IEEE NEWSLETTER

ELECTROMAGNETIC COMPATIBILITY GROUP

Number 34 August 1964

6th National Symposium on EMC:

The 6th National Symposium on Electromagnetic Compatibility was held in Los Angeles, June 9-11, 1964. The total paid registration was 250 with an additional attendance of 150 exhibitor's personnel and 70 more involved with the technical program. This is a total of 470 persons involved with the over-all Symposium. The success of the Symposium was expressed by Raymond E. Banks, Executive Secretary, Los Angeles District, IEEE, as follows:

"In view of the high interest in the subject of EMC in the Los Angeles area, we would like to host this symposium again in the very near future. The Los Angeles chapter of EMC is quite active and could provide material assistance. I hope you can mention this in the Newsletter article."

The speaker at the banquet was Maj. Gen. Benjamin H. Pochyla with an interesting talk on EMC in the Space Age. Some films from Ft. Huachuca, describing the EMC operations now going on, illustrated his talk.

The total membership of the IEEE EMC Group is being mailed a copy of the Digest of this Symposium whether or not they were present at the Show. The following is a picture of the officials of the Symposium. Unfortunately, Mr. Richard Stoddart, Chairman, could not take a more active part because of sickness in his family.

Officials of 6th National Symposium on Electromagnetic Compatibility: A. T. Parker, Chairman, Advisory Committee; John Eckert, Chairman, Technical Program; John W. McDonald, Chairman, Registration; Hollice Favors, Technical Program Committee; William Lana, Chairman, Exhibits; and Harry J. Delaney, Symposium Vice-Chairman.

Random Notes:

A single transient can cause complete malfunctioning, so now "once in flight," transients are not permitted."

RFI is still being used to describe outside interference with EMC meaning inside interference. EMC, however, is gradually replacing RFI in describing the new discipline.

MIL-STD-826 is merely a collection of test procedures for all problems in system testing. Transient test procedures have to be approved and a new procedure worked out for handling test data.

$25,000 to $50,000 is the estimated cost for a complete spectrum signature test of a system.

MIL-STD-449B contains RF characteristics of electronic equipment and is presently more of a guide than a standard.

27 Mc CB is now out of control.

U.S. Signal Corps film shown at banquet is No. MF 1194.16.

Write-ups of various subjects discussed at the Symposium have appeared in the following publications:

Electronic News, June 8, 1964, page 30, "New MIL Specs To Shape Calif. EMC Meeting".

Missiles and Rockets, July 6, 1964, page 38, "Design Cure Advocated For Radio Frequency Interference Problems".

Electronic Design, July 6, 1964, page 16, "Drive for Faster RFI Measurements Spawns New Gear".

7th National EMC Symposium To Be Held in New York:

The 7th National EMC Symposium for 1965 is planned to be held in New York in June or July of that year. Milton Kant, Sperry Gyroscope Co., Great Neck, N. Y., has been appointed Chairman of the Steering Committee with A. L. Albin, Fairchild Camera & Instrument Corp., Syosset, L. I., N. Y., as Secretary. Other members of the Committee are:

Technical Program: D. Fidelman, Electromagnetic Measurements Co., Farmingdale, L. I., N. Y., Mr. Albin, B. H. Liebowitz, Airborne Instruments Laboratory, Melville, L. I., N. Y., A. G. Zimballati, Grumman Aircraft, Bethpage, N. Y., W. S. Lambdin, Electro-Metrics Corp. Amsterdam, N. Y., J. H. Vogelman, Chromalloy Corp., West Nyack, N. Y.

Local Arrangements: R. L. Friedman, Polarad Electronic, Long Island City, N. Y., Mr. Kant, H. Bostram, Metex Electronic Corp., Clark, N. Y.

PR and Publicity: M. First, RF Interonics, Inc., Oceanside, N. Y.

Publications: P. Ross, The Bendix Corp., Teterboro, N. J.

