of external objects and so on. Copies of the Study Questions are available for those interested.

We propose to make use of the answers to this letter for this purpose as well as the original purpose. This will serve only as a starter and we shall do all we can to get more information by next January.

Please give this matter your prompt attention and send anything you have available that is considered reliable even though the number of readings may be small.

Address reply to:

C. W. Frick
8 Washington Avenue
Schenectady 5, N. Y.

"WHY RF GROUNDS?"

A. H. Sullivan, Jr., Vice-President of Engleman & Co., Inc. has written an article under the above title in the September 1960 issue of Electrical Design News. He states:

"There is no theoretical or practical consideration which dictates the use of a connection to the earth's surface as part of an RF circuit. There is, indeed, no consideration dictating the use of any reference point as a so-called "ground". RF circuits must be dealt with as electrical networks in which each element of the network plays a part in the overall circuitry. All RF energy should be conducted, or otherwise utilized, within an RF circuit in accordance with the laws governing transmission and radiation of electromagnetic energy. Every element of a circuit must be controlled completely from the standpoint of its position in the RF energy network.

"Under this concept, the use of a so-called RF ground contributes nothing to the functioning of an RF circuit and may cause degradations of the circuit which are frequently high, unknown and/or variable. It follows, therefore, that the use of - and any reference to - (earth) grounds as elements of RF circuits should be discontinued....."

The editor of Electrical Design News comments on the article as follows:

"Here is a subject which vitally concerns many EDN readers and these men should give Mr. Sullivan's article a careful reading, coming to it with their opinions, but not coming opinionated. If EDN readers would like to voice their comments on this subject, we would be happy to publish their letters as they are received."

RADIO INTERFERENCE CONTROL OF SEMICONDUCTOR CIRCUITRY:

The above titled paper is by Fred J. Nichols, President, Genistron, Inc., 6320 W. Arizona Circle, Los Angeles 45, California. This is a 32-page reprint of the technical paper presented at the Fourth Conference on Radio Interference Reduction and Electronic Compatibility in Chicago, Illinois, and a copy may be obtained by writing to Mr. Nichols.

A NEW DISTRESS SIGNAL TO IDENTIFY:

YACHTING, October 1960, contains the following on a new radio distress signal being developed by the Coast Guard:

"A new automatic device for transmitting radio distress signals is being successfully developed by Coast Guard technicians, and a prototype model may soon be ready for use on vessels at sea. The device is an alarm generator designed to transmit alternating wailing signals that can be heard above radio interference and tracked through automatic receivers. Planned for use on the distress frequency, at 2182 kilocycles, the device would transmit two alternating wailing tones at 1300 cycles per second and 2200 cycles per second. The resulting signal is expected to be far more effective than the traditional "May Day" call used by vessels in distress.

"The new equipment should be especially useful to small boat owners, as it is compact enough to fit in a small box that can be plugged into any commercial transmitter. The electronic components are said to be relatively inexpensive, so that sets should be produced commercially at prices within easy reach of the average boat owner.

PRACTICAL APPROAGH TO INTERFERENCE PREDICTION AND SUPPRESSION:

Under the above title the September 9, 1960 issue of Electronic page 84, carried a four-page article by Paul B. Wilson, Jr., of the Interference Testing and Research Laboratory, Inc., Boston, Mass. The sub-head states:

"Information is provided on circuit interference problems and on proper grounding techniques to aid in system design."

ITEMS OF INTEREST IN PROCEEDINGS OF THE IRE, September '6

NBS Journal of Research to Publish URSI Report: page 16A

"The recent explosive growth of radio science in the U.S. is reflected in the U.S. National Committee Report to the Thirteenth General Assembly of the International Scientific Radio Union to be he in London during September, 1960. This report, reviewing the developments of the last three years, numbers nearly 600 manuscript pages and will be published in Vol. 64, No. 6, November-December 1960, issue of the Journal of Research of the National Bureau of Standards, Pt. D: Radio Propagation. An outline of the contents of this special issue is given below.

"The price of an annual subscription to Part D, published 6 times a year, is $4.00 in the U.S., $4.75 abroad. Order from U.S. Government Printing Office, Washington 25, D. C."

A Conference on the Propagation of ELF Electromagnetic Waves - by J. R. Wait, National Bureau of Standards, Boulder, Colorado: page 1648

"On January 26, 1960, a conference was held at the Central Radio Propagation Laboratories (CRPL) in Boulder, Colo., which was devoted mainly to the subject of radiowave propagation of extremely low frequencies (ELF). The frequency range (less than about 3 kc) is well below those currently used in communications. Lightning discharges, however, produce considerable energy in this range, and the radiated fields have been used for studying the nature of lightning phenomena for many years at frequencies as low as 10 cps. Other natural sources of both a terrestrial and an extraterrestrial nature also radiate electromagnetic energy in this frequency range, but usually to a lesser extent than lightning."

