PROFESSIONAL GROUP ON RADIO FREQUENCY INTERFERENCE

NEWSLETTER

NUMBER 19 DECEMBER 1961

HIGHLIGHTS OF THE SEVENTH ARMOUR CONFERENCE

Electronic Week, a management newsletter of November 20th, 1961, published by the Hayden Publishing Company, Inc., New York 22, New York, summarizes the Seventh Conference on Radio Interference Reduction and Electronic Compatibility as concisely as seems possible and has given permission to reprint the following:

"The Defense Department's RFI Compatibility Program is a source of concern to design engineers and test-equipment makers. While certain to have far-reaching effects it is not far enough along to provide specific, meaningful guidance.

"This confusion was evident in discussions at the recent Seventh Conference on Radio Interference Reduction and Electronic Compatibility held at the Illinois Institute of Technology.

"Officials of the Electromagnetic Compatibility Analysis Center at Annapolis, Md. (EW, April 3, 1961) acknowledged that it was too early to tell what influence the center's activities would have on equipment and systems design. Authors of technical papers described new techniques and devices designed to aid the fight on radio frequency interference but expressed the wish that they knew more about instrumentation requirements.

"Industry delegates reported difficulty in taking spectrum signatures, as now required under some defense contracts, and of properly interpreting the published procedures for measuring the data. DOD experts replied that, in cases of doubt, it was best to follow the basic intention of the spectrum-signature-collection plan, i.e. to provide complete characteristics of the significant outputs of emitters throughout the frequency spectrum and the response characteristics of receivers.

"Eventually, the center will store spectrum signatures of all military emitters and receivers and an environmental file of emitter and receiver locations, detailing such information as hours of operation, frequency, bandwidth, and antenna height. It also will be set up to provide data on R & D programs for equipment and test instruments, engineering standards and interference reports.

"Uncertainty as to specific requirements is particularly hard on test equipment manufacturers, for whom the military's electromagnetic-compatibility program should mean a lucrative new market. They are reluctant to start redesigning next-generation equipment pending more concrete guidelines. (Electronic Design, Nov. 22, 1961)."

Other highlights are:

Approximately 458 attendees.

Military lack of motivation to do something about RFI is a thing of the past.

The recent establishment of the Electromagnetic Compatibility Analysis Center (ECAC) is one proof of the above.

It is the intention of ECAC to use ALGOL, a common computer language developed in Europe for solving mathematical problems, in its programs.

There are three broad objectives of ECAC management: To predict interference potentialities; to provide means for improved RF management, and to provide consultant service to the research and development community.

Digital computers will eventually perform all functions of data reduction and data report preparation.

The Field Army radio relay system will compel the most efficient use of the operation to assure a minimum of RFI.

The HF radio spectrum is permeated by wide band noise phenomena which goes unnoticed by many radio measuring techniques.

Electronics, November 24, 1961, page 28, carries a 2-page review of the Seventh Armour Conference. There are 4 illustrations.

Publication of the two RFI bibliographies, mentioned in previous Newsletters, are scheduled for early 1962. Copies will be sent to all PGRFI members.

New Chapter Chairmen Announced:

Rome-Utica Chapter	-	L. R. Pangburn General Electric Co. Utica, N. Y.
Chicago Chapter	-	William H. Schwagart Hallicrafters Inc. Chicago, Illinois
Washington DC Chapter	-	Herman Garlan FCC Washington, D. C.
Vice Chairman	-	Aaron J. Sullivan, Jr. Frederick Research Corp. Wheaton, Maryland
Secretary	-	Rupert Haskins Naval Research Lab. Washington, D. C.

Fourth National PGRFI Symposium - San Francisco - June 28-29, 1962

Advance Information on the 4th National PGRFI Symposium will be held in San Francisco, 28-29 June 1962. Five hundred word summaries of papers are requested and may be submitted to the Technical Program Committee immediately. The theme for the conference will be "Design-the Answer to RFI". It is felt that after having several symposia where the central theme was interference prediction and control, the time has come once again to highlight design - the ultimate solution. The development of this theme will, it is hoped, serve the following purposes:

Establish some requirements for interference-free design, at the circuit, equipment, and system levels.

Bring to the attention of designers of high-performance and highly sensitive devices, the importance of freedom from interference as a design criterion and its importance in preliminary design.

Bring new applications in communication and control to the attention of active workers in the field of RFI so that some new problems can be anticipated.

