IEEE

NEWSLETTER



ELECTROMAGNETIC COMPATIBILITY GROUP

ISSUE No. 48

Rexford Daniels, Editor Monument Street, Concord, Mass.

APRIL 1967

G-EMC AD COM



Call for Nominations

The IEEE G-EMC Nominations Committee hereby notifies the membership that nominating petitions for the election of five (5) members to the IEEE G-EMC AdCom for a three-year term commencing July 1, 1967, will be accepted up until May 31, 1967. The bylaws concerning these nominations are as follows:

ARTICLE VI

Section 1: On or before December 1st of each year, all members of the IEEE G-EMC shall be notified that nominations for members of the Administrative Committee are open. This shall be done either by notice in a Newsletter or by direct notification of each member by post card or letter.

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

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

The members of the Administrative Committee, whose term of office expires on June 30, 1967, are:

John J. Egli <u>Fred J. Nichols</u> Zigmund V. Grobowski Henry Randall Ralph M. Showers

The above notice in this Newsletter complies with the requirements in Section 1 and will be the only notification for 1967 nominations which will be sent to members by the IEEE G-EMC.

Other members of the Administrative Committee and their expiration dates are:

1968

John A. Eckert Dept. 344/32, Northrop-Norair 3901 Broadway Hawthorne, Calif. 90250

.

James J. Krstansky IIT Research Institute 10 West 35th Street Chicago, Illinois 60616

Stanton A. Bennett 2016 N. Patrick Henry Dr. Arlington, Virginia 22205

<u>Richard B. Schul</u>z 17128 N. E. 5th Place Bellevue, Washington 98004

Leonard W. Thomas 1604 Buchanan Street, N. E. Washington, D. C. 20017

1969

Charles Gregory	Dr. Heinze M. Schlicke
2000 S. Eads	8220 N. Poplar Drive
Arlington, Virginia 22202	Milwaukee, Wisconsin 53217

J. Paul Georgi, Technical Samuel Skolnik Director Branch Chief, ECAC Systems Engine USNMEL, Annapolis, Md. SEACR 21402 Wright-Patters

Samuel Skolnik Branch Chief, USAF, R.T.D. Systems Engineering Group, SEACR Wright-Patterson AFB, Ohio 45433

A. H. Sullivan, Jr. 7121 Wolftree Lane Rockville, Maryland 20852

₩......

Each nominating petition (signed by at least 15 IEEE G-EMC members, with addresses, and accompanied by a biographical sketch of not more than 100 words) should be sent before May 31, 1967 to the Chairman of the Nominations Committee:

James J. Krstansky, Assistant Director Electronics Research IIT Research Institute 10 West 35 Street Chicago, Illinois 60616



Mohawk Valley:

A meeting was held on January 10, 1967 and a talk was given by <u>Donald R.J. White</u>, White Electromagnetics, Inc., Rockville, Md., on <u>"Electromagnetic</u> Compatibility - Its Definition, Problems, and Future".

New Jersey Coast:

There was a meeting held on September 22, 1966 and a technical film was shown on electromagnetic compatibility entitled "The Invisible Battleground".

Another meeting was held on November 2, 1966 and Robert V. Titus, Director of ECAC, spoke on <u>"E. C. A. C.</u> Mission and Accomplishments to Date"

San- Francisco:

A meeting was held on October 26, 1966 and Andy Hish, EMC Instruments, Inc., North Hollywood, Cal., spoke on "EMC What Are We Measuring".

Washington, D. C.

There was a meeting held on January 26, 1967 and a talk was given on <u>"Navy Actions Regarding Electro-</u> <u>magnetic Compatibility"</u> by Wilford Dean, Jr., Director, Radio Frequency Spectrum, Office of Chief of Naval Operations.

H. M. SACHS JOINS THE VERTEX CORPORATION

Herbert M. Sachs, formerly Deputy Director of the Electromagnetic Compatibility Analysis Center of the IIT Research Institute, has joined the technical staff and become a principal of the Vertex Corporation, 10400 Connecticut Ave., Kensington, Md. 20795. This company will-specialize in research and development in a number of technical disciplines including operations research, electronic systems analysis, and basic physics programs.

INTERFERENCE AND RADIO ASTRONOMY

The following item appeared in the 11 February 1967 issue of Science News:

"Last December, a U.S. scientific satellite had to be launched with an important experiment deliberately disabled because it would have seriously interfered with radio telescope reception over half the earth.