A Receiver for Observation of VLF Noise from the Outer Atmosphere - by G. R. A. Ellis, Upper Atmosphere Section, Commonwealth Sci. and Industrial Res. Organization, Camden, N.S.W., Australia: page 1650

"One of the principal reasons for the absence of previous observations of noise bursts at kilocycle frequencies has been the difficulty of recording them in the presence of the relatively much stronger interference from electric mains and from atmospherics in the same frequency band. Although many attempts have been made at places remote from electrical supply systems the interference from atmospherics has still caused difficulties. Yet the wanted noise signal is usually bandwidth-limited white noise while the interference is impulsive, taking the form of intermittent short pulses, which last, for atmospherics, a fraction of a second, and, for mains, a few thousandths of a second recurring at half the mains period. Well-known techniques are available for improving signal-to-interference ratio in situations like this. Here a minimum reading recorder is used and has been found satisfactory. With this, discrimination against impulsive interference of the order of 30 db can be obtained without difficulty. This makes it possible to record easily noise bursts at 5 kc at geomagnetic latitudes greater than about 40°. This frequency has been chosen because it coincides both with a trough in the atmospherics spectrum and a peak in the VLF noise

spectrum."

COKE RUBBLE USED AS SHIELDING MATERIAL:

In the September 1960 issue of Naval Research Reviews, the following paragraph appears in an article titled "Progress Report at the Naval Radio Research Station" (Sugar Grove, West Virginia):

"Station development thus far has included completion of a 60-foot auxiliary antenna, laying the reinforced-concrete foundations for the concentric tracks on which the main antenna will rotate, laying the foundation for the center pintle, excavation of the big hole in which will be erected the laboratory-control building, and completion of a cable tunnel that will be a subway from the control building to the pintle. The building will be completely underground, buried under thick layers of coke rubble and packed earth to insure that none of the radiation from instruments and machinery will interfere with the faint cosmic signals detected from outer space."

TRANSATLANTIC RADIO WAVE-CARRYING CHANNEL:

In the October 1960 Bureau of Ships Journal appears the following news item on page 33:

"DID YOU KNOW THAT.....Radio messages have been sent across the Atlantic Ocean with no more power than it takes to light a 100-watt electric bulb?

This feat was made possible through the discovery of a radio wave-carrying channel through the atmosphere. The channel, apparently, will furnish a reliable means of transoceanic communication that may make 'live' intercontinental television a reality soon.

The channel, called a 'radio-carrying duct,' was discovered by and has been used experimentally in a joint research program of the Air Force Cambridge Research Center, the Naval Research Lab., and the Electromagnetic Research Corporation of Washington, D. C. The experimental messages were sent from Brazil to an aircraft 1,430 miles out over the ocean.

The duct is 'broad band' and appears to be free of solar interference. There is little loss of signal in transmission.

The duct used for the experiments is due to temperature characteristics of the Northern and Southern Trade Wind Belts. However, similary ducts probably exist in trade wind areas of the North Atlantic and of the Northern and Southern Pacific.

The new method is expected to be available soon for both civilian and military use."

MEASURES R-F INTERFERENCE AT HIGH ALTITUDES:

In the October 14, 1960 issue of Electronics is the following article with the above title:

"Prototype Instrument to measure r-f interference at satellite altitudes is being developed by Armour Research Foundation for the Air Force. The instrument will ultimately be used to gather information of use in the design of aerospace communications systems.

Armour researchers indicate that the complete instrument - minus power pack - will occupy about 2 cu ft, weigh less than 100 lb. The package would be lofted in a satellite, measure the electromagnetic environment over 'selected ranges of the frequency sprectrum', store information in digital form on tape, play it back to an earth station on command."

ITEMS OF INTEREST IN PROCEEDINGS OF THE IRE, October 1960:

Page 1695 - "Shot and Thermal Noise in Germanium and Silicon Transistors at High-Level Current Injections (Schneider and Strutt, p. 1731) - During the past five years the PROCEEDINGS has published a number of papers and letters which have progressively developed the theoretical representation of noise in junction diodes and transistors, first for germanium and later for silicon. These studies were all made for the case of small current densities. The present paper complements this series by considering the case of high current densities. An interesting feature of the analysis is that at high current densities the equivalent circuit of a p-n junction includes an inductor as well as resistors and capacitors."

Page 106A - "A new program to minimize radio interference between military electronic equipments and systems was announced by the Department of Defense.

