PROFESSIONAL GROUP ON RADIO FREQUENCY INTERFERENCE

NEWSLETTER

NUMBER 12 JULY 1960

HIGHLIGHTS OF SECOND NATIONAL SYMPOSIUM:

The Second National Symposium on Radio Frequency Interference held in Washington June 13, and 14, 1960 had a total attendance of 406, broken down as follows: PGRFI 156; IRE 100, non-members 150, 37 of the 156 PGRFI members were enrolled at the door.

More statistics: - Tickets sold for the FCC Field Trip were 88, Luncheon 193, and Banquet 170.

The Symposium was so successful that the same committee plans an invitation to the Administrative Committee of PGRFI to hold the Third National Symposium in Washington next year.

The Papers Award, for the best technical paper, was made to Donald McClenon, Naval Research Laboratory, Washington, D. C., for his paper on Strong Signal Receiver Problems.

There are still some copies of the Digest of the National Symposium which may be obtained by ordering through PGRFI, The Institute of Radio Engineers, Inc., 1 East 79th Street, New York 21, N. Y., at $2.00 per copy. If copies of other papers are desired, members should write to the authors with the exception of those given by members connected with Jansky & Bailey, Inc., who should write to Jack M. Carter, Jansky & Bailey, Inc., 1339 Wisconsin Avenue, N.W., Washington 7, D. C. for

"The Jansky and Bailey RFI Prediction Model"
"Designing RFI Reduction Into Equipments"
"The Role of Propagation Calculation in Interference Prediction"

Military Standard, Measurement of Radio Frequency Spectrum Characteristics, MIL-STD-449, was especially published for distribution at the Symposium. For those who did not attend, copies may be obtained by writing Superintendent of Documents, U.S. Government Printing Office, Washington 25, D. C., and sending 30 cents for each copy.

The keynote of the Symposium was set by Henry Randall, OSD-DR&E who summarized his talk as follows:

"GETTING ON TOP OF THE NATION'S RFI PREDICTION AND MEASUREMENT EFFORTS"

"Prediction and measurement of radio frequency interference go hand in hand, but they have not been going fast enough. There have been real difficulties in standardizing measurement of those characteristics of equipment which contribute to RFI, and it has been possible to predict only the simplest RFI situation with available information. The culmination of effort on the part of many individuals is seen in recent Defense Department actions which will definitely improve our position. For one thing a summary plan has been prepared dealing with the various areas of responsibility within the Department of Defense. It calls for emphasis on all aspects of the measurement program. It calls for an analysis center to use data gathered from all sources. This center will serve the operational planners, those who assign frequencies, the Development engineers, and anyone else who needs prediction information.

"Another action which is part of the summary plan is to accelera the measurement of spectrum characteristics. The "Proposed Militar Standard, Measurement of Radio Frequency Spectrum Characteristics, dated 19 April 1960, which has recently been made available, is also a step in support of this DOD program. This document is being issued a a Defense standard MIL-STD-449."

Department of Defense Directive, Copy of Declassified:

9 June 1960

RADIO FREQUENCY COMPATIBILITY PROGRAM

1. A comprehensive program is hereby established to cope with radio interference between electronic equipments and systems and particularly, to ensure that, to the maximum practicable extent, electronic systems will not suffer operational degradation due to the absenc of appropriate means for rejecting interference and for achieving *radi frequency compatibility. (*Radio frequency compatibility is defined as the capability of electronic equipments or systems to be operated in the intended operational environment at designed levels of efficiency without degradation due to unintentional interference. The scope of this definition encompasses the utilization of the full flexibility of equipment as well as the factors involved in the ability of operators to cope with interference.)

2. Specific objectives are set forth as follows:

a. RESEARCH AND DEVELOPMENT AREA

(1) ENGINEERING STANDARDS

(a) Radar Standards: In the development of radar standards, account shall be taken of the possible need for separa values for different functional applications -- i.e., airborne surveillan guided missile control, shipboard height finding, etc.

1. Transmitters:

a. Radar transmitter emission bandwidth and frequency stability values shall be established. These determinations shall also include radar systems designed to shift frequency as a function of time.

b. Radar transmitter standard skirt levels shall be established for:

(1) Pulse systems.
(2) Pulse doppler systems.
(3) Continuous wave.
(4) FM/CW.

c. Spurious radiation levels shall be established.

d. Limits for the average radiated power of each cross modulation shall be established for multiple radar use of the same antenna system.

e. Values shall be established for radar antenna side lobe levels.

2. Receivers: In the case of receiver standards, account shall be taken of the state of the radio art as regards anti-jam features.

a. Values shall be established for the limitation of the response of radar receivers to undesired signals for:

(1) Pulse systems.
(2) Pulse doppler systems.
(3) Continuous wave.
(4) FM/CW.

b. Limitations shall be established for radar receiver oscillator radiations.

c. Selectivity values shall be established for radar receivers.