"The experiment was an ionospheric sounder transmitting at a frequency of 406.8 megahertz, according to a letter in the Feb. 3 Science by G.W. Swenson Jr. of the National Radio Astronomy Observatory and R.N. Bracewell of Stanford University.

"They urged scientists contemplating transmission near radio astronomy frequencies to check first with the International Frequency Registration Board, Palais Wilson, Geneva, Switzerland.

FAIRCHILD/ELECTRO-METRICS TO HOLD ONE-DAY SEMINAR

Fairchild/Electro-Metrics Corporation, 80 Church St., Amsterdam, New York 12011, will hold a one-day seminar at the Shoreham Hotel in Washington on July 17th the day before the opening of the 9th Electromagnetic Compatibility National Symposium which opens July 18th at the same hotel.

The one-day Fairchild/Electro-Metric's seminar is open to all interested persons in the RFI/EMC field. Design of, applications and operational characteristics and theory, of Fairchild automated RFI instrumentation including the EMC-10, EMC-25, and the Spectrum Surveillance System Model FSS-250 will be convered. Present and potential users of this equipment are particularly invited. There will be no charge for attendance but those who plan to attend are asked to let Dale Samuelson at Fairchild, 80 Church St., Amsterdam, N.Y. 12011 know by July 1st that they will be in attendance because a luncheon will be furnished by Fairchild.

. Sant

Instructions for Attending SAE-AE-4 Meetings.

Those interested in attending the SAE Committee AE-4 (on Electromagnetic Compatibility) meetings (which are announced in many trade journals), need only to write:

> J. F. Lippert, Staff Engineer AE-4 Committee, SAE Headquarters 485 Lexington Avenue New York, N.Y. 10017

> > Walter D. McKerchar, Chairman

CC.



IEEE Transactions on Instrumentation and Measurement, in its December 1966 issue, has published some of the papers given at the above conference at the National Bureau of Standards Laboratories, Boulder, Colorado, June 21-23, 1966. Papers of particular interest are:

Measurement of FM Noise Spectra of Low-Noise VHF Crystal Controlled Oscillators - by R.E. Paradysz and W.L. Smith, Bell Telephone Laboratories, Inc., Allentown, Pa.

The abstract and first paragraph are as follows:

"Abstract - The design and characterization of stable, low-noise crystal controlled VHF oscillators are described. Operating in the 60 MHz to 80 MHz frequency range, these oscillators have shown total refrequency deviations of less than 4 parts per 10¹⁰ in a 5 kHz band. Noise characteristics have been determined from power spectra measurements, FM noise measurements, and phase noise measurements. The equivalent noise sideband power spectra corresponding to each method of measurement were calculated and compared to the spectra predicted by a very simple model of the oscillator circuit. Agreement within a few dB was found for the region within about 500 Hz of carrier frequency, but measured noise power was found to be considerably higher than predicted for higher baseband frequencies in the range from 800 Hz to 5 kHz. Measurement techniques and evaluation of data are presented.

"Current widespread interest in low-noise highstability signal sources prompted an investigation of the noise characteristics of quartz crystal controlled oscillators. The residual phase and frequency fluctuations of signal sources effectively limit the sensitivity of Doppler-type radar and tracking systems (1) -(3), contribute to the excess noise in adjacent channels of microwave communications systems, and influence the accuracy and resolution of high-speed data processing systems. Consequently, a better understanding of the fluctuations and noise associated with stable fe frequency generators is of considerable interest." Noise Comparators and Standards for S and X Bands

by

G. J. Halford, Services Valve Test Laboratory Haslemere, Surrey, England

The abstract and first three paragraphs are as follows:

"Abstract - Noise comparators and associated thermal standards have been developed to provide accurate noise source calibration facilities at S and X Bands. The comparators are based on a null-balance form of the Dicke radiometer, but eliminate problems of RF switching by using an IF switch. Matching facilities are incorporated. The thermal standards include both waveguide and coaxial forms and operate at 400°C. The most successful type is described in detail. Gas discharge noise sources have been developed as highly reproducible transfer standards, with outputs stable over many thoasands of hours to within a few hundredths of a decibel.