The 'Radio Frequency Compatibility Program' is aimed particularly at insuring that electronic systems posses capabilities for rejecting interference and operating at intended levels of efficiency without degradation caused by unintentional interference. Guidelines have been set up for new engineering standards, measuring and testing techniques, analysis procedures and frequency allocation methods.

In the research and development area, new radar standards will reflect the need for different values for different functions, such as airborne surveillance, missile control or shipboard height-finding. Standards for communications, navigational aids, telemetering and other equipments will be improved or developed to insure that interference characteristics are shown. Joint standards will also be established for instrumentation, measurement techniques, test procedures and data reduction.

'Equipment spectrum signatures' will be required on specifications at all levels of development of existing and new radar equipment. DOD defines a spectrum signature as a summary of data showing all radio frequency energy radiations of electronic equipments. It also gives the characteristics of receivers influenced by electromagnetic energy."

Death of Dr. E. Vernon Potter:

E. Vernon Potter, PhD-EE, died unexpectedly on Thursday evening, October 6, 1960, in Chicago. He was attending the Sixth Conference on Radio Interference Reduction and Electronic Compatibility at the Armour Research Foundation.

Dr. Potter was Division Director of Physics and Electronics at the Naval Civil Engineering Laboratory, Port Hueneme, California.

ITEMS OF INTEREST IN ELECTRONIC INDUSTRIES, SEPT. 1960:

RFI-Oddities: page 36

"A Navy installation in Maryland complained of interference to the FCC. Investigators traced the radiation to a transmitter in the British West Indies, left on and unattended.

A multitone emission which intruded on a radiotelegraph circuit between the U. S. and Brazil turned out to be a spurious emission of a radio-telegraph station in Hawaii.

In another case, jumbled air-ground communication at an airfield near Washington, D. C., was shown to be caused by a defective transmitter in the Azores."

Controlling RFI Susceptibility in Receivers

On page 92 there is an article with the above title by H. M. Sachs, Supervisor and J. J. Krstansky, Armour Research Foundation, Chicago 16, Illinois. The sub-head states:

"With good basic design it is usually possible to produce receivers that have low susceptibility to undesired signals. Some of the factors to consider in the receiver's design are sensitivity, selectivity, spurious responses, intermodulation, and cross-modulation as well as standard shielding considerations."

Recent Advances in Low-Noise U.H.F. and Microwave Amplifiers - G. O. Chalk. "Brit. C & E" Apr. 1960 8 pp.: page 172

"The conventional u.h.f. and microwave low-noise amplifier

are the triode and the traveling-wave tube. In recent years considerable advances have been made in improving the noise performance of these tubes and at present the best noise figures achieved with triodes vary from about 2 Db at 200 Mc/s to 6 dB at 1,000 Mc/s. (England)."

Aspects of Potential Signal-to-Noise Ratio in the Presence of Fading Signals - D. D. Klovsky, "Radiotek," 15, No. 5, 1960. 9 pp.: page 172.

"Individual coherent and incoherent reception criteria are obtained for an ideal receiver of discrete communication with fluctuating noise and with smooth and rapid fading of the signal. The probability density of the incoming to the receiver signal envelope is assumed to be distributed according to the general law of Rayleigh. Circuit application of the derived criteria is illustrated. The lowest probability of erroneous reception is calculated for certain types of systems. (U.S.S.R.)".

EVALUATION OF THE SHIELDING EFFECTIVENESS OF BMEWS STRUCTURES:

Under the above heading, SIGNAL, September, 1960, page 25, carries an article by J. J. O'Neil, Chief, Technical Operation Section, Electro-magnetic Environment Division, Headquarters, U. S. Army Signal Research and Development Laboratory. Information of particular interest has been extracted as follows:

" 'Determine if a screen room more than a mile long ranging in height from 15 to 60 feet and in width from 20 to 100 feet will furnish 36-60 DB attenuation in the frequency range of 0.15 to 1000.0 megacycles.' " " 'Assure that various screened rooms internal to the large shielded structures provide the required degree of attenuation.' " " 'Accomplish this in the northern wastes of Greenland without delaying the operations of the building contractor.' "

