



PROFESSIONAL
GROUP ON
RADIO
FREQUENCY
INTERFERENCE

NEWSLETTER

Number 26

March 1963

1964, in New York City.

5th SYMPOSIUM REPRESENTATIVES At IEEE NEW YORK CONVENTION:

Representatives of the 5th National Symposium on Radio Frequency Interference, to be held in Philadelphia, June 4-5, 1963, will be available during the IEEE Convention in New York City, March 25-28, 1963, at the booth of the Ace Engineering & Machine Company. It has been decided to have a limited number of exhibits at the Symposium which will be allocated on a first-come first-served basis. Those wishing to discuss papers and exhibits should come to the Ace booth. In the meantime, those who want to make definite arrangements for exhibits should get in touch with either of the following:

Mr. Ben Puchaski, Exhibit Manager, 5th Nat'l
Benn Associates Symposium on RFI
210 N. Broad St.
Philadelphia 7, Pa.
Phone: 215 - LO 7-4987

Mr. Fred Kugler, Vice-Chairman, 5th Nat'l
Symposium on RFI
Ark Electronics Corp.
624 Davisville Rd.
Willow Grove, Pa.
Phone: 215 - OL 9-4121

ROME - UTICA CHAPTER HOLDS DINNER MEETING:

A dinner-social meeting was held by the Rome-Utica Chapter of PTG-RFI on January 23, 1963. There were over 60 in attendance. Dr. Fred Morris, President, Electro Mechanics Co., Austin, Texas, showed slides and provided a very interesting commentary on his recent trip to the South Pacific. A major portion of the attendees consisted of over 40 people from the semi-annual contractor's conference, which is conducted by the Applied Research Branch of RADC's Electromagnetic Vulnerability Laboratory.

NEW YORK CHAPTER ELECTS NEW OFFICERS:

The New York Chapter of PTG-RFI elected the following officers for the ensuing year:

Chairman	M. Kant Sperry Gyroscope Co. Great Neck, N. Y.
Vice-Chairman	S. J. Burruano Burruano Associates Westwood, N. J.
Sec'y-Treasurer	A. L. Albin Fairchild Camera and Instrument Co. Syosset, N. Y.

There was a discussion of the possibility of the New York Chapter sponsoring the 1964 National PTG-RFI Symposium, in connection with the World's Fair scheduled to be held in

CHAPTER MEETINGS

Chicago Chapter - August 14, 1962 - "Practical Considerations and Approaches to Radio Interference Suppression Design" by W. F. Johnson, Potter Co., No. Chicago, Ill.

Los Angeles Chapter - September 20, 1962 - "Frequency Management: Why we need it; How we should do it; The rewards to expect." - by Major William E. Birks, USAF Space Syst. Div.
"The need for good public relations in handling interference complaints." - by Ray E. Meyers, ARRL.
November 15, 1962 - "INCITE" For Interference Control - by Joseph H. Robinson, North American Aviation, Calif.
"Instrumentation for Interference Measurement." - by Joe Lorch, Empire Devices, Calif.

Philadelphia Chapter - December 18, 1962 - "Spectrum Displays of Radio Frequency Interference." - by David Fidelman, Electromagnetic Measurement Corp.

Seattle Chapter - December 10, 1962 - "Shielding Theory and Practice" - by Richard B. Schulz, The Boeing Co., MASD, Seattle Wash.

Washington, D. C. Chapter - November 20, 1962 - "Television Taboos." - by Julian Dixon, Office of the Chief Engr., FCC, Washington, D. C.
"Mathematical Approach to UHF-TV Station Assignments." - by Arnold Skrivseth, Office of the Chief Engr., FCC, Washington, D. C.

NATIONAL AERO-NAUTICAL MEETING ON EMC/RFI: Announcement

The Society of Automotive Engineers, Committee AE-4, Radio Interference, will present a technical session on "Electromagnetic Compatibility and Radio Frequency Interference" at the National Aero-Nautical Meetings on Monday, April 8, 1963. This will be the first formal presentation of the subject to the predominantly inmechanically oriented membership of the Society. Additional interest is indicated by the participation of the American Society of Naval Engineers who with SAE are jointly sponsoring the National Meetings this year. Government and Industry have cooperated in supporting a highly informative and authoritative program. Prominent experts will bring to this session their wide experiences in the field of EMC/RFI.