"The need to improve the accuracy of noise measurements has become increasingly evident in recent years, particularly in the microwave frequency bands. "A pioneering step in this direction was taken by Wells and his colleagues at the National Bureau of Standards, Boulder, Colo. (1), when permanent facilities were set up for the calibration of X-Band gas discharge

noise sources against an accurate thermal standard. "This paper describes similar work carried out in S and X Bands at the Services Valve Test Laboratory, Haslemere, England, as part of a program to provide noise comparators, thermal standards and stable transfer standards for all the more widely used frequency bands."

Precision Power Measurements of Spacecraft CW Signal Level with Microwave Noise Standards

3

by

C. T. Stelzried and M.S. Reid, Jet Propulsion Laboratory, California Institute of Technology Pasadena, Calif.

The abstract and first paragraph are as follows:

"Abstract - One of the important measurements required in the evaluation of a spacecraft communications system is the determination of the absolute level of the received CW power. A new, precise measurement method which compares CW signal power with microwave noise power is described. This technique, together with statistical methods of data reduction, results in significantly increased accuracy. The overall probable error of the measurement was reduced from 0.8 dB to 0.3 dB, defined at the receiver input for an antenna/receiving system of the Jet Propulsion Laboratory's Goldstone Deep Space Communication Complex. Application of these techniques to the Mariner IV spacecraft was begun on June 29, 1965, and continued after Mars encounter. The theory, equipment, and method of data acquisition and reduction are described. Results and accuracies are discussed. The Mariner IV spacecraft received power at Mars encounter normalized for 100 percent antenna efficiency was measured to be -154.2 dBm as compared to a theoretically predicated level of -153.1 dBm.

"The determination of the CW power level received from the spacecraft is an important measurement required in the experimental evaluation of the communications system of a deep space mission. This measurement is important in the design of future spacecraft as well as in the evaluation of earthbound receiving stations. This paper describes a new and improved technique of measuring spacecraft power levels, which results in significantly reduced errors."



ITENS OF INTEREST IN EVALUATION ENGINEERING JANUARY/FEBRUARY 1967

The items of interest are as follows:

Evaluating and Specifying RFI Filters - by William F. Johnson, The Potter Company, Wesson, Mississippi

The opening paragraph is as follows:

"Modern electronic equipment with its inherent sophistication and miniaturization has created a relatively new problem - Electromagnetic Interference (EMI). In the past, if one piece of electronic equipment affected the performance of a nearby piece of equipment, we afforded ourselves the luxury of separating these equipments by such a distance as to eliminate the interference between them. Today, we are using more and more electronic equipment in a given space. With the density of electronic equipment increasing daily, not only on military and space vehicles and installations, but also in the commercial world, the problem of EMI is attracting worldwide attention.

The Key Ways To Reduce Electromagnetic Radiation Side Effects - by Rexford Daniels, President, Interference Consultants, Inc., Boston, Mass.

The first paragraph is as follows:

"As science pushes out the use of the electromagnetic spectrum at both ends, it is finding itself coming into increasing conflict with both nature and other users of the spectrum. The reason seems to be that researchers are discovering that everything in nature and made by man has one or more resonant frequencies that can be stimulated by man-made electromagnetic energy. When this happens, it can cause such reactions as mutations in biology, changes in molecular structure in chemistry, accelerated and increased corrosion in metals and even explosions. These reactions, usually unforseen when planning the use of a new frequency, are called 'side effects' when found. This term is now being expanded to include unexpected changes in values of components, creation of new resonant conditions and accumulative effects of lowlevel emissions."

An interesting quote:

(a. "One connector engineer told an EVALUATION ENGINEERING editor, 'Look for a three to fourfold increase in the use of RFI connectors in the next few months.'" ARTICLES OF INTEREST IN EDN - DECEMBER 1966

Plastic Conductors Transparent to RF

The Radio Standards Laboratory, National Bureau of Standards, Boulder, Colorado, has developed a non-metallic transmission line. A brief description is contained in the sub-title and first paragraph of a single page article as follows:

"How do you precisely measure an RF electromagnetic field when transmission-line conductors must intercept the field to reach the measuring antenna? An approach not fully exploited before makes the conductors 'transparent' to the field.

"A nonmetallic, balanced transmission line is 'semiconducting' to avoid perturbing effects on RF field measurements. The line is rendered 'semiconducting' by uniformly dispersing finely divided carbon black throughout a polytetrafluoroethylene (PTFE) plastic material. The RF losses are extremely high (\$53 db/ft at 30 MHz) compared with that of the conventional copper-conducting line."