CHAPTER ACTIVITIES

Boston:

A meeting of the PTG-MIL/EMC was held on March 19, 1964 at which time J. Paul Georgi of the Electromagnetic Compatibility Analysis Center, Annapolis, Md., gave a talk titled "The Electromagnetic Compatibility Analysis Center".

Cape Canaveral::

Two meetings were held by this Chapter: One on February 12, 1964 at which time Robert Friedman, Polarad Electronic Instruments, New York, New York, gave a paper titled "Radio Frequency Interference Measurements"; another meeting was held on April 20, 1964 and Robert W. Sproul, The Singer Co., Metrics Division, Bridgeport, Conn., gave a paper titled "The Accuracy of Noise and Field Intensity Measurement".

Chicago:

A meeting was held on December 3, 1963 and Mr. Don Cooper, Genistron, Inc., 111 Gateway Road, Bensenville, Illinois, gave a paper on "System Approach to RFI Control".

Dayton:

There were two meetings held: One on January 16, 1964 and Mr. Jack McGalk, Sprague Electric Co., Vandalia, Ohio gave a paper titled "Filter Design Topic, Tour of Facility"; another meeting was held on February 5, 1964 at which time Mr. Donald R.J. White, White Electromagnetics, Inc., Bethesda, Maryland gave a paper on "Electromagnetic Compatibility Instrumentation".

Mohawk Valley:

A meeting was held on February 4th, 1964 and Mr. John Waitkenaus, American Electronic Labs., Lansdale, Pennsylvania, gave a paper titled "Interference Control Techniques for UHF/VHF Receivers."

New Orleans:

A meeting was held on April 22, 1964 at which time Mr. L.S. Boudreaux, Ill. of the Chrysler Corp., Space Division, New Orleans, Las., gave a paper titled "Susceptibility Testing of Vehicle Components & Subsystems".

Philadelphia:

There was a meeting on February 4, 1964 and W.J. Spengel, Leeds & Northrup, Philadelphia, Pa., gave a paper titled "Minimizing Signal Interference in Industrial Data Systems."

Los Angeles:

A meeting was held on May 21, 1964 at which time Fred J. Nichols, Genistron, Inc., Los Angeles, Calif., gave a paper titled "Future Advancements in Radio Interference Filters".

San Francisco:

There were two meetings held by this Chapter. One meeting was held on March 19, 1964 and the following papers were presented: "RADC's Role in Solving Future RFI Problems" - the speaker was R. Powers, RADC by Dr. Schnurer, G.E. Microwave Lab.; "Field Experiences in Prevention of Interference Problems" - the speaker was Lloyd H. Williams GEEIA, Sacramento.

Another meeting was held on June 18, 1964 and a paper was presented on "Instrumentation for Wide-Band Spectrum Analysis"- the speakers were H.L. Halverson and A. Fong, Hewlett Packard Co.

10th Tri-Service Conference on EMC:

A preliminary notice of the 10th Tri-Service Conference on EMC, Chicago, Illinois, November 17-19, 1964, has been mailed out by IIT Research Institute, 10 West 35th Street, Chicago, Ill. 60616. Information as to papers and other questions should be sent to Sarto Morissette who may also be reached at CAlumet 5-9600, extension 2448.

Effects of Arctic Nuclear Explosions on Satellite Radio Communication:

Proceedings of the IEEE, June 1964, carried a 5-page article by P.R. Arendt, and H. Soicher, U.S. Army Electronics Research Development Laboratory, Fort Monmouth, N.J. The summary of the article is as follows:

"Two recent mileposts on man's scientific and technological journey are his achievements with nuclear energy and artificial earth satellites. The present paper is concerned with aspects of both, specifically with the anomalous effects of nuclear tests on the reception of signals from various orbiting satellites. Observing on frequencies from 20 to 400 Mc, the authors recorded radio blackouts and reception from far beyond the geometric horizon, made comparisons with normal propagation periods, and correlated the observed anomalies with ionospheric disturbances attributable to nuclear explosions."