Technical Session

Electromagnetic Compatibility and Radio Frequency Interference
Sheraton-Park Hotel, Washington, D. C. - April 8, 1963 - 2:00 P. M.
Chairman: C. M. Dean, Pratt & Whitney Aircraft Division, United Aircraft Corporation (Chairman AE-4)
Electromagnetic Compatibility, A Management Responsibility
J. M. Bridges, Dir., Office of Electronics, Office of Dir., Defense Research & Engineering, Office of Secretary of Defense
Radio Frequency Compatibility Program - Command Responsibility
Gdr. Henry Bress, USN, Asst. Dir., Navy Radio Frequency Spectrum Div., Office of Chief of Naval Operations
Electrical Interference Problems Experienced on Boeing Transport Type Aircraft C. E. Shappel, Jr., Senior Group Engineer, Transport Div., The Boeing Co.
Extreme Ambient Electromagnetic Interference Control
D. E. Clark, Senior Project Engineer, Scintilla Div., The Bendix Corp.

CALL FOR WESCON PAPERS:

A call for papers for the 1963 Western Electronic Show and Convention to be held August 20-23, 1963 at the Cow Palace, San Francisco, has gone out. The following should be submitted by April 15, 1963:

1. Three copies of a 100 to 200 word abstract, including title of paper, name and address of author.
2. Three copies of 500 to 1,000 word summary of the paper which identifies related work and new contributions.
3. Indication of the technical field in which the paper falls (use IEEE professional technical group classification to aid rapid distribution to reviewers.)

Any necessary military or company clearance of papers must be granted before submission of the paper.

Address all materials to: Dr. Jerre D. Noe
Technical Program Chairman
1963 Wescon
Suite 2210
701 Welch Road
Palo Alto, Calif.

SPECIAL NOTE: A convention record will not be published.

IRE-AIEE CONSOLIDATION NEWS:

The following is a summary of the information now available (Jan. 16th) on the consolidation of the IRE-AIEE into the new organization as published in MIL-E-GRAM, January 1963, with additions:

1. The IRE Symbol is not to be used after December 1962.
2. The new IEEE Symbol will be available early in 1963.
(See IEEE advertisements in technical publications)
3. The mailing address of the IEEE is Box A, Lenox Hill Station, New York 21, New York. Address questions to Dr. Ernst Weber, IEEE President-elect; Dr. B. M. Oliver, IEEE Director-elect; or to Mr. Hendley Blackmon, IEEE Director-elect.
4. No IRE Professional Group or AIEE Committee will be forced to merge at this time with any other Group or Committee. However, all Technical activities will be monitored and, after a few years, if independent activities appear to be duplicative, the IEEE Directors may initiate steps to clarify responsibilities. All existing IRE-PG's continue at present as IEEE-PTG's
5. Standards work will be carried forward by a committee organization appointed by the IEEE Board of Directors and operated under the IEEE Technical Operating Committee.
6. Chapters. A PTG Chapter may join other Chapters and Technical Groups in what is effectively a local-level merger. Such local-level action does not force merger on the parent PTG's. Mergers must be based on mutual agreement on both the general proposition as well as the details, including such factors as publications, meetings, and interim administration.
7. The IEEE Staff will be located on the 10th floor of the United Engineering Center, 47th Street at 1st Ave., New York City, Telephone 212-752-6800.
8. Major IEEE subject areas are: Electrical Support Systems and Techniques; Guidance - Navigation - Control - Telemetry - Communications; Instrumentation and Check-out; Training and Education; Management and Administration; Mechanical Structures, Systems, and Techniques, and Electromagnetic Compatibility.

U. of ILLINOIS RADIO TELESCOPE May Get INTERFERENCE GUARD:

Electronic News, February 18, 1963, carried the following news item:

"Urbana, Ill. -- Rep. William L. Springer (R.-Ill.) said last week the University of Illinois' new radio telescope now in use in Danville, Ill. soon will be given protection from any interference on television Channel 37 for a radius of 600 miles.

"Mr. Springer told U of I officials that he had been informed by reliable sources that such an arrangement would be disclosed in a short time by the Federal Communications Commission.

"Sources in Washington, meantime, said the FCC will decide the question of how Channel 37 is eventually to be used on the basis of two applications already filed in New Jersey for commercial use of the channel. New Jersey is well beyond the 600-mile protection proposed

by the U of I.