(b) Engineering Standards for Other Equipments Standards for communications, navigational aids, telemetering and other equipments designed to emit or receive radio frequencies shall be reviewed, improved and/or developed to ensure that interference characteristic limits are made available. In the case of receiver standards, account shall be taken of the state of the radio art as regards anti-jam features.

(c) Manuals: Manuals shall be compiled which define the foregoing standards for radar, communication, navigational aids, telemetering and other devices designed to emit or receive radio frequency energy. These manuals shall be promulgated as a requirement to research and development interest throughout the military establishment. These manuals shall be used by the Joint Frequency Allocation Panel as criteria in the processing of frequency allocation applications for new electronic equipment. Provision shall be made for periodic review of these manuals in order to maintain pace with the state of the radio art.

(d) Target Date: For completion of Radar Manual - 1 January 1961; other manuals to follow as soon as practicable.

(2) MEASUREMENT TECHNIQUES AND TEST PROCEDURES

(a) In order to achieve the standards set forth in (1) above, Joint Standards shall be established which deal with instrumentation, measurement techniques, test procedures and data reduction.

(b) Initial emphasis shall be placed upon providing the capability for acquiring spectrum signatures of both existing and new radar equipments. An equipment spectrum signature is a summary and presentation of data showing all radio frequency energy radiations, both desired and undesired, of electronic equipments that generate electromagnetic energy for either internal or external use. It also includes the characteristics of receivers that are influenced by electromagnetic energy.

(c) Specifications at all levels of development, from initial design to final production, shall include the requirement for the submission of spectrum signatures. A copy of each spectrum signature shall be submitted to the Joint Frequency Allocation Panel, together with an indication of corrective measures being taken in those instances where deviations from established standards exist.

(d) Target date: For completion of Joint Measurement Techniques and Test Procedures Standard on Radar - 1 January 1961; balance to follow as soon as practicable.

(3) TEST EQUIPMENT

(a) A program shall be established to ensure that a test capability exists which is adequate in scope and accuracy to meet the equipment standards set forth in section (1).

(b) Initial emphasis shall be placed in the radar area. An urgent need exists for tunable band rejection filters with sufficiently low insertion losses in the radar bands to permit the investigation of high-power radar spectrum signatures.

(c) Test equipment shall be provided which will permit operating personnel to determine accurately emission characteristics of operational equipments.

(d) Target date for completion of preparation of Test Equipment Program: 1 January 1961.

(4) EQUIPMENT AND SYSTEM CHARACTERISTICS

(a) Detailed technical data on the characteristics of new equipment shall continue to be provided as specified in JANAP 141. The following requisites pertain:

1. Measured data shall be provided as soon as available.

2. The source of data, whether estimated or measured, should be specified.

3. Characteristics for transmitters, receivers, antennas and ancillary equipment shall be provided.

4. Changes to characteristics shall be provided on a timely basis.

(5) TUBES AND COMPONENTS

(a) Tubes and other components shall be developed which will permit new tunable pulse radar systems to have the capability to tune rapidly over the full extent of the approximately allocated frequency bands. Emphasis should be placed in this regard in the radar bands between 1000 and 10,000 MCS.

(b) Techniques and components shall be improved or developed to reduce the emitted spectrum of radar transmitters to approximate more closely the minimum bandwidth required for the transmission of intelligence. Specific effort shall be devoted initially, but not necessarily limited to, the following areas:

1. Narrow-band techniques, such as pulse shaping.

2. Modulation methods for band compression.

3. High-power filters.

(c) Target date for completion of preparation of Program for Tubes and Components: 1 January 1961.

(6) EDUCATION IN ELECTRONIC COMPATIBILITY

(a) A program shall be established for the compilation of training manuals on electronic compatibility.

These manuals shall provide information which will facilitate the recognition and reduction of electronic compatibility problems at both the design and operational levels. Special material shall be included for design engineers, inspectors, installation personnel and management groups of the electronics industry. Information shall be prepared covering the following categories:

1. Non-professional -- containing data suitable for dissemination at command and operational levels.

2. Technical -- containing data suitable for promulgation to development engineers, naval inspectors and technical personnel within the operating forces.

(b) Target date for completion of preparation of program: 1 July 1960.

7. ADMINISTRATION

(a) The efforts of the individual Military Services is implementing the research and development portions of this program shall be coordinated by the Director of Defense Research and

Engineering. Funding incident thereto shall be as determined and allocated to the Military Departments by the Department of Defense.

b. OPERATIONAL (FREQUENCY MANAGEMENT) AREA

(1) LIBRARY OF SPECTRUM SIGNATURES

(a) A library of spectrum signatures of proposed and existing military electronic equipment designed to emit or receive radio frequency energy shall be established. Initial emphasis shall be given to radar equipments. This information shall be collected by the individual Military Services for submission to the Military Communications-Electronics Board.

(b) This library shall be available to the Military Services for environmental evaluation and equipment development studies.

(c) Target date for initial submissions to Military Communications-Electronics Board: 1 July 1960.