Bring to the attention of workers in the field new components and material and to encourage their use in eliminating interference.

Help in making useful the results of current efforts in interference-prediction and data collection such as the DOD Radio Frequency Compatibility Program.

It is hoped that this symposium will be able to develop its theme in terms of topics bearing on these and related objectives. Invited papers and panel discussions are being arranged and contributed papers encouraged to insure full development of this theme. The technical program committee also recognizes the importance of broader efforts in other areas within the field and has allowed time for additional material to cover contributed papers of significance and current interest.

The timeliness of this theme is highlighted by two factors:

New requirements and equipments which give rise to special problems in RFI.

New design techniques and components which may be applied to reduce unwanted interference and susceptibility.

The San Francisco Bay Area has a large concentration of effort in aerospace and in new design techniques varying from solid-state logic circuitry to millimeter wave transmitters. This, the first symposium of its kind in this area, will thus draw on a part of the industry which has not been closely tied in with previous RFI symposia.

Make your plans now to attend, take your vacation and have the additional benefit of visiting the "City by the Golden Gate" during its loveliest season.

Send summaries to: R. G. Davis, Technical Program Chairman
Dept. 58-25, Lockheed Missiles and Space Company
Post Office Box 504
Sunnyvale, California

CISPR Meeting in USA October 2-7, 1961:

The Plenary Assembly of the International Special Committee on Radio Frequency Interference was held at the University of Pennsylvania, Philadelphia, Pennsylvania, on October 2-7, 1961. The meeting was arranged by ASA Sectional Committee C63 affiliated with U. S. National Committee of the International Electrotechnical Commission. Dr. R. M. Showers was general chairman of the arrangments for this U.S.-1961 CISPR Meeting and reports on it as follows:

"The International Special Committee on Radio Interference held its Seventh Plenary Meeting on the campus of the University of Pennsylvania in Philadelphia from October 2 to 7, 1961. The last Plenary Meeting was held at the Hague in 1958. The detailed work of the meeting was carried out under three subcommittees having to do respectively with limits, measurements and safety. In addition to discussions of various study questions and the establishment of new ones having to do with various technical questions in the radio interference field, there was detailed consideration of four documents which had been submitted for approval. Eventually, these will be incorporated in CISPR Publications 1 and 2 entitled, "Specification for CISPR radio interference measuring apparatus for the frequency range 0.15 Mc/s to 30 Mc/s," and "Specification for CISPR radio interference measuring apparatus for the frequency range 25 Mc/s to 300 Mc/s," respectively. The subject matter of the documents in question is the method of measurement on industrial, scientific and medical equipment in high voltage transmission systems. The frequency range is 15 Mc/s to 300 Mc/s. As a consequence of the discussions at the meeting, these documents were referred back to the Working Groups for further consideration."

The U. S. delegates to these three sub-committees are as follows:

Mr. Herman Garlan - Delegate to CISPR Sub-Com. A-Limits

Mr. H. A. Cauper, Jr. - Delegate to CISPR Sub-Com. B - Measurements

Mr. Leonard Milton - Delegate to CISPR Sub-Com. C - Safety

Mr. L. W. Thomas, USA, chairman of CISPR - S/C-A - Limits

Each of these delegates had several observers to call on if necessary.

The delegates at large were:

Wm. E. Pakala
Westinghouse Elec. Corp.
Research Laboratories
Pittsburgh 35, Penna.

Dr. C. C. Chambers
University of Pennsylvania
107 Towne Building
Philadelphia 4, Penn.

Dr. Ralph M. Showers
Moore School of Electrical Engineering
University of Pennsylvania
200 South 33rd Street
Philadelphia 4, Penna.

Mr. L. W. Thomas
Department of the Navy
Chief, Bureau of Ships,
Code 695B
Washington 25, D. C.

Mr. Maximilian Ware
Office of the Chief Signal Officer
D.A. Att. SIG-RD-6F
Washington 25, D. C.

Mr. H. E. Dinger
Naval Research Labs.
Code 5416, Bldg. 26
Washington, D. C.