Single-Step RF Attenuation Measurement Range Extended

H. L. Kaylie, Airborne Instruments Lab., Div. of Cutler-Hammer, Inc., Deer Park, N.Y., authored a technical paper at the Conference on Precision Electronic Measurements held in Boulder, Colorado. The sub-title and first paragraph of a 2-page write-up is as follows:

"A new technique has been developed for measuring attenuation at RF. With this technique it is practical to accurately measure RF attenuation greater than 100 db in a single step. The technique uses noise injection and coherent detection as additions to an IF series substitution method of RF measurement.

Conventional IF Substitution Methods

"From a practical viewpoint, the IF substitution method of RF attenuation measurement has offered the largest single-step measurement capability. In this method a mixer is used to convert the signal power at RF to linearly related power at IF. A given percentage change in the RF signal level than will result in an equal percentage change in the IF signal level. The percentage change is measured by adjusting a precision variable IF attenuator so that its attenuation change is equal to the change in the IF signal level."

Nomograph - Some Filter Design Parameters

Neil Welsh, chief engineer of Telonic Engineering Co., Div. of Telonic Industries, Inc., Laguna Beach, Calif., has developed a nomograph of which the sub-title of the article describes it as follows:

"In analyzing filters for either Chebishev or Butterworth response, this nomograph can give rapid results with a good degree of accuracy.

DB Made Easy

"This convenient scale converts voltage, current or power ratios directly into decibels. The power db scale can be read in dbm if the ratio scale is labeled milliwatts."

Lighted Pushbutton Shielding

A 9-page article titled "LPB's For The Do-It-Yourselfer" has the following paragraph of interest:

"According to D. Clark from Licon, more customers are requesting RFI shielding in lighted pushbutton switches. The 'hidden legend', such as pilot control, is quite effective in military applications.

"Some of the larger hotels, such as the Hilton, are making use of lighted control in their room circuits. The bulky automation equipment in Pepsi Cola's new bottling plant is controlled from a lighted switch panel. JPL and Uncle Sam's Post Office are finding new applications for lighted switches.

"Ed Lortie from Oak pointed out that home market in such applications as projection equipment and microwave ovens looks very promising."

ARTICLES OF INTEREST IN EDN-FEBRUARY 1967

EMI Cures for AGE - Part 1

James D. Habegger, Project Engineer, Instrument Div. of Lear Siegler, Inc., Grand Rapids, Michigan, has authored a 4-page article under the above title. The subtitle and part of the first paragraph are as follows:

"Attempts to reduce EMI generated by AGE (Aerospace Ground Equipment) sap hours of labor and induce headaches. By designing EMI-preventive measures into the AGE, life can be made more pleasant.

"AGE operation involves many switching functions. These functions are particularly troublesome because they cause exceptionally difficult EMI control problems. In such systems, the first step toward a successful design is a clear definition of the pulse parameters (rise time, height, etc.)....."

Flat Cables - Test Before Flying

Roy O. Lang, Sr. Research Egnineer, Lockheed Missiles and Space Co., Sunnyvale, Calif., has authored a 5-page article under the above title. The sub-title and subject headings are as follows:

"The use of flat flexible cable offers a relatively simple solution to the problem of routing a large number of conductors in a restricted space. However, the switch from wire cable bundles involves more than a change in the type of hardware used. Detailed here are some of the electrical characteristics that must be considered. (Characteristic topic titles only followed.)

> "Inductive Coupling Test "Crosstalk Between Conductors

"Interference Pickup from a Radiated Field

"Reducing Interference by Utilizing Conductor-To-Shield Capacitance The conclusions are as follows:

"The tendency of flat shields to develop eddy currents in induction fields can be eliminated by 'stripping' the shield. This procedure, however, will increase the susceptibility to radiated fields in 100ohm and high-impedance circuit applications.

"Crosstalk between traces is low. It can be reduced further by leaving space conductors adjacent to interference source conductors and by using a strip shield.

"When subjected to radiated fields, the flat cables developed less interference voltage than the twisted shielded pair under open circuit conditions (Fig. 6). In all other impedance applications the flat cables in radiated fields developed higher interference voltages (Fig. 6) and currents (Fig. 7). In these tests equal copper cross-section was achieved by paralleling a number of flat conductors. Thus, the flat cables suffered from the probable disadvantage of having large flat areas directly exposed to the field. "The low capacitive reactance inherent in flat

"The low capacitive reactance inherent in flat cable construction makes this cable a prime candidate for dc power-line applications. Transient interference can be shunted to ground. The shunting characteristics can be calculated and the lines can be designed to serve as combined conductors and filters."