(2) ENVIRONMENT FILE

(a) Procedures shall be established within the Military Communications-Electronics Board for the systematic procurement of information regarding the planned specific operational environment of electronic equipments and systems. This information shall be furnished in the application format provided by the Military Communications-Electronics Board at the earliest practicable stage of experimentation or development. In addition to equipment characteristics and the nature of the operational requirement involved, information should include the number of the same equipments planned for use in the same environment, geographical coordinates for fixed installations, and locale or region of mobile use. Responsibilities inherent in this undertaking are as follows:

1. It shall be the responsibility of the applicant to provide, upon request, a tabulation of his own essential electronic equipments or systems which may be affected by operation of the equipment involved.

2. It shall be the responsibility of any Military Service anticipating interfer ence to provide, upon request, a tabulation of all equipments that are expected to be affected.

3. Intra-service compatibility shall be recognized as being the sole responsibility of the applying service.

(b) A file shall be compiled and maintained of all electronic equipments which are common to give operational environments. These environments shall be divided into separate categories such as:

1. Fixed installations.

2. Field Army and Marine Corps mobile forces.

3. Ship task force deployments.

4. Air Force deployments.

5. Mixed environments.

(c) This file shall include provisions for cross-referencing the characteristics of Military Electronic Equipments and details of pertinent frequency allocations.

(d) Target date for establishment of Environment File: 1 July 1960.

(3) ANALYSIS PROGRAM

(a) A comprehensive radio frequency compatibility analysis program shall be established which will afford prompt and thorough examination of compatibility problems. This program shall encompass:

1. Analysis of equipment characteristics, including spectrum signatures, of equipment under development to determine if in conformity with established standards.

2. Automatic examination of spectrum signitures of equipments involved in a given operational environment determine if problem areas exist.

3. Automatic analysis of operational en vironmental conditions existing in problem areas.

4. The development of simulators for u as frequency management or research and development tools.

(b) A separate center serving the Military Services shall be established and maintained on a full-time basis to provide a central library of data and a means of obtaining prompt analysis of spectrum signatures, environmental data and compatibili problems. This center shall be initiated under a contract which shal provide for early conversion of the operation to a Defense laboratory or agency.

(c) In those instances where analysis indicat in the case of equipments under development that radio frequency cor patibility problems are likely, action shall be initiated to ensure that remedial measures are instituted.

(d) In those instances where analysis indicat serious radio frequency compatibility problems among existing equip ments, and such problems are substantiated in fact by operational ex perience, corrective action shall be initiated by the cognizant Militar Service. Such efforts shall include provision for phase-out and replacement, where necessary.

(e) Target date for establishment of Analysis Program: 1 July 1960.

(4) ALLOCATION PROCEDURES AND PLANNING

(a) The Military Communications-Electronic Board shall review and revise, as necessary, over-all joint military radio frequency allocation procedures and planning. This to encompa

1. The review and revision or amplifica tion of policies applicable to joint planning for, and the use of, the ra frequency spectrum.

2. The review and revision of joint military functional radio frequency allocation plans with particular attenti to further specific refinement in areas of the spectrum where frequen congestion is demonstrated clearly.

3. A review and revision of procedures plicable to the consideration of applications for frequency allocation fc new electronic equipment or systems.

(b) Study the needs with respect to additional capability in regard to personnel and equipment to cope adequately wit rapidly increasing workload.

(c) Under current national procedures, the us of frequencies within bands allocated to meet operational needs of mili radars is subject to local coordination between all operating agencies concerned to avoid harmful interference. The Military Communicatio Electronics Board should review this procedure with a view to meeting any deficiencies (Particularly in frequency bands allocated for military use), together with alternative methods as a basis for the accommodation of operational requirements in any local interference area.

(5) PERSONNEL

(a) The individual Military Services shall be responsible for the necessary augmentation of the engineering staffs of their respective frequency allocation sections and agencies charged wit the collection of data required to implement this program. It is estim ed that, within the frequency allocation sections, a minimum of two additional electronic engineers and two clerical assistants per Military Service will be required. Present personnel ceilings shall be adjusted to meet these needs.

(6) ADMINISTRATION

(a) The operational (frequency management) area of this program shall be directed by the Director, Communications-Electronics, Joint Staff, JCS. With respect to the joint separate analysis center, responsibility for engaging in contractual obligations and supervision thereof shall be vested in one of the Military Departments, as determined by OSD. The effort of the center shall be responsive to guidance from the Director, Communications-Electronics, Joint Staff, JCS, in coordination with the Office of the Director of Defense Research and Engineering.