IEEE Subcommittee 27.2 Reactivated:

The IEEE Subcommittee 27.2, Radio Interference - Definitions, has been reactivated. In order that the work of this subcommittee may best serve the interests of those working in the field, the chairman solicits suggestions as to what terms are in need of better definition. It would help if those intending to contribute would state why the present definition(s) for a term is (are) unsatisfactory, and what they propose that the definition include.

Please address your comments to the subcommittee chairman, Harold E. Dinger, Code 5416, Naval Research Laboratory, Washington, D.C. 20390.

Congress May Aid Fight Against RFI:

Electronic Design, July 6, 1964, carries the following news bulletin on page 4:

"Washington - Legislation pending before Congress would permit the Federal Communications Commission to force compliance by manufacturers with regulations covering RFI emission.

"Bills introduced by Sen. Warren Magnuson (Dem., Wash.) and Rep. Oren Harris (Dem., Ark.) seek to prevent the manufacture, import, sale, shipment or use of devices that cause interference. Until now, FCC regulations were concerned only with the operation of interfering equipment.

"Passage of the bills would, for the first time, enable the FCC to act against the manufacturer, if he is in the U.S., or the seller, if the equipment is made abroad."

A Guide To Accurate Noise Measurement:

Microwaves, July, 1964, carries a 5-page article under the above heading by Robert L. Sleven, Section Head Airborne Instruments Laboratory, Deer Park, New York. The sub-title states:

"What is the relationship between single- and double-sideband noise figures? Can image-frequency gain be ignored? How do second-stage contributions affect amplifier noise? The way around these pitfalls of microwave noise measurement is charted by author Sleven."

Special Notice - Dropping PT From Group Titles:

The IEEE Board has approved dropping "Professional Technical" from the Group titles. From now on, the title format for all Groups will be: "IEEE_____Group
For example: "IEEE Electromagnetic Compatibility Group" would be abbreviated to "G-EMC" and will also continue to be identified as G-27.

RFI Transient Tests:

White Electromagnetics, Inc., 670 Lofstrand Lande, Rockville, Maryland, has a 2-page Technical Bulletin, Volume 4, Number 3, under the above title. Part of the introduction is as follows:

"MIL-STD-826 and certain other RFI specifications require transient tests in which the peak value of certain interference signals emanating from test specimens at selected frequencies are measured. The usual procedure, but not the only one, involves using the slide-back detector method for capturing the peak of the transient signal. Several trys are necessary in this technique before the signal level can be 'zeroed in.' This process is time

consuming and is virtually useless if the transient either does not occur very often or is a one-or two-shot affair...."

The Auto-Plot Controller mentioned in this Technical Bulletin was described under "New Products" in the EMC Newsletter No. 33.

MSC to Investigate Static Hazard:

The phenomenon of spacecraft static charge accumulation at docking, moon contact or ground contact has become a matter of increasing concern to design engineers at the Manned Spacecraft Center, Houston, Texas. The potential fire and explosion hazard which exists on electrostatic discharge at any such spacecraft contact becomes especially significant where electrically initiated pyrotechnic devices are concerned. It is understood that MSC has given an industrial contract for a study.

Papers Brought Out by Boeing:

The following papers have been brought out by the Boeing Co., Airplane Division, Renton, Washington:

"A Parallel-Strip Line for Testing RF Susceptibility"
by B. E. Roseberry and R. B. Schulz

"Introduction

"This paper presents a technique for establishing known, high intensity RF fields suitable for testing the susceptibility of electronic equipment to these fields. The technique overcomes a deficiency in tests for radiated susceptibility which are required by military specifications, such as MIL-I-26600. Such tests fail to use field intensities that are representative of the environments in which electronic equipment will be installed.

"It is becoming more important not only to use realistic field strengths, but to know these field strengths to a fair degree of accuracy. The system designer will have more assurance of system compatibility if components have been tested to meet the requirements of the installation environment.

"A significant amount of time and money can be saved if susceptibility problems are recognized and solved prior to equipment installation."