Supressing Inductive Switching Interference

Edward J. Ho, Ampex Corporation, has authored a 2-page article with nomograph under the above title. Paragraphs of interest are as follows:

"The basic picture: many devices, much performance variation. These data give a sound basis for comparing device performance and for choosing the most suitable method to meet specific requirements.

"Switching inductively loaded circuits often causes interference in adjacent electronic equipment. The means used to Suppress this usually change the 'dropout' or 'release' time, a factor of varying importance depending on the particular application.

"In Fig. 1, the effect on release time is plotted for four basic suppression circuits and for varying ratios between supply and maximum voltages.

"Table I evaluates the various suppression techniques on six major bases.

"This information has been extracted from NASA Tech Brief 66-10449."

AIRBORNE INSTRUMENTS BRINGS OUT NOISE FIGURE MEASUREMENTS BOOKLET

Airborne Instruments Laboratory, Deer Park, Long Island New York 11729, has brought out a 20-page booklet titled "Noise Figure Measurements". Chapter headings are: Theory and Definitions; Methods of Measurement, and Instrumentation. Instructions as to whom to write for the Noise Figure Slide Rule are given on the back cover. Copies of the booklet may be obtained by writing to: George F. McCarthy, Sales Manager, Microwave Instruments Department, at the above address.



A FREQUENCY-SELECTIVE LIMITER USING NUCLEAR MAGNETIC RESONANCE

D. R. Jackson and R. W. Orth, Boeing Company, Seattle, Washington, have authored a 10-page article, under the above title, in the January, 1967, issue of the Proceedings of the IEEE. The Abstract and the first paragraph of the Introduction are as follows:

"Abstract - A new device is reported which promises to be of significant value in combating in-band interference. By the application of an inhomogeneous magnetic field to a specially shaped volume of nuclear spins, frequency-selective limiting is obtained over a band of frequencies much larger than the unbroadened NMR (nuclear magnetic resonance) linewidth. The NMR limiter is a passive, self-adaptive filter with the capability of selectively attenuating signals that are separated in frequency by as little as a few cycles per second. The theory of this device is developed, and experimental results are given for a model operating at 30 MHz with a bandwidth of 1.2 kHz. Suppression by 30 db of CW interference placed within the sidebands of an AM voice signal has been observed.

"Introduction - A new anti-interference device that uses nuclear magnetic resonance (NMR) to obtain frequency-selective limiting is described in this paper. This device can be used to combat ECM and RFI, and promises to be especially useful in systems that are subjected to CW or periodically modulated signals."

RFI FILTERS IN IDENTIFICATION TO APPLICATION

Cornell-Dubilier Electronics, 50 Paris St., Newark, N.J. 07101, has brought out a 16-page RFI filter catalog. The catalog has been designed to help the design engineer select the proper filter necessary to eliminate unwanted interference signals. Stock-standard filters have been developed to simplify filter engineering and offer the designer frequent opportunity to avoid costly, custom engineering and manufacturing of filters. Sections of the catalog are titled: Numerical Listing, Feed-Thru Diagrams, Pi Diagrams, Tubular Pi Diagrams, and Filter Capabilities.

BOOKLET FOR SHIELDING ENGINE-GENERATORS

"Radio Frequency Interference" is an 18-page report dealing with all phases of RFI as it pertains to enginegenerators. The exhaustive study discusses the causes of RFI and the methods to measure, locate and suppress it. The report is published especially for those who use engine-generators in the areas of strategic radio transmission. Copies can be obtained by writing to Onan Div. of Studebaker Corp., 2515 University Ave. S.E., Minneapolis, Minn. 55414.

R

SLIP-RING NOISE TECHNICAL PAPER

Slip-Ring Noise is the subject of this 12-page technical paper. Well illustrated with line drawings and photographs, the publication concerns electrical noise in sliding contacts, a major problem encountered by.users and producers of slip rings. The brochure presents an understanding of the fundamentals of noise characteristics and the solution to this problem by the utilization of proper analysis techniques. Copies may be obtained from Electro-Tec Corp., Virginia Div., Blacksburgh, Virginia.