SUMMARY OF FREQUENCY ALLOCATIONS FOR USE BY RADIO ASTRONOMY

Dr. John W. Findlay, Assistant to the Director, National Radio Astronomy Observatory, Green Bank, West Virginia, gave the Banque Address on work of the Observatory. He stated that the science of radio astronomy requires the quietest conditions possible for its observations and very kindly sent the Summary of Frequency Allocations for Use by Radio Astronomy, as agreed upon by more than 100 countri at the Administrative Radio Conference of the International Telecommunications Union at Geneva in December 1959, to the editor of the PGRFI Newsletter. The Summary is as follows:

Frequency	Allocations	Notes
2495 kc - 2505 kc 4995 kc - 5005 kc 9995 kc - 10,005 kc 14,990 kc - 15,010 kc 19,990 kc - 20,010 kc 24,990 kc - 25,010 kc	The standard frequency guard-bands at 2.5 Mc/s, 5 Mc/s, 10 Mc/s, 15 Mc/s, and 20 Mc/s and 25 Mc/s may be used by the radio astronomy service. The radio astronomy service shall be protected from harmful interference from services operating in other bands in accordance with the provisions of these Regulations, only to the extent that these services are protected from each other. In Region 1* only 2498-2502 kc of the 2.5 Mc band may be used by the radio astronomy service.	The bands 10,003-10,005 kc and 19,990-20,010 kc are also allocated on a secondary basis to the space and earth-space services for research purposes.
73 - 74.6 Mc	In Region 2, the band 73-74.6 Mc/s may be used by the radio astronomy service. Administrations assigning frequencies to stations of services to which this band is allocated should take all practicable measures to avoid harmful interference to radio astronomy observations.	73-74.6 Mc is primarily assigned as follows: -- Region 1. Fixed, mobile except aeronautical mobile. Region 2. Fixed, mobile, broadcast. Region 3. Fixed, mobile.
79.75 - 80.25 Mc	The band 79.75-80.25 Mc/s is also allocated in Regions 1 and 3 (except Korea, India and Japan) to the radio astronomy service. In making assignments to stations of other services to which this band is allocated, administrations are urged to take all practicable steps to protect radio astronomy observations from harmful interference. The radio astronomy service shall be protected from harmful interference from services operating in other bands in accordance with the provisions of these Regulations, only to the extent that these services are protected from each other.	79.75-80.25 Mc is primarily allocated as follows: -- Region 1. Fixed, mobile except aeronautical mobile. Region 2. Fixed, mobile, broadcast. Region 3. Fixed, mobile, aeronautical radio navigation.
150 - 153 Mc	In Region 1, the band 150-153 Mc/s is also allocated to the radio astronomy service. In making assignments to new stations of other services to which this band is allocated, administrations are urged to take all practicable steps to protect radio astronomy observations from harmful interference. The radio astronomy service shall be protected from harmful interference from services operating in other bands in accordance with the provisions of these Regulations, only to the extent that these services are protected from each other.	150-153 Mc is primarily allocated as follows: -- Region 1. 146-151 Mc fixed, mobile, except aeronautical mobile (R) 151-154 Mc as 146-151 Mc plus meteorlogical aids. Region 2 and 3. Fixed, mobile.
322 - 329 Mc	Radio astronomy observations on the Deuterium line (322-329 Mc/s) are carried out in a number of countries under national arrangements. Administrations should bear in mind the needs of the radio astronomy service in their future planning of this band.	235-328.6 Mc is allocated world-wide to fixed and mobile. 328.6-335.4 is allocated world-wide to aeronautical radio navigation.

*NOTE:

Region 1 is roughly the European Continent including the USSR

Region 2 is roughly the N & S American Continent

Region 3 is roughly Asia, Australia & New Zealand

Frequency	Allocation	Notes
404 - 410 Mc	The band 404-410 Mc/s in Regions 2 and 3 and the band 406-410 Mc/s in Region 1 are also allocated to the radio astronomy service. An appropriate continuous band within these limits shall be designated on a national or area basis. In making assignments to stations of other services to which these bands are allocated, administrations are urged to take all practicable steps to protect radio astronomy observations from harmful interference. The radio astronomy service shall be protected from harmful interference from services operating in other bands in accordance with the provisions of these Regulations, only to the extent that these services are protected from each other.	The band 404-410 Mc is primarily assigned as follows: -- 404-406 Mc. World-wide to meteorlogical aids, fixed, mobile, except aeronautical mobile. 406-420 Mc. World-wide to fixed and mobile, except aeronautical mobile.
606 - 614 Mc	In Regions 1 and 3, the band 606-614 Mc/s may be used by the radio astronomy service until such time as it is required for use by other services to which this band is allocated. During this period administrations should take all practicable measures to avoid harmful interference to radio astronomy observations.	The band is primarily allocated as follows: -- Region 1 and 2. Broadcasting. Region 3. 585-610 Mc radio navigation. 610-890 Mc fixed, mobile, broadcasting.
1400 - 1427 Mc	Allocated world-wide to radio astronomy service except in Albania, Bulgaria, Hungary, Poland, Roumania, Czechoslovakia and the U.S.S.R., the band 1400-1427 Mc/s is also allocated to the fixed service and the mobile, except aeronautical mobile, service.	In Albania, Bulgaria, Hungary, Poland, Roumania, Czechoslovakia and the U.S.S.R. the bands 1600-1690 Mc/s, 3165-3195 Mc/s, 4800-4810 Mc/s, 5800-5815 Mc/s, and 8680-8700 Mc/s are also used for radio astronomy observations.
2690 - 2700 Mc	The bands 2690-2700 Mc/s and 4990-5000 Mc/s are also allocated to the radio astronomy service. In making assignments to stations of other services to which these bands are allocated, administrations are urged to take all practicable steps to protect radio astronomy observations from harmful interference. The radio astronomy service shall be protected from harmful interference from services operating in other bands in accordance with the provisions of these Regulations, only to the extent that these services are protected from each other.	The band 2550-2700 Mc is primarily assigned world-wide to fixed and mobile services.
4990-5000 Mc	The bands 2690-2700 Mc/s and 4990-5000 Mc/s are also allocated to the radio astronomy service. In making assignments to stations of other services to which these bands are allocated, administrations are urged to take all practicable steps to protect radio astronomy observations from harmful interference. The radio astronomy service shall be protected from harmful interference from services operating in other bands in accordance with the provisions of these Regulations, only to the extent that these services are protected from each other.	The band 4400-5000 Mc is primarily assigned world-wide to fixed and mobile services.
10,680 - 10,700 Mc 15,350 - 15,400 Mc 19,300 - 19,400 Mc 31,300 - 31,500 Mc	The bands 10.68-10.7 Gc/s, 15.35-15.4 Gc/s, 19.3-19.4 Gc/s and 31.3-31.5 Gc/s are also allocated to the radio astronomy service. In making assignments to stations of other services to which these bands are allocated, administrations are urged to take all practicable steps to protect radio astronomy observations from harmful interference. The radio astronomy service shall be protected from interference from services operating in other bands in accordance with the provisions of these Regulations, only to the extent that these services are protected from each other.	The bands are primarily assigned world-wide as follows: -- 10,550-10,700 Mc. Fixed, mobile, radio location. 15,250-15,400 Mc. Fixed, mobile. 17,700-21,000 Mc. Fixed, mobile. 25,250-31,500 Mc. Fixed, mobile.
Above 40,000 Mc	No allocations made by this Conference.	

RESULTS OF PGRFI TECHNICAL PAPERS QUESTIONNAIRE:

Dr. R. M. Showers, Chairman of the Technical Papers Committee of PGRFI and now Chairman of the Professional Group itself, has submitted the results of his questionnaire on the types of articles which the members would like to see in the PGRFI Transactions, as follows:

"Seventy-eight replies were received to the questionnaire.

"With regard to professional interest, the largest number was employed in communications systems design and development, and installation for RFI-free operation. The second largest group is interested in equipment design and corrective measures to meet RFI specifications including susceptibility. In decreasing order of interest were the following:

1. Communication systems design, development and installation for RFI-free operation.
2. Equipment design and corrective measures to meet RFI specifications, including susceptibility.
3. Monitoring, source location, control, inspection, etc. of area for RFI.
4. Measurements to specifications of RFI and susceptibility.
5. Consulting activities (some specialists in RFI).
6. Frequency assignment.
7. RFI instrument design, development, manufacture.
8. RFI filter design, development, manufacture.
9. Research activities in RFI.
10. Specification writing, committees, etc.
11. RFI from power lines.

A large proportion of replies indicated interest in 1 - 10 KMC measurement and control. About 90% of the work is military originated.

With regard to the topics desired in the TRANSACTIONS, primary interest is shown in Tutorial and Survey Papers: RFI instruments, calibration, techniques for use, RFI test procedures, standards, limits - miscellaneous equipment such as current probes and stabilization networks. Next was RFI susceptibility: prediction, measurement and its reduction. Interest was also shown in the following topics:

Shielding - Shielded enclosures; rf cables and connectors; as a corrective measure on test items.
Inter- and Intra- System RFI problems.

Interference sources - character, identification, location.

Corrective measures - suppression techniques and components.

Design information for RFI-free equipment.

Frequency Assignment.

Transients - Measurement and suppression techniques.

Miscellaneous - biological hazards, pyrotechnics, bibliographies.

R-F grounding practices."

MIL-I-1691OB Due in About Tree Months:

At the Washington Symposium, it was announced that MIL-I-1691 OB would be available in about three months. Below is a new requirement.

3.15 RF Grounding, Color Marking.

Components of grounding systems employed with the grounding of RF energy, excluding equipment interior, shall be identified by an appropriate color marking as specified hereinafter. Grounding components including enclosures, covers, cables, straps, bonds, condui pipe, connectors, couplings, joints, and/or any metal member used the transfer of RF ground energy from equipments or structures to "earth ground".

3.15.1 The identifying colors shall be luminous pink (see color car superimposed on a black base. Luminous pink and black paint may b used in inside installations or where extremes of temperature and moisture are not present. Luminous pink and black epoxy shall be u in locations of extreme temperature, moisture, underground and for greatly exposed surfaces.

3.15.2 The color identification may be applied as a band, such as o pipe and cables; strip, such as on metal members; or as a pink squa where appropriate. Where advantageous, the strip, when applied, sl be pointed on the end toward "earth ground" and the location in confin areas, wherever possible, should be visible from the nearest opening for illumination with a light.