Mr. J. J. Kark
Sec. of ASA C63
Nema Headquarters
155 East 44th Street
New York 17, New York

IRE COMMITTEES 1961:

The Institute of Radio Engineers Committee 27 on Radio Frequency Interference is as follows:

27. RADIO FREQUENCY INTERFERENCE
S. I. Cohn, Chairman
S. J. Burruano, Vice Chairman

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H. R. Butler
E. W. Chapin
J. F. Chappell
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W. Jarva
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R. W. Lisk
H. R. Meahl
R. B. Schulz
C. Smith
L. W. Thomas

27.7 MOBILE COMMUNICATIONS EQUIPMENT
J. F. Chappell, Chairman

K. Backman
W. M. Cagney
W. G. Chaney
S. F. Meyer
J. R. Neubauer
N. Shepherd
W. A. Shipman
B. Short
R. C. Stinson

ITEMS OF INTEREST FROM PROCEEDINGS of the IRE, OCTOBER 1961:

Antenna and Receiving-System Noise-Temperature Calculation

In the "Correspondence" Section, page 1568, is a description of a Naval Research Laboratory report, NRL Rpt. No. 5668, 1961, by L. V. Blake, Radar Division. A summary of the report is given as follows.

A Naval Research Laboratory report recently completed by the writer contains results, which are here summarized, that may be of interest.

In Part I a calculated curve representing the noise temperature of a typical directive antenna in the frequency range 100 to 10,000 Mc is presented (Fig. 1) together with the method and details of the calculation. Since antenna noise temperature (averaged over all galactic directions) is virtually independent of antenna gain and beamwidth, the curve may be used as an approximation for any typical directive antenna. ...

"Part II presents a methodology for utilizing this antenna noise temperature in calculation of a system noise temperature, from which the total system noise power output and signal-to-noise power ratio may easily be computed. Basic concepts and definitions are first reviewed and then applied to development of formulas for noise temperatures of components of a cascade system and of the over-all system. The need for definition of both spot (frequency-dependent) noise temperature and average temperature over a pass band is pointed out, together with the need for definition of a transducer input noise temperature that reflects only the intrinsic noise."

Excess Noise in Microwave Detector Diodes

Volume MTT-9, No. 4, July, 1961, contains a paper under the above title by J. J. Faris and J. M. Richardson. A summary of the paper is as follows:

"The dependence of available excess noise in type 1N26 microwave crystal-diode rectifier on applied microwave power was measured. This may be approximated by a power law with constants characteristic of the particular crystal. As a consequence of the dependence of both excess noise and dc rectified power on input-power level, there is a level which minimizes the ratio of these quantities. Similarly, in the case of a modulated microwave carrier there is an input level which minimizes the ratio of excess noise to demodulated power, and so provides optimum detection of small modulation."

ITEMS OF INTEREST IN ELECTRONIC INDUSTRIES, OCTOBER 1961:

Interpreting Transistor Noise Performance

Under the above title is an article by Louis Calgagno and Richard E. Hobson of the Rheem Semiconductor Corporation, Mountain View, California. The sub-head and first paragraph are as follows:

"Equivalent Noise Voltage can prove a useful, and simple concept as a noise factor. With relatively inexpensive equipment the ENV can be measured, and a noise figure can be obtained from a single algebraic calculation.

"With the advent of the production of silicon double-diffused mesa transistors in large quantities, the circuit designer now has available transistors which combine many desirable features. Not the least of these is a high degree of uniformity in many parameters, including that of excellent low-noise characteristics. This article evaluates "Equivalent Noise Voltage referred to the input, as a useful measure of transistor low-noise performance, compared with the commonly used parameter Noise Figure. The effects of source impedance variation are illustrated."

Distribution of Duration of Pulse Noises at Remote Control Device Output

On page 216 is described the above Russian article as follows:

"L. B. Venchkovsky. 'Avto. i Tel.' June 1961. 6 pp. The effect of pulse noises with logarithmic-normal distribution of amplitudes on a remote control device is considered. There is determined distribution density of probabilities of the pulse noise durations at the device output for RC and guassian low frequency filters. (U.S.S.R.)"

ITEMS OF INTEREST IN ELECTRONIC DESIGN, OCTOBER 11, 1961:

Evaluating Data for Low Noise Transistor Circuit Design

A 4-page article by William A. Rheinfelder, Applications Engineer, Motorola Semiconductor Products, Inc., Phoenix, Arizona, is under the above title. The sub-head states:

"In two previous articles ('Design Considerations for Low Noise Transistor Input Stages,' ED, Sept. 13, 1961, p 48 and 'Measurement Techniques for Low Noise Transistor Input Stages,' ED, Sept. 27, 1961, p 70) author Rheinfelder discussed various aspects of design and measurement for low noise transistor stages. This final article presents typical measurement data based on a recommended low-noise circuit design. A new equivalent noise circuit for transistors is also described."