Sand Sand

AUDIO TAPE AVAILABLE ON SECONDARY POWER LINE INTERFERENCE

Donald M. Knight, 5950 Orchard St., Dearborn, Michigan 48126, who has spent 40 years working as a radio and television interference investigator for utility companies, has prepared a one-hour tape recording for the purpose of training personnel. The tape includes actual reproductions of unusual noise problems, the description of the type of equipment that should be used in making tests, and the corrective action which was required in a number of instances. Tape time is at 31/4 inches per second and the cost is \$20.00 per tape.

WHY R-F CONNECTORS FAIL!

William J. McNeil, Micon Electronics, Inc., Garden City, N.Y., has written a 4-page article under the above title in Electronic Products, February 1967. The sub-title and first two paragraphs are as follows:

"At gigacycle frequencies the r-f connector is much more than a piece of machined metal. Its impedance properties can be easily affected by misapplication, careless handling, or poor assembly.

"Two comparatively new developments have focused attention on the reliability of r-f connectors.

"As equipment has moved into the higher frequency ranges - particularly the gigacycle region - the number of connector failures has mounted, and there has come a realization that the connector is much more critical an item than previously supposed. The connector, in fact, with its associated cable, has become the limiting factor in most microwave systems."

SAR

HELP STAMP OUT EMI

Robert B. Cowdell, Genistron, Div., Genisco Technology Corp., Los Angeles, Calif., has written a 5-page article with 11 figures in EDN, November 23, 1966. The subtitle is as follows:

"Effective use of EMI testing methods in conjunction with equipment design can get you past that formidable EMI spec. However, effective use implies effective planning on the part of both managers and designers. This article suggests means for better planning aimed toward more effective EMI control."

S

Saul A. Ritterman, Dept. of Electrical Technology, Bronx Community College, Bronx, N.Y., has written a 4-page article, including 2 graphs, under the above title, in the February 1967 issue of EE, The Electronic Engineer. The sub-title and first paragraph are as follows:

"In power supply filters, calculate the filter capacitors in terms of the ratio of load current to ripple voltage. It is easier than calculating capacitance as a function of ripple attenuation.

"There is no question that the design of power supply filters should be based on the amount of ripple voltage that we can tolerate at the output. The best criteria to relate the filter to ripple, is to carry the filter analysis in terms of the ratio between load current and maximum ripple voltage. This approach is, in many cases, far more useful than the conventional one of relating the filter design to the percentage improvement that the filter produces in output ripple voltage."

· ARC

TAPES BY MAIL

The following letter appeared in the February, 1967 issue of Radio-Electronics:

"Dear Editor:

"The letter in Jack Darr's 'Service Clinic column of November 1966 regarding erasing of tapes sent overseas was of special interest to me. His reply was correct, but there was one factor left out. All outgoing packages passing through customs offices either here or overseas are passed under an X-ray machine. You know what would happen to a sound tape going under such radiation complete erasure. Postal authorities stress that any shipments of sound or data recordings made magnetically on tape be clearly marked:

> SOUND TAPE RECORDING DO NOT X-RAY

"This is true as well of the tapes coming back into the U.S. from abroad.

L. Norman Gray

Indianapolis, Ind."

Sand L

PROBLEMS IN DESIGNING AIRBORNE POWER SUPPLIES

Thaddus Pertowski, Section Head, Kearfott Products Div., General Precision Inc., Little Falls, N.J., has authored a 4-page article, under the above title, in the February 1967 issue of EE, The Electronic Engineer. A paragraph of interest is as follows:

"Radio Frequency Interference

"The switching regulator mentioned previously is another source of RFI. Since RFI filters must be added in each of the input and output leads and filters cost about \$15 each, the overall cost is significantly increased. For example, a power supply with 10 isolated outputs would require 20 RFI filters and add \$300 in parts cost. It is not uncommon to find as much as 1.0V peak-to-peak RFI at the unfiltered output of a power supply. The RFI filters must reduce this down to the SOMV level.

"To further control RFI, extra shielding is needed on the transformer, and isolation bulkheads are added to help contain the interference. All these RFI requirements build up extra costs, bring weight penalties and increase package sizes."

-946-

New Books

Noise and its Effect on Communication, Nelson M. Blachman (McGraw-Hill, New York), 205pp. \$13.50.

Here is a concise, unified treatment of the pertinent fundamentals of random processes and their spectra, the effect of nonlinear transformations upon a signal and noise, the statistical theory of detection, and information theory. Although the noise dealt with is primarily the Gaussian noise that arises in every electrical circuit and limits the sensitivity of electronic equipment, the approach used and many of the results obtained are general enough to apply to other types of noise as well. Suitable for reference as well as self-study, this book includes among its special features many facets of information theory not found even in more specialized books.