"Until now, these sources added, the FCC unofficially has kept the channel clear for radio astronomy until it could be decided what frequencies to designate for that purpose.

"Radio astronomers have been involved in a controversy with the FCC to reserve Channel 37 for scientific research since it is considered the band best adapted to this work.

"Professor George C. McVittie, head of the U of I department of astronomy, pointed out that the proposed protection could be a 'useful first step' in preventing man-made interference on the frequency on which the university's radio telescope is now operating."

LATEST THING In ARC - PROTECTION CIRCUITS:

In Electronics, February 22, 1963, is a 2-page article with a schematic under the above title by Daniel D. Mawhinney, Electron Tube Division, Radio Corporation of America, Harrison, New Jersey. The sub-title and first paragraph state:

"Arc-protection circuit distinguishes between peak pulse currents and fault currents of similar magnitude. Developmental tubes that require high electrode potentials can be protected from breakdown and flash-over during preliminary operation and testing.

"Currents at unspecified times as well as excessive currents are sensed by a newly developed arc-protection circuit. It protects high-voltage electron devices from the effects of sudden faults, even during pulse operation. The circuit has proved satisfactory for protecting developmental high-voltage devices during preliminary operation and testing."

INTERFERENCE CONTROL GUIDES For COMPUTING SYSTEMS:

Computer Design, January 1963, 739 Boylston Street, Boston, Mass., carries an article under the title "Interference Control Guides" by Donn L. Ingram, Electromagnetic Compatibility Consultant, A. T. Parker & Associates, Hollywood, California. The sub-title states:

"Use of high speed computing systems in military and space systems requires stringent control of electrical interferences. Here is a checklist of design do's and don'ts for minimizing this interference control problem."

SELECTING MATERIALS For RADIATION SHIELDS:

Materials in Design Engineering, February 1963, page 132, carries a 3-column article under the above title. The first paragraph states:

"A recent report issued by NASA states that radiation will not have a strong influence on the selection of structural materials for aerospace vehicles. However, data on component failures and high radiation levels have reemphasized the need for radiation shields."

The source of the article is "Ionizing Radiation in Space and Its Influence On Spacecraft Design," by Louis F. Vosteen, National Aeronautics and Space Administration Rpt. TN D-1474. Report available from Office of Technical Services, Dept. of Commerce, Washington 25, D. C. (Price \$1. -).

ELECTRICAL NOISE And INTEGRITY Of SEMICONDUCTOR DEVICES:

Military/Industrial Systems Design, February 1963, has a 2-page article with the above title. The first three paragraphs state:

"Although electrical noise generated by semiconductors is rather widely recognized as a source of major performance problems in many low-level or precision circuits, the implications of certain types of noise in terms of integrity of semiconductor components are less well recognized.

"Various types of noise, mixed in varying proportions, are present in all semiconductors. For example, all will generate pure thermal noise as a result of the random thermal motion of the carriers within the conducting materials. Similarly, all semiconductors will exhibit "Shot" noise, which is due to

the random passage of the discrete carriers across the junction.

"Thermal and Shot noise follow fixed relationships and, for a given operating condition, may be computed accurately." The conclusion states:

"The rapidly growing understanding of the nature and implications of electrical noise is not only aiding in the development of improved low-noise circuitry, but also is providing a new approach toward the evaluation of component reliability."

ITEMS OF INTEREST FROM ELECTRONIC DESIGN

February 15, 1963:

NBS to Calibrate Microwave Noise Sources at Boulder - The first two paragraphs are:

"Calibration of waveguide noise sources in the microwave frequency range is now offered by the Radio Standards Lab. of the National Bureau of Standards, Boulder, Colo."

"Microwave noise calibrations presently are performed at three selected frequencies (9.0, 9.8 and 11.2 Gc/s), in the range 8.2 and 12.4 Gc/s (WR90 waveguide)."

The Key To Designing Attenuation Equalizers - by Phillip R. Geffe, Senior Staff Engineer, Axel Electronics, Inc., Jamaica, N. Y. The first two paragraphs are:

"Attenuation equalizers are useful in all types of communication and signal-processing systems because they can be used to introduce corrections, large or small, in the device's frequency response."

"Although equalizers have been known for many years, it is possible to simplify and clarify the normally tedious design procedure so that a practical design can be accomplished in a few minutes without extensive calculations."