Electrical Conductivity of Copper Base Alloys

A 3-page tabulation of copper alloys of importance to electronics, by C. L. Bulow, Bridgeport Brass Company, Bridgeport, Connecticut, starts on page 159. 29 copper alloys are listed.

Atmospheric Refraction of Radio-Frequency Electromagnetic Waves

The above report by P. F. Nicholson, Naval Research Laboratory, Washington, D. C., April 1961, is available from the Office of Technical Services, Washington 25, D. C. 36 pages at $3.60. Order

AD-256768. A description of the report is:

"Propagation of an electromagnetic wave through the earth's atmosphere is discussed. Even with the omission of effects due to the earth's magnetic field and deviations resulting from tropospheric and ionospheric inhomogeneities, ray tracing is quite difficult. The relatively simple method of dividing both the troposphere and ionosphere into a number of spherically stratified layers and summing progressively the refraction in each layer has allowed accommodation of a wide range of refractive index distributions. From the given graphical presentations and suggestions for the programming of other relevant profiles, the tracking engineer or radio astronomer may easily determine the influential factors leading to a realistic assessment of a curve for refraction error."

Directory of Electronic Equipment Characteristics, Non-Radar Types:

Under the above title, a report is available, AD-256545 from OTS, Washington, D. C. This report was written by I. E. Perlin and C. E. Blakely, Georgia Institute of Technology Engineering Experiment Station, Atlanta, Ga., Sept. 1959, 100 pp, $9.10. A description of the report is as follows:

"In predicting interference the calculation of the frequencies where interference will occur and their magnitudes are of interest. A device used to show this pictorially is the mutual interference chart or mutual interference matrix. The processing of a mutual interference matrix for sets of noninterfering frequencies was separated into two cases. The first case was concerned with symmetric mutual interference matrices with no distinction between the transmitter or receiver frequencies. The second case was applicable to a general mutual interference matrix with the distinction between transmitter and receiver frequencies preserved."

Practical Aspects in Evaluating Shielded Rooms:

Under the above title, James C. Klouda of the Elite Electronic Engineering Company, Chicago, Illinois, wrote a 3-page article in the June 1961 issue of Electro-Technology. Reprints of this article may be obtained from Mr. Klouda at Elite Electronic Engineering Company, 5117 S. Ashind St., Chicago, Illinois.

Noise-Performance in Tin Oxide Resistors.

Under the above title, J. G. Curtis, Corning Electronic Components, Corning Glass Works, Bradford, Pa., wrote a 3-page article in Electronics, November 10th, 1961. The first two paragraps are:

"Different current noise levels in apparently identical resistors indicate that noise may be related to electrical performance. This hypothesis arises because it is logical to assume that differences in noise level result from differences in construction. However, even though construction differences can be detected visually or electrically, past searches for noise-performance correlations have resulted in limited and sometimes negative findings.

"During an investigation of resistor noise at Corning Glass Works, positive noise-performance relationships were observed in tin oxide film resistors. Experiments show that, although not all noisy resistors are substandard, all substandard resistors are noisy. And none of the quiet resistors are substandard."

RFI From Slip Rings:

Electromechanical Design, November 1961, contains a 15-page article on slip rings which are rotary electrical couplings that conduct electrical signals or power between rotatively engaged members by means of sliding contacts. The section on radio frequency noise is as follows:

RADIO FREQUENCY NOISE

A slip ring brush combination, as previously stated, produces a current variation that comes close to being statistical. This fact means that a reasonably uniform noise spectrum is produced. Measured HF noise varies considerably between structures. The total noise power produced increases with current but the spectrum distribution may vary.

The actual form of the assembly, i.e., length of wiper arms, interface capacitance between brushes and slip rings, etc., can cause tuned circuits which can be excited by such noise. The noise spectrum, depending upon the specific arrangement may be either reinforced at particular frequency bands of little or no energy. Radio frequency noise is both radiated and conducted from the ring brush interface. The radiated variety can usually be shielded at the assembly and is accomplished readily since most assemblies are built within metal enclosures. The conducted noise is the biggest problem since all of the interconnections to such a device are potential noise transmission lines. To this extent, the eventual HF noise performance of such couplings can only be evaluated after initial assembly into the end use system. Criteria may then be established on the basis of laboratory tests for acceptable units in that particular system. When these factors are taken into account, the HF noise problems are greatly reduced.