8

Radiation Effects on Electronic Systems, Henning Lind Olesen (Plenum Press, New York), 234 pp. \$16.50.

This introduction to the effects of nuclear radiation on electronic and electrical equipment was written to meet the needs of the electronic engineer unfamiliar with nuclear terminology who must design equipment hardened against radiation damage. It describes thoroughly the creation of the radiation environment and its interaction with electronic and electrical circuitry, and discusses problems of design against radiation damage and interference. Topics discussed include radiation effects on semiconductors and other materials, passive and active radiation shielding, and recommended experimental methods and simulation facilities for design testing.

8

Contemporary RF Enclosures, Erik A. Lingren (Erik A. Lingren, Chicago), 108 pp. \$12.50.

An unbiased, comprehensive discussion of construction and materials, this report provides research and engineering information of improvements made in RF enclosures The author outlines the five factors that determine the degree of attenuation to be expected from different types of rooms and the material used in their construction. With the information given and the tables shown, the attenuation that will be obtained can be predicted with considerable accuracy for each type of room.





Glenair Presents Shielded Assemblies

Glenair, Inc., 1211 Air Way, Glendale, California 91201, has come out with a new line of EMI Cable-To-Connector Shielding, Circular EMI Adapters and Rectangular EMI Glenair offers a wide variety of cable Backshells. shield termination techniques to satisfy individual. requirements, ranging from simple braided shielding to flexible or rigid conduit. Inquiries should be made for descriptive literature Form No. G101.

Emerson & Cuming Presents New Products

Emerson & Cuming, Inc., Canton, Mass. 02021, has come out with several new products for the RFI/EMC field.

Conductive Plastic Magnet for RF Shield:

Eccoshield SV-MAS is a new approach to the problem of RF and mechanical sealing. A flexible plastic magnet core is bonded to a highly conductive plastic film of Eccoshield SV.

Eccoshield SV-MAS can provide an extremely simple closure By applying a strip of it around the edge of the opening, the plastic magnet draws the door or cover into excellent contact with the conductive plastic thereby forming the RF and mechanical seal.

Silicone Rubber Based Conductive Sheet Material:

Eccoshield SV-R is the latest addition to the family of conductive sheet materials offered by Emerson & Cuming, Based on silicone rubber, Eccoshield SV-R has flex-Inc. ibility and elasticity, together with conductivity approaching that of many metals.

It has the elongation - about 100% - and high temperature capabilities - up to at least 400°F - typical of silicones. Although tensile strength is not as high as that of Eccoshield SV, the original conductive sheet material, it has superior compression set characteristics. When stretched, volume resistivity increases, but returns to the original value when tension is removed.

"Do It Yourself", RF Shielding Kit

Emerson & Cuming, Inc., Canton, Mass., has brought out a 4-page bulletin 11-2-9A, under the above title, which describes in minute detail how you can build a high performance RF shielded room using the Eccoshield CP system of metal-clad panels and joint-sealing components. The purpose of this system is to reduce costs, eliminate the need for great skill and know-how in assembly, and provide a means whereby RF shielded enclosures can be erected on short notice by the user. The following insertion losses have been measured when properly put together:

250	KHz	Magnetic F	ield	greater	than	86	db
10	MHz	Electric F	ield	greater	than	106	db
400	MHz	Plane Wave		greater	than	80	db

The Electro-Mechanics Co., Box 1546, Austin, Texas 78767, has brought out a magnetic field intensity meter which is especially designed for RFI measurement, evaluation and analysis. The Model 6611 meter has a bandwidth of 1.0 cps to 15 kc at 3-db points and a sensitivity of 2 The Model 6611 meter has a bandwidth of ucersteds. The sensor is 8 inches long and 1 inch in dia. or use in small or restricted areas. The device is battery-operated, requires less than 2w for operation and weighs only 12 1b.

Tecknit Brings out Magnetic Gaskets

Technical Wire Products Inc. 129 Dermody St., Cranford, N.J. 07016, has brought out a new EMI/RFI shielding gasket/strip for electronic equipment enclosures that adheres magnetically to any ferrous surface. Instruction are simply to place TECHMAG, which is the name applied to this new product, on a cabinet flange where it stays permanently in place. For those who wish more information, requests should be made for Data Sheet EMC-064.



En l