Origin of Noise in Millimeter Wave Generation is Investigated -

"It is shown that the concepts of noise and incoherence in millimeter wave generation are different, and that an incoherent field of a cavity mode need not exhibit noise. The origin of fundamental noise in an amplifier is shown to come from spontaneous emission of the amplification mechanism. This study begins with an examination of the relationship between the uncertainty principle and minimum amplifier noise. The concept of coherence is discussed, and an incoherence parameter is defined in terms of uncertainty. Harmonic oscillator states are examined for coherence. Spontaneous emission is examined both for coherence and noise. Investigation of High Frequency Limitations in Millimeter Wave Generators. Julian Schwinger, Cambridge, Mass., June, 1962, 25 pp, \$2.60. Order AD 276 940 from OTS, Washington 25, D. C."

Low-Noise X-Band Parametric Amplifier -

"The development of parametric amplifiers and related devices from vhf to X-band is described. The basic theory of parametric amplifiers is given for the negative resistance amplifier, upper and lower sideband converters, and the traveling-wave parametric amplifier. Two X-band amplifiers are described, one operating in a degenerate mode and the other in a non-degenerate mode. A design of a broadband X-band amplifier is presented which theoretically yields 600 Mc bandwidth. A Low-Noise, X-Band Parametric Amplifier, Motorola, Inc., Phoenix, Ariz., January 1962, 80 pp, \$8.60. Order AD-274 114 from OTS, Washington 25, D. C."

AIRCRAFT DISCHARGERS MINIMIZE CORONA-INDUCED RECEIVER NOISE:

Electrical Design News, January, 1963, carries a 4-column article under the above heading. The first paragraph states:

"Menlo Park, Calif. - Scientifically designed static electricity dischargers have eliminated the hazard of corona-induced receiver noise in jet aircraft. Built on the foundation of basic field theory, the simple 'black rods' protruding from trailing edges are fruits of a meticulous program of research, design and development."

GRAPHICAL DESIGN OF LC FILTERS For DC POWER SUPPLIES:

Under the above title, Electronic Design, January 18, 1963, page 84, carries a 4-page article by T. W. Maciejowski, Supervisor Production Engineering, Borg-Warner Controls, Santa Ana, Calif.

The sub-title and first paragraph are:

"Four graphs speed determination of the inductance and capacitance of an LC filter at either 60 cps or 40 cps."

"The LC filter is the most frequently used ripple-reduction filter for dc power supplies. Such filters usually are composed of one or more sections, each consisting of a series dc choke followed by a parallel electrolytic capacitor (Fig. 5). For 60- and 400- cps supplies, the four graphs, Figs. 1-4, simplify determination of the inductance and capacitance. The values selected provide satisfactory regulation at the minimum operating current, the desired ripple reduction and compensation for secondary imbalances of several per cent."

NOISE FIGURE MEASUREMENT DISCUSSED In PRIMER:

Under the above title, Electronic Design, January 18, 1963, page 152, discusses an 8-page publication titled "Application Note No. 57" by Hewlett-Packard Company. The text states:

"The basic considerations of noise figure, its definition and measurement are given in Application Note No. 57."

"The 8-page publication states that the ultimate sensitivity of a detection system is determined by the noise presented to the system with the signal. In addition, any system will contribute noise to the signal in detection and amplification processes. Since the input noise presented with the signal cannot usually be controlled, the approach is to study, measure and attempt to minimize the noise contribution by the system."

"Specific topics discussed are: noise figure measurements with a signal generator, noise source as a broadband signal generator, noise figure measurements with an excess noise source, networks in cascade and accuracy considerations."

"Hewlett-Packard Co., 1501 Page Mill Road, Palo Alto, Calif."

COMPATIBILITY OF SHIPBOARD ELECTRICAL And ELECTRONIC EQUIPMENT DESIGN

H. H. Hansen, Marine Systems Department, Westinghouse Electric Corp., has a 2-page article in the February 1963 issue of SIGNAL under the above title. It has some interesting discussions of problem areas which would apply to other installations.

RECENT TUBE IMPROVEMENTS:

Under the above title E. S. Mockus, Chief, Development Engineer Vacuum Tubes for Industrial Components Div., Raytheon Company, Newton, Mass., discusses tube improvement in the February 1963 issue of Electronic Products. There is a discussion of a new tube to reduce flicker noise.