"3000 Mile Detection Range - This, in over-simplified terms, describes the task recently undertaken by U. S. Army Signal Research and Development Laboratory, Fort Monmouth, New Jersey at the request of the Corps of Engineers, who are responsible for the design and erection of the first Ballistic Missile Early Warning System (BMEWS) in Thule, Greenland. This system which will be capable of detecting high-trajectory missiles of the 'Jupiter' and 'Atlas' type is a huge undertaking that will provide this country with a 3000 mile detection range and a minimum of 15 minutes warning in the event of an attack from over the North Pole. The system, insofar as the structures are concerned, consists of three Transmitter Buildings, the dimensions of which are 400 feet by 150 feet by 50 feet in height: four Scanner Buildings 150 feet by 80 feet by 60 feet high, in addition to a Cafeteria, Power Distribution Building, Electronic Maintenance shop and Heated Vehicle Storage and Fire Station. These buildings, designed to withstand winds of 150 MPH, are laid out in a 6000 foot long semi-circle and connected by a passageway 15 feet high by 20 feet wide which is approximately 1800 feet long. This passageway provides RF radiation and weather protection for movement of operating personnel, carries utility lines from building to building and is large enough for vehicular traffic.

"Building Requirements - The shielding effectiveness required for the completed buildings varied depending upon their proximity to the antennae. The Transmitter and Scanner Buildings, for example, were required to have 60-70 DB attenuation as they were located in the areas of highest field intensity. The Power Distribution Building and the R. F. lock at the entrance to the passageway had a 40 DB requirement while the other buildings located at the extremity of the system had a lesser requirement. The purpose of the shielding was two-fold: to protect operating personnel from the extremely high R.F. radiated power which it has been estimated could kill a man at distances greater than a mile, and to assure interference free operation of the electronic equipment."

Frequency Allocations for Space Communications:

SIGNAL, September, 1960, contains a Staff Report to present the issues discussed at the reopening of the Federal Communications Commission Docket 11866, concerning the allocation of frequencies above 890 mc for the use of non-government space communications. This Report is of interest because it mentions some of the interference problems encountered in the frequency bands up to 10,000 mc.

One of those whose testimony was presented before the FCC c behalf of the Electronic Industries Association (EIA) was Dr. S. G. Lutz, Senior Staff Scientist at Hughes Research Laboratories, Mali California. Dr. Lutz has given a paper before the 5th National Sym posium in Washington on Space Electronics and Telemetry which mentioned frequency sharing between satellite communication and services as being essential for developing the high capacity of an eventual satellite system. Dr. Lutz's paper was printed in the Tra: actions of PGSET and reprints may be obtained from Dr. Lutz by enclosing 8¢ in postage. Dr. Lutz is also co-authoring a paper to b presented at the Montreal Communication Symposium on November 4th, 1960 entitled "Control of Interference between Surface, Microwave, and Satellite Communication Systems". No information is obtainable, as yet, as to the availability of this paper.

Approximate Radar Range Equation Causes Errors in Low-Noise System Calculations:

On page 183 in the October 12, 1960 issue of Electronic Desig is an article by Larry D. Smith, Electronics Engineer, Heavy Military Electronics Dept., General Electric Company, Syracuse, N. Y under the above title. The sub-head states:

"Noise figure measurements, based on a standard temperatur of 290 K, have come in for considerable discussion recently in light of advances made in low-noise receivers. Old definitions seem inadequate. Miscalculation occurring in noise measurements carry o to estimates of radar range improvements possible with new, low-noise technique. Author Larry Smith shows how large miscalculations can be avoided by using a different form of the radar range equation."

On page 184 is given a more exact equation which the author claims removes the error.

ITEMS OF INTEREST IN ELECTRONIC DESIGN, SEPT. 14, 1960:

RFI Test Equipment - by Richard B. Schulz, Research Engineer, Armour Research Foundation, Chicago, Illinois: page 74

The sub-head states:

"In Electronic Design's Feb. 3 issue, containing a series of articles of radio-frequency interference (RFI), a partial listing of available measuring equipment was included. A complete, up-to-date tabulation is now presented to assist new interference-control groups to select equipment. Please note that the table does not include simplified go/no-go devices, some obsolete equipment or spectrum analyzers.

Index of Manufacturers

Empire Devices Products Corporation
Amsterdam, New York

Ferris Instrument Company
Boonton, New Jersey

Measurements Corporation
Boonton, New Jersey

Polarad Electronics Corporation
Long Island City, New York

Sprague Electric Company
North Adams, Massachusetts

Stoddard Aircraft Radio Co., Inc.
Hollywood, California."

Library of Congress Reports now Available
RFI-Filters: page 192

"A description is given of radio interference filter F-312(XW-1) /G as delivered on contract AF30(635)2908. The filter is a development model of a capacitor storage signal integrator designed for use in direction finding equipment. Designed as a replacement for other more cumbersome equipment, it is an effective means of improving the signal-to-noise ratio to the point where a usable output is obtained when the input signal-to-noise ratio is 0.066. Certain recommendations are made for further improvement and reduction in the input power requirements. Radio Interference Filter F-312(XW-1)/G, Andersen Laboratories, Inc., West Hartford, Conn., Feb. 15, 1957, 22 pp, Microfilm $2.70, Photocopy $4.80. Order PB 145439 from Library of Congress, Washington 25, D. C."