When slip rings and brushed operate in the range above the constant resistance levels shown in Figure 11, there is evidence of increased electrical erosion. The effect of such erosion can readily be detected by running identical assemblies with and without current. The current level below, which no such erosion takes place is referred to as the "dry circuit" condition.

Brush pressure is a great factor in the dynamic contact resistance. A compromise must be made since

- High brush force to obtain high pressures per unit area, while initially reducing noise, eventually raises it as wear progresses.
- High brush force increases torque.
- Low brush force increases sensitivity to shock and vibration
- Low brush force increases contact resistance but extends life.

The compromise again depends upon material choices and operating environment. For this reason, there can be few straightforward and generally applicable ground rules covering all design applications.

NCEL Armour Paper to be Published:

The paper given at the 7th Armour Interference Conference by D. B. Clark and J. L. Brooks of the U. S. Naval Civil Engineering Laboratory, Port Hueneme, California, titled "Field Evaluation of the NCEL Interference Attenuating Power Conductor" will be published as NCEL Laboratory Report TR-178 with the title "Evaluation of the Interference-Suppressing Power Conductor."

RFI Suppression by Filter Design Techniques:

White Electromagnetics, Inc., Bethesda 14, Maryland, has published its 6th Technical Bulletin titled "RFI Suppression by Filter Design Techniques - Part I - Theoretical Considerations". Copies of this and other Technical Bulletins, issued by this company, may be obtained by writing to 4903 Auburn Avenue, Bethesda 14, Maryland.

Frederick Research Brings Out Handbook on RFI:

Frederick Research Corporation, 2601 University Blvd., West, Wheaton, Maryland, is bringing out a series of 4 volumes under the title "Handbook on Radio Frequency Interference":

Volume I	Fundamental of Electromagnetic Interference
Volume II	Electromagnetic Interference Prediction and Measurement
Volume III	Methods of Electromagnetic Interference-Free Design and Interference Suppression
Volume IV	Utilization of the Electromagnetic Spectrum

Date of issue is planned for the end of 1961. No cost for the series or for individual volumes has, yet, been established.

Article on R. F. Shielded Structures:

J. J. O'Neil, U. S. Army Signal Research and Development Laboratory, Ft. Monmouth, N. J., has authored an article titled "R. F. Shielded Structures" in the October/November 1961 issue of Ground Support Equipment. This article resulted from a survey made of shielded enclosures from the Arctic to the Marshall Islands to determine their effectiveness after various periods of operation. The article contains many interesting observations on the degrading influences affecting various types of shielded enclosures and gives recommendations for the design, construction, and maintenance of R. F. shielded enclosures. Your editor has been able to have reprints made of this article and will furnish copies, while they last, for 12¢ in stamps.

Brushless AC Generators for Military and Emergency Power

F. L. Nelson, Chief Engineer, Kato Engineering Company, Mankato, Minnesota, has written a 3-page article under the above title in Military Systems Design, September-October, 1961. Of interest to those engaged in RFI work is the following paragraph:

"The characteristics of brushless alternators which are particularly desired for military applications include (1) sparkless commutation for explosive atmospheres; (2) improved radio filtration with radio noise practically eliminated; (3) lighter weight; (4) high altitude operation problems reduced; (5) less maintenance because brushes, commutators and sliprings are eliminated and (6) improved reliability particularly for standby equipment."

New York Metropolitan Chapter Elects Officers:

The New York Metropolitan Chapter, at its first meeting, elected the following officers for the ensuing year:

Chairman - Mr. Leonard Milton, Filtron Company, Inc.
Vice Chairman - Mr. Harold Schwenk, Sperry
Secretary-Treasurer - Mr. Samuel J. Burruano
Burruano Assocs., Inc.

FCC Notice of Proposed Rule Making:

The FCC has sent out a Notice of Proposed Rule Making, Docket No. 14376, in the matter of amendment of Part 15 of the FCC Rules to provide for telemetering devices and wireless microphones. The first three paragraphs of the Proposed Rule Making are as follows:

"1. Notice is hereby given of proposed rule making in Part 15 of the Rules of the Federal Communications Commission to make the frequency band 88-108 Mc/s available for use by low power telemetering devices and wireless microphones.

"2. Although telemetering devices and wireless microphones have not been the subject of interference complaints, the Commission is aware that these devices are being operated throughout the entire 30-100 Mc/s band. Manufacturer's literature, articles in periodicals, letters of inquiry to the Commission, etc., have indicated the wide interest in such use. In addition, the Commission has noted that the medical profession is making more and more use of telemetering devices in the 88-108 Mc/s band because of the availability of receivers and the advantages of radio over wire transmission of physiological data.