SPECIFYING TRANSFORMERS For LOW-LEVEL SYSTEMS:

Under the above title Troy Burgess, Design Engineer, Triad Transformer Corporation, Division of Litton Industries, Venice, Calif., has a 3-page article in the February 1963 issue of Electronic Products. The first two paragraphs state:

"Advances in instrumentation techniques, particularly in low-level signal measurements, have emphasized the need for transformers capable of discriminating against interference that often accompanies signal voltages. Interference problems due to stray magnetic fields, ground loops, common-mode signals, and machine-made noise can be reduced and even eliminated for all practical purposes by using special shielded transformers."

"Transformers intended for low-level systems generally fall into one of the following categories: low-level input transformers; chopper input transformers; power supply transformers; and line isolation transformers. An understanding of the shielding techniques employed within these transformers and some typical applications will aid the engineer responsible for specifying suitable units. Table I, a reference list of required information, should be followed when specifying 'non-catalog' transformers from a manufacturer."

It is understood that copies of the article are obtainable from Electronic Products magazine on request and that the Triad Transformer Corporation will reprint it in its company publication "Transformation".

DIRECT-COUPLED BANDPASS FILTERS In COAXIAL LINE:

Electrical Design News, August 1962, carried an article under the above title by H. Smith, Fellow Engr. Network Synthesis, Westinghouse Corp., Baltimore, Maryland. The first two paragraphs are:

"Direct-coupled bandpass filters in coaxial lines frequently are required in UHF and microwave systems. This article presents design data and methods for design for three bandpass direct-coupled coaxial line filters whose response is of the Tchebycheff type.

"The filters described employ inductive posts, which short the inner and outer conductors, as the coupling elements. Filters which employ this type of structure are preferred by virtue of their ease of manufacture and power-handling capabilities."

THE NEW BREED - ELECTROMAGNETIC COMPATIBILITY ENGINEER:

The IEEE Student Journal, March 1963, contains an article under the above title by Rexford Daniels, president of Interference Consultants, Inc., Boston, Mass. The first two paragraphs state:

"The need for an entirely new type of engineer, whose job it is to make it possible for man to live in the electromagnetic environments which he creates, is emerging from the Department of Defense's Electromagnetic Compatibility Program. This new type of engineer will have to add to his accomplishments a knowledge of everything about the secondary and side effects of frequency which are now being evidenced in the fields of electrolysis, corrosion, nuclear effects on materials, biomedical reactions, radiation hazards to personnel, explosives and flammable fluids and many others, and which are rapidly taking compatibility engineering out of a service category into a constantly widening coordinating function. His job will be somewhat like that of a 'systems' or 'committee' engineer but with much broader scientific applications.

"For no longer are buildings merely inert masses of metal and mortar but they are becoming potential antennas; no longer is the earth merely an absorber of electromagnetic energy but it is becoming an immense electronic component; and no longer is it safe to store or transport photo-flash bulbs, squibs, photographic film, magnetic recording tape, or certain chemicals without first checking into the electromagnetic environments through which they will travel or be stored. It is now even becoming more hazardous to play with sparks than it was with matches because the influence of a spark may extend hundreds of miles and trigger many types of phenomena."

700 CYCLES FOUND TO ANESTHETIZE ELECTRONICALLY:

A news item in Electronic News, January 21, 1963, on page 47, describes an experimental research instrument made by the Southern Solid State Electronics, Inc., Memphis, Tennessee. It would produce a current of 700 cycles per second which is sent through the brain between two electrodes and causes a blockage of nerve waves transmitting pain to the brain. The patient is anesthetized in two seconds and put into an electric sleep.

"FERRET" SATELLITE DESCRIBED:

Newsweek, December 31, 1962, had the following to say about the "Ferret" satellite:

"Ferret. By far the most secret robot inspector developed to date is an exotic new satellite which eavesdrops on communication transmissions. Washington has never acknowledged the existence of this sentry. But among veteran satellite watchers it is known, for want of official nomenclature, as the "Ferret." Its mission: To pick up radar and radio traffic - especially around Baikonur, Russia's major rocket-testing base. Developed by Lockheed and RCA, Ferret satellites have intricate electronic and electromagnetic sensors to track down clear, coded, and scrambled transmissions and relay these to U.S. listening posts. Two dramatic Ferret capabilities: Tapping Soviet microwave telephone links and pinpointing missile launch sites by their radio guidance signals....."