3.15.3 All color coding shall be done only after fabrication is complete.

3.15.4 No color coding is to be applied on matching surfaces, in the threads of connectors, or where bonding or soldering is to be done.

3.15.5 Color Cards. - Color cards may be obtained upon applicatio to the Chemical Laboratory, Norfolk Naval Shipyard, Portsmouth, V Upon requesting, specify the form of color material and the purpose for which cards are desired.

Samples of Actual Color Marking Paint and Epoxy Available:

Emerson & Cuming, Inc., Canton, Mass., who cooperated with the Navy in developing the above color marking materials, can fill sample orders for both the paint and epoxy combinations.

ROME-UTICA CHAPTER ELECTS OFFICERS:

The following will serve as officers of the Rome-Utica Chapter of the Professional Group on Radio Frequency Interference until 1 Jul 1961:

Chairman:	C. R. Miller, RADC
Vice-Chairman:	L. R. Pangburn, G. E.
Secretary:	D. R. Clark, GEEIA.

John W. Worthington, Jr. was chapter organizer and requests that all future correspondence be directed to the appropriate officer.

INSTRUMENTATION FOR COMPLEX SIGNAL ENVIRONMENT TESTI

The IRE Transactions on Instrumentation, June 1960, carries a paper on the above subject by D. Krueger and G. Herlt, Jr., of HRB-Singer, Inc., State College, Pa. The introduction is as follows:

"The purpose of this paper is to discuss the program and equipment developed to simulate a complex signal environment.

The instrumentation to be discussed permits evaluation and test of receivers, data processing systems, and display devices. While it is true that most evaluations can be accomplished utilizing existing te equipment, such instruments usually restrict measurements to single frequency tests. In order to obtain a high signal density, multiple, re dundant equipment are required, which is economically infeasible. Likewise, most stan dard test instruments restrict modulation to constant amplitude pulses of approximately one microsecond or employ generators which cannot be modulated efficiently by complex modulati This program was to develop an end product capable of simulating a hi density complex signal environment in order that signal environment testing and/or evaluations could be efficiently and economically completed.

To provide complete simulation instrumentation for any effort, i is necessary to establish the exact requirements of the parameters to simulated. Without going into detail as to how these are determined, the following requirements indicate the parameters and level of simula tion desired in this equipment:

1) Pulse-type signals were to be simulated with variable ranges of PRF, PW, and scan rates (see Appendix).

2) Simulation was to be accomplished at both RF and video levels.

3) Signal levels were to be variable as to the amount of noise present.

4) Antenna beamwidths (signal illumination times) were to be variable.

5) Up to 100 different signals were to be available with programmed availability.

6) Bandwidth suppression effects in the case of tape playbacks were required.

7) The RF, video, and noise were to be capable of either independent or system operation.

8) PAM, PFM, PWM, and PPM were required.

9) Scan types were to include circular, sector, conical, lobe switching, raster, helical, and both sinusoidal and sawtooth spiral scan.

These requirements dictated three independent but compatible ıits: a signal density simulator, a complex pulse simulator, and a :ceiver suppression simulator."

?OBILE UNIT TO CHECK INTERFERENCE:

On Page 52, Electronics, June 24, 1960, is the following item:

"MOBILE UNIT from the Boulder Laboratories of National Bureau Standards will travel across the country this summer to measure an-made interference caused by generators, power lines, sparkplugs ıd other electrical gear.

Goal is to get information that will lead to methods for cutting ıwn noise that interferes with communication, radio navigation, mis-le control and so forth.

A panel truck will be equipped with antennas, recording instru-ents and the like, will carry two Boulder Labs noise experts. Meas-ements in particular areas will study noise in relation to population nsity, industrial activity, and power consumption. Small towns and .ral areas will be checked as the truck travels; a three-day stopover planned for Chicago. The five-week journey will loop through the idwest to Pennsylvania and Washington, D. C., return through Ten-ssee, Arkansas and Oklahoma.

Diesel generator and engine are used on the truck to eliminate ark-plugs; special suppressors will filter out static from the tires".

ARTICLES OF INTEREST IN IRE PROCEEDINGS, PART 1, JUNE 1960:

The Television Allocations Study Organization - A Summary of ı Objectives, Organization and Accomplishments, by George R. Town, rmerly Executive Director, TASO. A discussion of interference to IF and UHF on page 999.

Measurements of the Subjective Effects of Interference in Tele-sion Reception, by Charles E. Dean, Hazeltine Research Corp., ttle Neck, N. Y. Page 1035.

Picture Quality - Procedures for Evaluating Subjective Effects of :erference, by Gordon L. Fredendall and William L. Behrend, RCA ıbs., Princeton, N. J., Page 1030.

IRE Standards on Television: Methods of Testing Monochrome levision Broadcast Receivers, 1960 (Standard 60 IRE 17.S1 at $1.00 r copy). Chapter 5 - Interference, Picture on pages 1140 to 1143.