"3. Furthermore, the unrestricted operation of these devices over the range of frequencies 30-100 Mc/s poses an interference threat to licensed radio services concerned with the protection of life and property. In order to clear up these illegal operations, the proposed rules would make available the frequency band 88-108 Mc/s. The proposed rules also specify field strength limits which make remote the possibility of harmful interference to other radio users, and require type approval, based on measurements in our own laboratory as a control mechanism."

Requests for copies, or any comments, should be addressed to: Ben F. Waple, Acting Secretary, Federal Communications Commission, Washington 25, D. C.

RFI Articles on Computers:

The two articles which appeared in the June and July, 1961, issue of Electronic Equipment Engineering titled "RFI - Its Effect on Computers" and "RFI - A Computer Study" were abstracted from a paper presented by the authors at the 6th Armour Conference on RFI, 1960. The original paper appeared in the Proceedings of the Conference under the title "Radio Interference and Susceptibility Study of a Solid State Digital Computer Model" by J. A. Harder and R. L. Powers. Copies of the original paper may be obtained by writing to Mr. J. F. Schuehler, Dept. 808, International Business Machine Corporation, Neighborhood Road, Kingston, New York.

Balky Satellite Forced to Stop Playing Around

The following news item appeared in the Washington, D. C. Post, November 18, 1961, under the above title:

"Scientists did some risky trouble-shooting at a 500 mile range yesterday to discipline a misbehaving satellite that was threatening to thwart its own mission.

"The problem began when the Navy's Transit Radiation Research and Altitude Control satellite (TRAAC) unaccountably started receiving, on its mechanism for handling commands from earth, the signals it was putting out itself to help trackers.

"As scientists at the Johns Hopkins Applied Physics Laboratory explain it, the interference prevented TRAAC from receiving vital commands for performing its mission, including one to shut off the transmitter putting out the pesky signals.

"And the spurious signals all but prematurely activated the unique TRAAC feature being tested -- extension of a weighted boom designed to stabilize the satellite eventually in a position facing the earth.

"Despite the risk that their own attempts would trigger the boom, scientists at their Silver Spring headquarters beamed signals at the tumbling satellite every three or four seconds when they calculated that its antenna was facing the earch so as to increase prospects of overcoming the interference. After 12 passes, it worked.

"With the navigational signals shut off, Johns Hopkins will have to base its tracking on known orbit, on telemeter radiation detection signals the satellite is sending back."

Interfering Electronic Heaters May be Ordered Out of Use:

Bulletin No. 808, of the Society of the Plastics Industry, Inc., 250 Park Ave., New York 17, New York, carried a news item under the above title, parts of which are as follows:

"On March 8 and May 3, 1961, the Federal Communications Commission amended its rules to provide for fast action in removing electronic heaters from service which cause harmful interference to radio navigation and safety radio services. This type of interference has become serious. Under the amended rules, Engineers in Charge of FCC District Offices are authorized to order offending equipment out of use immediately when such interference is present. Users of electronic heating equipment who have not had their equipment certified, or where such equipment causes harmful interference, operate in violation of the FCC Rules and Regulations and are subject to the penalties provided for in the Communications Act of 1934, as amended.

"Monitoring stations are on the alert for unauthorized heater emissions, and mobile investigative cars, equipped with direction finders and two-way radios, are poised to follow up on all reports of heater radiations. Engineers from all the FCC District Offices are inspecting plants for uncertified heaters. The FAA is cooperating by making joint aircraft flights possible with the FCC for locating heaters from the air that are radiating excessively."

Author of Book Comments on RFI:

Fred D. Rowe, author of "How to Locate and Eliminate Radio and TV Interference", see PGRFI Newsletter No. 18, page 8, made the following comments in a recent letter to your editor:

"In the matter of grounding techniques as stated in the National Electrical Code we understand that the interpretation of the code apparently varies in different localities. In some instances grounding of the neutral power lead to conduits is not premitted and we have not been able to find out why. Perhaps you have been able to get an answer since it has been pointed out that neutral grounding to conduit can effectively lower the noise level in many instances. However, local power engineers are not usually familiar with radio interference causes and must be shown why their construction methods should be changed to accomodate a situation foreign to power distribution. Perhaps I have been stating specific cases not associated with your question in general but this is all I can come up with at the moment.