SPECIAL ISSUE On CORROSION:

Materials in Design Engineering, Reinhold Publishing Corp., 430 Park Ave., New York 22, N.Y., has its January, 1963, issue

devoted entirely to corrosion problems. Chapter headings are as follows: "The Many Faces of Corrosion"; "Evaluating Materials for Corrosive Service."; "What We Do and Don't Know About Corrosion"; "Designing to Prevent Corrosion"; "Coatings to Prevent Corrosion"; "Corrosion Resistance Data on Materials", and "Corrosion Terms You Should Know".

SURVEY OF MICROWAVE OSCILLOSCOPES:

In Microwaves, February 1963, is a 5-page Product Survey including 2 Tables by Alan Serchuk, New Products Editor. The sub-title and first paragraph state:

"The latest capabilities in wave measurement are presented in this survey of Microwave Oscilloscopes. Conventional and sampling types are described, while an accompanying article explains the function and design of sampling scopes.

"Analysis of high-speed waveforms has been one of the major problems encountered by the microwave engineer. The conventional oscilloscope is generally not capable of gigacycle bandwidths. The few instruments that do exhibit such bandwidths require very specialized circuitry and components."

The oscilloscopes discussed are made by the following manufacturers:

Analog Instrument Corp.
Cedar Grove, N. J.

Cawke Research & Electronics Ltd.
Distr. by: Calvert Electronics, Inc.
New York, N.Y.

Dumont Laboratories
Clifton, N. J.

Edgerton, Germeshausen & Grier
Boston, Mass.

Hewlett-Packard Co.
Palo Alto, Calif.

Hughes Aircraft Co.
Vacuum Tube Products Div.
Oceanside, Calif.

Lumatron Electronics
New Hyde Park, L. I., N. Y.

Tektronix, Inc.
Beaverton, Ore.

Wiltron Co.
Palo Alto, Calif.

CONSTRUCTING BROADBAND R-F SWITCHES:

In Electronic Industries, February 1963, page 97, W. Bruce Warren, Jr., RMS Engineering Inc., P.O. Box 6354 Station H, Atlanta 8, Ga., has written a 4-page article under the above title. The sub-title and paragraphs on RFI are as follows:

"With ordinary computer diodes it is possible to build low power r-f switches. The switches can turn 'on' and 'off' in a few nanoseconds, and they will operate up to and above a few thousand megacycles. The details are given here."

"Gating RFI"

"The switch can be used to 'disconnect' a receiver from its antenna during the occurrence of radar or other pulse type (broad band) interference. This has several advantages over other blanking schemes. If blanking is done further down the line, e.g. at late i-f or audio, saturation and ringing may have already been produced by high level interfering pulses. Also, the use of the switch as a retrofix is an external modification and does not need any internal changes in the receiver.

"The introduction of a switch in the input r-f circuit does not produce any intermodulation effects, since in the 'closed' position the diodes are backbiased and are essentially 'not there'. In the open position, a high attenuation is inserted be-

tween the antenna and the receiver input. Also, there is very little feedthrough from control circuit to output. In some speech system applications using this technique, it is possible to hear the 'holes'. Although not nearly as objectionable as the interfering pulses themselves, the 'holes' may be annoying. This problem has been solved by driving the switch control circuit at a multiple of the interfering pulse repetition rate. This places the gating rate above the audio range. Little degradation results.

"When the source of interfering pulses is nearby, a sync line may be used to connect the switch control circuit with the source. When the RFI source is not accessible, a simple, low gain receiver may be used in the switch control circuitry."

CUT-OUT SLIDE RULE Simplifies Noise Calculations:

R. LaRosa, T. Cafarella and C. E. Dean, Hazeltine Research Corporation, Little Neck, New York, have written a 3-page article in Electronics, February 8, 1963. The first two paragraphs are as follows:

"The noise figure of a receiver or amplifier can be obtained by measuring its power output when connected successively to two sources of different temperature, as shown in the illustration p. 66, and making calculations with this slide rule.

"The noise figure is obtained in two steps, the first step giving the excess noise temperature contribution T_e of the receiver, a quantity widely used to describe the quality of ultra-low-noise equipment. The second step, if desired, is to convert the value of T_e into the equivalent noise figure, the quantity generally used for expressing the performance of medium-low-noise equipment."

Single copies of this article are available free by checking the reader service card of Electronics.