Narrow-Band Filtering of Random Signals, (Correspondence) by S. P. Lloyd, Bell Telephone Labs., Murray Hill, N. J. The first paragraph states: "The misconception that the output of a narrow-band filter is more nearly Gaussian than some corresponding non-Gaussian random input appears to be widespread. The incorrectness of this concept is demonstrated by the following examples:....."

THE RADIO NOISE SPECTRUM:

PGRFI Newsletter, No. 8, page 3, mentioned publication of the above book by the Harvard University Press, 79 Garden Street, Cambridge 38, Mass. Notice has been received that it will be available July 25, 1960 at $7.50. The following is the index of papers contained therein:

1. MAN-MADE RADIO NOISE - E. W. Allen, Federal Communications Commission

2. THE AURORA AND RADIO WAVE PROPAGATION - Allen M. Peterson, Stanford University and Stanford Research Institute

3. IONOSPHERIC SCINTILLATION OF RADIO WAVES OF EXTRATERRESTRIAL ORIGIN - Robert S. Lawrence, National Bureau of Standards, Boulder, Colorado

4. METEOR SCATTER - Von R. Eshleman, Stanford University

5. ELECTROMAGNETIC EMISSION FROM METEORS - Gerald S. Hawkins, Boston University and Harvard College Observatory

6. WHISTLER-MODE PROPAGATION - R. A. Helliwell, Stanford University

7. THE RADIO SPECTRUM OF SOLAR ACTIVITY - A. Maxwell, G. Swarup, and A. R. Thompson, Harvard Radio Astronomy Station, Fort Davis, Texas

8. NATURAL BACKGROUND NOISE AT VERY LOW FREQUENCIES - Jules Aarons, Air Force Cambridge Research Center

9. SOLAR WHISTLERS - Thomas Gold and Donald H. Menzel, Harvard College Observatory

10. NOISE OF PLANETARY ORIGIN - B. F. Burke, Department of Terrestrial Magnetism, Carnegie Institution of Washington

11. CORRECTING NOISE MAPS FOR BEAMWIDTH - R. N. Bracewell, Stanford University

12. A STUDY ON COSMIC RADIO NOISE - Donald H. Menzel, Harvard College Observatory

13. INTERSTELLAR HYDROGEN - Thomas Gold, Harvard College Observatory

OVERALL NOISE-FIGURE NOMOGRAM:

Electronic Design, May 25, 1960, page 122, carries a nomogram on the above subject by Murray Falkowitz, Sylvania Electronic Systems Waltham Laboratories, Waltham, Mass. The sub-head states: "Murray Falkowitz designed this noise-figure nomogram to save himself tim It can save time for anyone designing receivers or amplifiers where noise is a consideration. It solves the kind of problem that can't be solved by slide rule alone... The nomogram shown here can be used to compute the over-all noise figure of two cascaded active networks, giving the noise figure of each network and the power-gain of the first..

SEARCH COIL LOCATES NOISE-SENSITIVE CIRCUIT TROUBLE-SPOTS:

Electronic Design, June 8, 1960, page 148, carries a short article by Carl R. Faix, Design Electrical Engineer, RCA, Moorestown, N. J., on how to build a search coil. The first two paragraphs state: "A handy little noise generator was constructed to help design certain high-impedance, voltage-sensitive circuits to be insensitive to

lay contact noise and arcing. The circuits, containing thyratrons and ockley diodes, worked quite well in the breadboard stage. However, en wired into a cabinet with many operating relays, there were con- ntly being prematurely triggered. . ." The search coil, held near ints suspected of being sensitive to relay noise and arcing, quickly ates possible circuit trouble spots.

N/SPQ-5 RF RADIATION HAZARD DISTANCE:

BuShips Journal, June 1960, mentions the following:

"Recent measurements of the AN/SPQ-5 radar have shown the ximum RF radiation hazard (RAD-HAZ) distance to the safe toler- ce level (10 MW/CM^2) is 10 feet from the AN/SPQ-5 antenna. Where AD-HAZ warnings have been posted on the basis of any previous stance, they are to be relocated in accordance with the new 10-foot stance."

Interference Makes News:

TIME, June 4, 1960, carried the following news item:

Blue Network. In Lithgow, Australia, taxi drivers agreed watch their language after some of their two-way radio communica- ons were accidentally broadcast over the loudspeaker in Our Lady of timа Church.

ELECTRONIC DESIGN, JUNE 22, 1960:

On page 191, of the Index of Articles from January 6 through ne 22, 1960, is a cross-index under Radio Frequency Interference ich lists fourteen articles.

On page 4 is a news item headed: "New Military Specifications y Upset Designers". The text states: The army, Navy and Air Force are preparing important changes in the specifications they write procure electronic equipment. These changes may result in revised sign practices throughout the industry, in the opinion of some mili- ry spokesmen. Most affected will be designers working in the areas radio frequency interference, maintainability and reliability. In FI, the services are planning to require military contractors to sub- it a frequency response signature with each equipment they produce. rpose: the elimination of components and circuitry that cause exces- e RFI, and the more efficient use of the frequency spectrum . . . .