"By the way, I worked on an unusual case of interference recently that you might be interested in. For half a mile around the location of a TV and FM tower complaints were coming in from TV viewers that Channel 5 pictures were flickering and jumping out of sync. The interference when heard on locating equipment was of a popping nature occurring frequently and rather rapidly. The video line monitors in the station did not indicate any difficulty but the 'off-the-air' monitoring receiver showed a pronounced flicker each time a 'pop' occurred. The results of the investigation wound up to be an arcing between the transmission line and a bolt on the tower up near the antenna at the 500-foot level. Why this suddenly happened was not known as the station had been in operation for about eleven years. In view of the fact that this interference was triggering sync pulses it is not hard to contemplate what could happen to other classes of service such as military. And it so happens that a Nike base is established within the range of the scope of the interference located, namely less than a quarter mile away from the tower!"

Line Impedance Stabilization Networks, Report of:

A Navy, BuShips, "Report of Development of Line Impedance Stabilization Networks", NAVSHIPS 94119, is now available through the Form and Publications Supply Office, Byron, Georgia. This report includes information on design and construction of two line impedance stabilization networks for the measurement of conducted radio interference from 150 kilocycles to 100 megacycles. Construction drawing include information necessary for field activities to manufacture these networks. Experimental models were designed and built at the Material Laboratory (MATLAB) at the New York Navdl Shipyard, Brooklyn 1, New York. One, a single-line version, has a single-lead input and single-coaxial output; and is used with equipments which do not have a standard power-line input. The other, a dual version, is electrically equivalent to two single-line networks in a single enclosure and is used with equipments that have a standard, three conductor power input.

Notes on Spectrum Signature Measurement Problems:

A paper, by J. J. Dozier and A. H. Sullivan, Jr., of the Frederick Research Corporation and J. W. Savage, of Jansky and Bailey Division Atlantic Research Corporation, was delivered at the 17 October 1961 meeting of the Washington Chapter of PGRFI under the above title. Subjects diacussed were antenna patterns, data recording and reduction, logistic problems and radiation hazards. Copies of the paper may be obtained from Mr. A. H. Sullivan., Jr., Frederick Research Corporation, 2601 University Boulevard, West, Wheaton, Maryland.

Variation of High Frequency Power Gain and Noise Figure Versus Temperature:

A paper, by C. R. Gray and T. C. Sowers, of the Philco Corporation, Lansdale Division, Lansdale, Pennsylvania, was given before the 1961 Radio Fall Meeting at Syracuse, New York, under the above title. Copies may be obtained from Mrs. Aimee L. Moore, Commerical Engineering, Philco Corporation, Lansdale Division, by asking for Application Lab Report 741.

Noise Aspects of Low-Frequency Solid-State Circuits:

Under the above title, Prof. A. van der Ziel, of the University of Minnesota, delivered a paper at the October NEC Conference in Chicago. Reprints may be obtained by writing to Prof. van der Ziel, Institute of Technology, University of Minnesota, Minneapolis, Minnesota. The summary and first paragraphs of the introduction are:

"Summary

"A survey is given of the various ways of characterizing the noisiness of circuits. The results are applied to audio circuitsusing tunnel diodes, vacuum tubes, transistors and low-frequency parametric amplifiers. The design criteria for low-noise circuits are given.

"I. Introduction

"When the magnitude of the signal fed into the input of a low-frequency amplifier becomes smaller and smaller, one finally comes to the point where the wanted signal drowns in the noise background of the amplifier itself. This 'noise background', which is caused by spontaneous signals generated in the components and the devices, sets a lowest limit to the signals that can be handled by the system and is therefore of interest to the circuit designer.

"The following questions are of interest in this respect:

1) What are the noise sources?
2) How does one best characterize the noise?
3) How does one minimize the noise in a given circuit?
4) What are the device design criteria for low noise in a given application?"

Ice, Snow Tied To Signal Loss For Antennas:

F. R. Willis, Andrew Corp., Chicago, gave a paper before the IRE Canadian Conference at Toronto, October 1961, on the above subject. He stated that the accumulation of foreign material - ice, snow, leaves - in horizontally - mounted parabolic antennas, will produce a serious loss in signal strength in microwave relay systems. He said, that under severe ice and snow conditions, an uncovered antenna had a loss in signal of 22 db, while the antenna with the radome had a loss of only 6 db.