NOISE In TRANSISTOR MIXERS:

Proceedings of the IEEE, February 1963, contains a paper by J. S. Vogel and M. J. O. Strutt, both of the Swiss Federal Institute of Technology, Zurich, Switzerland, under the above title. It is a 9-page article starting on page 340. The summary of the article states:

"Summary- Starting from the physical sources of noise in junction transistors, an equivalent noise circuit for a high frequency mixer circuit is presented. By means of formulas which have been derived for normal amplifiers and mixers the noise current components in the collector circuit are computed. These noise current components at the intermediate frequency are due to diverse amplifying and mixing processes. The dependence of the derived noise factor upon working point, generator output resistance, frequency and oscillator voltage is verified.

"The noise figure exhibits a minimum not only as a function of the generator output resistance but also as a function of the collector direct current. The noise figure may be optimized by choosing appropriate values for the circuit components and the operating point. Finally, the application of the noise formula to a dc-stabilized mixer stage is presented."

ITEMS OF INTEREST In ELECTROMECHANICAL DESIGN, January, 1963: Relay Case Grounding

Electromechanical Design, January 1963, is running a series of columns on relays starting with the December 1962 issue. The January, 1963, column discusses relay case grounding and its various effects including RFI and personnel hazards. The February, 1963, issue will contain a column on single and three phase ratings.

Selecting Electronic Components for Space Radiation

Dr. Leonard B. Gardner, Scientist-in-Charge, Radiation Effects, nuclear Sciences Laboratory at Northrop Space Labs., Hawthorne, California, has written a 7-page article including 3 tables and 5 graphs. The sub-head states:

"This article discusses the selection of electronic components for application in a space radiation environment. The selection is primarily based upon favorable reports in the literature respecting the components' performance in pulsed and steady state radiation environments of mixed neutrons and

gamma rays. Secondary consideration is given to the differing degree of damage between these environments, i. e. between space radiation and mixed neutron and gamma ray radiation. In certain instances, the reports of component tests have been modified to conform with expected results in space radiation. In these instances, the modification is based upon the various mechanisms of radiation damage and experience in radiation testing. No attempt is made herein to correlate the energy dependence of damage between the various environments."

NBS MEASURES RADIATION BELT From NUCLEAR BLAST:

Space/Aeronautics, February 1963, page 47, has a short item under the above title. One paragraph states:

"Two months after the explosion, about one half of the radiation had decayed. Since the rate of decay is thought to be decreasing, at least 15 per cent of the original radiation may be present after one year."

DETERMINING SYSTEM NOISE FIGURE And SENSITIVITY:

Electronics, February 1st, 1963, page 44, has a 2-page article by H. H. Reed, Systems Engineer, Space Systems & Antenna Div., Collins Radio Co., Dallas, Texas, under the heading. "Rapid Evaluation of Complex Receiving Systems". There are two nomographs; the first for graphical determination of system noise figure which also includes values for equivalent noise temperature, and wide-range temperature scale which allows rapid determination of system sensitivity under varying conditions. The sub-head states:

"When receiving system consists of several units in cascade such as preamplifiers, multicouplers and receivers, these convenient nomographs can help evaluate performance as to noise figure and sensitivity. Second unit performance can also be expressed as equivalent noise temperature."

GOATS Used In RADIATION HAZARD AREAS:

It has been learned that the highly classified method of mowing grass above ammunition depots at critical installations is actually the use of goats. This is because power lawn mowers might touch off explosions. The classified part is that the goats have to be fed a metal-free diet.

TAMAR BUYS STODDART AIRCRAFT RADIO COMPANY:

Announcement has been made of the acquisition of the Stoddart Aircraft Radio Company, Inc., Los Angeles, by Tamar Electronics Industries, Inc. Rulon Gene Shelley, formerly vice-president and general manager of the Tamar Electronics Division, has been named vice-president and general manager of Stoddart. Mr. Stoddart will stay on temporarily to permit orderly transfer of management and operations.

PRICE SET For SPACE/AERONAUTICS REPRINT:

The Space/Aeronautics reprint, "Electromagnetic Compatibility", mentioned in PGRFI Newsletter No. 24, page 8, may be obtained from Space/Aeronautics, 205 East 42nd St., New York 17, New York, for \$1.00 per copy.