RFI - Spurious Emissions: page 193

"The mechanism for generating unwanted signals in high power microwave tubes was studied qualitatively. Several techniques for suppression of these signals are reported. These are by: (1) modulator design, (2) drive signal filtering, (3) undesired signal monitoring, (4) mode suppression and integral filtering, and (5) improved tube design. A cold-test model integral filter tube was made, and the incorporation of a harmonic filter in the vacuum envelope was found to be feasible. Measurement and Control of Harmonic and Spurious Microwave Energy, Gabriel Novick and Vernon G. Price, General Electric Microwave Laboratory, Palo Alto, Calif., May 1959, 86 pp, Microfilm $4.80, Photocopy $13.80, Order PB 145604 from Library of Congress, Washington 25, D. C. "

12 Stations Denied Court Ban on FCC Interference Rules:

In the October 31, 1960 issue of Electronic News is the following article with the above title:

"Washington. - High powered radio stations lost in U. S. Court of Appeals their dispute with theFederal Communications Commission over interference from other stations.

"The controversy involved regulations issued by FCC in 1959. The regulations established maximum permissible daytime skyway interference that less powerful radio stations may accord Class I or clear-channel stations which may be heard over wide areas.

"Clear Channel Broadcasting Service, composed of 12 Class I stations, challenged the regulations as unlawful.

"The Class I stations contended the regulations tended to increase, rather than decrease, interference from less powerful stations operating on the same frequencies.

The FCC denied this, saying the regulations gave the Class I stations a measure of protection whereas previously they had none."

Three-Component Arc-Suppression Network:

Electronics, September 2, 1960, page 58, carries a one-page article under the above title by P. N. Budzilovich, Senior Engineer, ITT Labs., Nutley, N. J. The first and last paragraphs state:

"Simplicity of design is a feature of a three-component network that provides high-quality arc suppression for contacts operating into inductive loads such as relay coils. It offers protection for relay and similar contacts without requiring a compromise in quality of suppression to limit decay time."

"This network may also be applied to static-switching devices."

Papers of Interest at Sixth National Communications Symposium October 3-4-5, 1960, Utica, New York:

"Interference Considerations - Mutual Interference in Communications Equipment Can Be Reduced" - Francis H. Yonker, HRB-Singer, Inc., State College, Pennsylvania.

"Atlas Missile IE Systems - Electromagnetic Interference Evaluation" - James H. Schukantz, Jr., Convair Astronautics, San Diego, California.

"Improving Intelligibility of Air to Ground Voice Communications" - LeRoy Stone, Blonder-Tongue Lab., Inc., Newark, N. J.

Booklet on a Mobile Laboratory:

The Frederick Research Corporation, 2601 University Boulevard, West, Wheaton, Maryland, has prepared a booklet under the following title: "FRC Mobile Laboratory for the Performance of Electromagnetic Radiation Measurements in the Field". A copy of this booklet can be obtained by writing to L. M. Carrese, Vice-President, at the above address.

The Detection and Evasion of Bats by Moths:

Dr. Kenneth D. Roeder, Professor of Physiology, Tufts Univer sity, Medford, Mass., will give a paper at the Lexington High Scho Auditorium on November 30th, under the above title. A description of the subject-matter is as follows:

"The countermeasures system of the moth as employed against the ultrasonic radar of the bat will be the subject of the lecture.

"The moth's receiver will be shown to have a frequency respon of 10 kc to 100 kc and a range of about 100 feet. The output of the r ceiver which is in the form of millivolt pulses with milliseconds dur tion has been recorded on tape. Dr. Roeder will describe his investigations endeavoring to find the answers to three questions. 1. How much information can the moth detect concerning the maneuvers of the bat? 2. How much of this basic information does the moth utilize in its behavior in evading the bat? 3. Is this behavior advantageous to the moth? Material pertinent to the first question will be demonstrated by binaural recordings stereophonical ly of the coded sequences available from the auditory nerves of the moth, while the material covering the moth's resulting behavior patterns will be shown in the form of photographs of moths in flight.

NOTE FROM THE EDITOR

The accumulation of material for this Newsletter had to stop some time in order that it could be in the hands of our members by December 1st. The editor regrets that some items had to be left out because requested further information had not been received. The editor wishes to thank all those who have been sending in material and hopes that still more will do so in order that our members can be informed of what is going on.

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