On page 23 is the following item: "Less Vulnerability to Inter- rence is required by the Navy for its electronics systems. Chief of val Operations Admiral Arleigh Burke wants electronics systems at are both less susceptible to electronic countermeasures and to terference from other devices used by the Navy. As time goes on, e Navy will try to write into its electronics specifications increas- gly tough requirements for resistance to interference."

MERICAN STANDARDS ASSOCIATION FORMS COMMITTEE TO DE- NE RADIO FREQUENCY FIELDS, ASA COMMITTEE C-95:

The American Standards Association has formed a Subcommittee Units of Measurement which will be known as ASA Committee C-95. e scope of the subcommittee will deal with the units of measurement ncerned with defining radio frequency fields and the resultant effects equipment and personnel. The areas of measurement would include mans, electro-explosive devices, and fuels. All units of measure- ent would be expressed in rationalized mks form, such as volts per eter or watts per square meter.

At the organization meeting held April 6, 1960, the following re elected:

Walter C. Reid, Bethlehem Steel Co., Quincy, Mass., Chairman
A. L. Albin, Filtron Company, Inc., Secretary

The following are the work assignments made:

a. Mr. A. L. Durkee, Bell Tel. Labs., Murray Hill, will prepare a discussion of the relation between electric field, magnetic field, and the direction of power flow.

b. Mr. A. P. DeMinco, Rome Air Development Center, will prepare a discussion on the problems of human safety measurements.

c. Mr. C. M. Fisher, RCA Service Company, will discuss electro-explosive devices.

d. Mr. J. T. Koppenhaver, Filtron Company, Inc., and Mr. G. M. Heimer, BuShips, Code 454, will jointly prepare a paper on fuel hazards.

e. Mr. P. C. Constant will compile a bibliography of applicable reports in our area of interest.

It was also requested that the Secretary invite the Environmental Health Laboratory to participate in the program.

A tentative date has been set for the next meeting at Bethlehem Steel Co., Quincy, Massachusetts, during the last two weeks in June.

SRI DEVELOPES AIRCRAFT RADIO STATIC ELIMINATOR:

SIGNAL, May 1960, page 107, describes the work done by SRI on the elimination of aircraft radio static as follows:

"Stanford Research Institute engineers have designed a device which successfully eliminates radio static caused when aircraft fly through snow or clouds of ice particles. The device allows noise-producing corona discharges to occur but prevents the generated noise from reaching the radio antennas.

When ice crystals composing the snow or clouds rebound from aircraft, electrons are removed from them and remain on the surface. Each impact leaves a minute negative charge. The cumulative effect of millions of such impacts is to cause the aircraft to become quickly charged to a voltage so high that corona discharges occur at the wing tips and other sharp extremities.

The corona discharges occur as a series of short-lived pulses, each of which acts as a tiny, broad band radio transmitter. The waves generated by the pulses travel about the aircraft, guided by the metallic surfaces and enter the radio antennas. The result in the receiver is known as precipitation static. This noise is frequently severe enough to impair seriously the functioning of radio receivers and navigation equipment.

To prevent the airplanefrom becoming charged when flying through solid-particle precipitation is impossible. It is also impossible to prevent the noise producing corona discharges from occurring. The SRI-developed devices incorporate a sharp tungsten pin supported by a resist ively coated plastic cement for attachment at all points on the aircraft at which the discharges occur.

A typical discharge device consists of a nylon rod about the size of a lead pencil, with the tungsten pin crosswise through it at a very carefully determined location (about an inch) from the outer end. The nylon rod is coated with paint having the proper electrical resistance.

The static discharges are also effective in carrying off charge created by jet-engine exhausts. While the static from this source is generally less than from precipitation, it is particularly troublesome because it is worse during the throttle changes that occur during landing - when good radio communication is particularly critical.

This basic problem of precipitation static has been under study by SRI for the Air Force A study of application of this static-elimination measure on military aircraft is being made".

DIGITAL MEASUREMENT OF AXIS-CROSSING INTERVALS:

Under the above title, A. J. Rainal, The Johns Hopkins University Radiation Lab., Baltimore, Md., authors an article in the June 3, 1960 issue of Electronics. The sub-head reads: "System described may provide knowledge necessary for the design of weak signal detectors based on an axis-crossing interval principle. Digital output contains dat useful in theoretical studies of noise".

Interference Problems Facing Radio Systems Using Shared Towers:

Under the above title, David Land, Motorola Communications & Electronics, Inc., 7138 Envoy Court, Dallas 35, Texas, presented a pap before the Lubbock Section of the IRE. Copies of this paper may be obtained by writing to him at the above address.

NOTICE:

Your editor will welcome items which mention papers which have been given locally on subjects of interest to those engaged in the control of interference and, better still, a copy of the paper to review. He also would like to have new products, which advance the art, called to his attention with information as to where additional information may be obtained by our members. New products, however, will have to show some advancement in the art to warrant mention.

Rexford Daniels, Editor
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