James Millen Company Issues Bulletin on Shields:

James Millen Manufacturing Company, Inc., 150 Exchange Street, Malden 48, Massachusetts, has issued 9 pages of a bulletin on Mu-Metal and Nicoloi Magnetic Shields. There are 5 interesting charts and 4 tables.

RF Radiation Hazards:

William L. Bunch, Jr., RAD HAZ Compatibility Group, Bureau of Ships, U. S. Navy, has written a 2-page article for BuShips Journal, October 1961, on the above subject. The article lists 79 radars and indicates the minimum distance a person can approach.

International Electronics Manufacturing Company Changes Name:

The International Electronics Manufacturing Company, Annapolis, Maryland, a subsidiary of Electro Instruments of San Diego, California, has changed its name to Electro International, Inc. The officers of the company are: Jack O. McCorkle, President, Carl C. Allen, Vice-President-Secretary, Joseph P. Bennett, Treasurer, and Anthony V. Greco is Sales Manager. The RFI Engineers are: Frank S. Marshall, Charles D. Joly, Richard R. Grim, John E. Melton, Kirby L. Sweatt and Billy R. Clark.

White Electromagnetics, Inc. Expands Personnel:

Lou Caresse has been appointed Vice President and Director of Plans and Operations of the above company.

Thomas Evans has been appointed Senior Engineer.

NEW PRODUCTS

Trinistor Controlled-Rectifier

A single page article appears in the November, 1961, issue of Automatic Control, on the Westinghouse Trinistor Controlled-Rectifiers. A schematic diagram is shown giving the connections for a single-phase static contactor for non-inductive loads up to 37 amperes rms at 115 or 230 volts and a chart is given for current ratings in ambient air temperature-degrees centigrade.

L J Products Makes RFI Reduction Products

L J Products, 7464 Girard Avenue, La Jolla, California, has brought out a line of solid state switches which have no contacts to arc or weld and claim noise-free operation. Models are listed up to 20 amps AC. A line of ultra isolation transformers is also offered to keep interference from being spread over wide areas on power lines and other equipments.

Non-Magnetic Alloy of Ti Ni Developed

The United States Naval Ordnance Laboratory, White Oak, Maryland, has issued a Report NOLTR 61-75 titled "The Properties of TiNi and Associated Phases" by W. J. Buehler and R. C. Wiley. Extracts from the abstract are as follows:

"A new class of alloys based on the ductile intermetallic compound Ti Ni and associated phases Ti2Ni, TiNi3 was investigated. These alloys, referred to as the "Nitinol" series, are non-magnetic, corrosion resistant and hardenable (by suitable composition and treatment) up to 62 Rc.

"Investigations into the Ti Ni alloy containing 54.5 w/o Ni revealed some unusual mechanical vibration damping properties. At room temperatures the alloy had a very high damping capacity, upon heating to temperatures slightly in excess of room temperature the damping capacity markedly decreases.

"Magnetic susceptibility measurements over a wide temperature range showed the material to be paramagnetic with a premeability approaching unity (1.002).

"This material offers a potential solution for many troublesome non-magnetic material applications where low permeability, strength, hardness, fabricability, and corrosion and abrasion resistance are a problem. It appears particularly useful as a material for non-magnetic tools in mine disposal applications and in various components of magnetometers, mine laying and servicing craft where the above characteristics are required. Its corrosion and abrasion resistance suggests its use in food and chemical processing industries. The improved low temperature (-80 degrees C) impact strength values (43-79 percent increase over room temperature) suggest the use of TiNi-base alloys as cryogenic materials. The marked changes in damping characteristics with temperature indicates a possible application of TiNi in temperature sensing devices."

Requests for further information should be addressed to: Mr. Edmond Adams, Chief, Magnetism & Metallurgy Division, USNOL. At the present time no companies have been licensed to produce this material. Since this is a government developed material, non-exclusive royalty licenses can be obtained by writing to the Patent Division, U.S. Naval Ordnance Laboratory, attention Mr. Q. E. Hodges.

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The Seventh Armour Conference revealed that there will have to be a lot more thinking done before the problem of RFI control can be brought down to a practical basis. This thinking will not only include new standards, new instrumentation, and new techniques, but also the development of new products. Your editor feels that the PGRFI Newsletter can speed up the solutions to many problems if its readers will only send in information about such new products even though they are in the development stage. And he wants to thank those who are already doing so.

Rexford Daniels
Monument Street
Concord, Massachusetts