BULLETIN ON ERASURE OF MAGNETIC TAPES:

Technical Talk Instrumentation Bulletin No. 5 published by the Minnesota Mining and Manufacturing Co., 2501 Hudson Road, St. Paul 19, Minnesota, describes how magnetic tapes should be packaged in order to minimize exposure to strong magnetic fields. Copies may be obtained by writing to Department Y2-289 at the above address.

EPOXY BONDING For MAGNETIC SHIELDS:

The Magnetic Shield Division of Perfection Mica Company, Chicago, Ill., announces a new epoxy bonding technique which enables production of multi-layer netic and co-netic magnetic shields that meet MIL spec requirements for finishing and plating.

NEW PUBLICATIONS:

Basic Radio Propagation Predictions:

A monthly service can be obtained through the Superintendent of

Documents, U.S. Government Printing Office, Washington 25, D. C.
The details are as follows:

"The predictions provide the information necessary for calculating the best frequencies for communication between any two points in the world at any time during the given month. The data are important to all users of long-range radio communications and navigation, including broadcasting, airline, steamship, and wireless services, as well as to investigators of radio propagation and ionosphere. Each issue, covering a period of 1 month, is released 3 months in advance and contains pertinent charts, drawings, and tables. Subscription price: \$1, 50 a year; 50¢ additional for foreign mailing. Catalog No. C 13. 31."

NEW PRODUCTS:

QRL Interference Suppressors:

Electrical Design News, January, 1963, page 215, has the following to say under the heading "Radio Interference Suppressor Prevents Frequency Jamming":

"A series of compact adapters for radio receivers, called "QRL Interference Suppressors", is designed to prevent frequency jamming and to eliminate interference. The devices operate on the principle of phase selectivity and are to be connected ahead of any radio receiving system. Various models in the series cover specific bands within the range of 150 kc to 25 Mc. When not in suppression service, the units double as tuned preselectors, providing improved signal-to-noise and image ratios while reducing intermodulation responses.

"The Pioneer Electric & Research Corp., 743 Circle Ave., Forest Park, Ill."

New Noise Cancelling Microphone:

Pacific Plantronics, Inc., of Santa Cruz, Calif., has developed a miniaturized, 2-ounce communications system to be used in the space helmet of astronaut Gordon Cooper during his orbital flight this spring. This system includes a new microphone which does a better job of cancelling ambient noise than the one used in the Schirra flight and it is claimed will achieve an effective noise cancellation of 5-15 decibels.

Metal Foil Wallpaper for RF Shielding:

Emerson & Cuming, Inc., Canton, Mass. has developed Eccoshield WP which is a group of specially developed metal foils which can be installed like wallpaper. It can be bonded with epoxy adhesives to understructures such as wood, plaster, concrete, metal, etc., with a minimum of site preparation. A Preliminary Technical Bulletin 11-2-9 on Eccoshield WP and a Preliminary Technical Bulletin on 11-2-5 on Eccoshield VY may be obtained on request. These 2 Bulletins include general installation instructions with materials to be used. For low frequency magnetic field shielding, Emerson & Cuming, Inc. has developed Eccoshield WP-3SS which is a stainless steel product with 3 mil thickness.

Electrically Conductive Coated Glass:

The Corning Glass Company, Corning, New York, in its brochure, "Designing With Glass", mentions that a special metallic oxide coating can be bonded on a glass panel, rod, or tube which will intercept RF radiation and become a highly efficient reflector of infrared radiation. They would like new production and new design ideas.

New Ignition RF Suppression System:

The Webster Manufacturing Company, 317 Roebling Road, South San Francisco, California, has developed a complete ignition shielding system called "Electro-Shield" for automobile and marine engines. Further information may be obtained by writing to J. R. Adams, Sales Manager.

NOTE:

Your editor has been receiving an increasing number of telephone calls from engineers in various companies who have been instructed to survey the RFI and EMC fields and report to management. In most cases, those who have been given the job do not have the remotest idea of what the subjects are all about. They ask for any help which can be given, other people to contact and the extent of the subject. When asked if a copy of their report could be obtained, the answer is usually negative.

Your editor has, however, seen parts of some of these reports and regrets to say that management is often given a very erroneous idea of what it is all about - to the detriment of the whole EMC/RFI program.

If it would be possible for just one company, which has produced an accurate report, to make that report available to other companies, a great deal of time and energy could be saved and our field given a big boost. Is there such a report available?

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