"Microavionics and the Supersonic Transport"
by R. L. Clapsaddle and R. B. Schulz

"Introduction

"The current program for the development of the United States supersonic transport represents a major milestone for American industry. In recent months, there has been a good deal of information released concerning the various airframe and engine designs and the performance characteristics of the proposed aircraft. This information is of natural interest to all connected with the business of commercial air travel. However, there is another and possibly equally important area which merits our interest and consideration. This is the contribution of the avionics industry to the supersonic transport development program."

"Electro-Compatibility Features of Microelectronics"
by R. B. Schulz and R. L. Clapsaddle

"Summary

"This paper considers theoretically the effects (relative to conventional design) of micro-miniaturization on the mutual compatibility among various portions of systems. It discusses the major factors involved, such as power levels, sizes of radiators and pickups, spacings among them, and function trends toward solid-state switching and greater use of digital operations. From these, compatibility relationships are developed and the relative severity of the compatibility problem is estimated."

"Comparative Effects of the RF Environment on Microelectronics"
by R. B. Schulz and R. L. Clapsaddle

"Introduction

"Since microelectronics offers many outstanding potential advantages, low cost, high reliability, low weight, low volume, etc., it is anticipated that a large share of future electronics will be microminiaturized. The purpose of this paper is to offer a means for predicting the extent to which the performance of microelectronics may be influenced by a future RF environment, on the basis of comparison with respect to more conventional construction techniques.

"The approach of this paper is to develop order-of-magnitude relationships showing relative severity of the electro-compatibility problem. To do so requires a basic knowledge of the construction and operation of microelectronics (µ E) elements as well as a prediction of the future RF environment. Microelectronics will be discussed for three specific construction categories: (1) discrete microminiature components, (2) thin-film (TF) circuits, and (3) semiconductor-integrated circuits (SCIC). Differences in electro-compatibility (EC) between these circuits and conventional circuits result from three basic factors involving geometry, constructional features, and special circuit-redesign requirements, as well as from the RF environment. These effects will be explored.

"Following such discussion will be a review of measures that might be used in order to enhance compatibility. With all of the foregoing material in perspective, conclusions will be drawn with respect to the severity of the interference problem relative to conventional construction."

"Evaluation of System Electrocompatibility"
by R. Goldman, E. D. Knowles, J. E. Maynard, B.E. Roseberry and R. B. Schulz

"Introduction

"Aerospace systems and associated ground control and launch equipments are becoming more complex with each generation of weapon or space system. The component subsystems - each a complex interrelation of lower order blocks - are not integrated into a complete system, on which interference compatibility testing may be performed, until the final installation stages. Invariably, operational schedule requirements are not compatible with the extensive testing required by MIL-E-6051C For modern systems, such testing entails a multitude of measurements over a frequency range of 25 octaves. Test data must be reduced and evaluated, compliance with the 6 db safety factor requirement established, and retrofit fixes devised and incorporated as required.

"Frequently, areas of noncompliance with MIL specs or conditions of marginal susceptibility are not disclosed until data reduction and evaluation are well under way; a task which often takes several weeks to complete.

"This procedure imposes severe demands on time and trained personnel. To reduce these demands and to increase overall testing efficiency, several fundamental approaches to the problems of system testing have been formulated and compared. The intent of this paper is to aid in the development of a basic test philosophy which will curtail overall test time, provide more immediate information on specification compliance, and yield repeatable test results.

"Further, there is an increasing trend toward automation of test performance. An evaluation of basic test concepts will aid in the selection of automated instrumentation and in determining an optimum configuration for a universal test console."

"Solving ELF Shielding Problems with High Permeability Materials"
by R. B. Schulz

"Abstract

"New data on shielding effectiveness at extremely low frequencies are presented for un-heat-treated, high permeability materials. The effect of various structural junctions in the sheet material is shown and a design approach for use of these data is suggested."

Copies of the above papers may be obtained by writing to R. B. Schu at the Boeing Company, Renton, Washington.

D.D. Israel of Emerson Appointed Chairman of JTAC:

D.D. Israel (F'42), a member of the Joint Technical Advisory Committee since 1952, was appointed chairman of JTAC at its meeting on May 21. Mr. Israel is vice chairman of the board of Emerson Radio and Phonograph Corporation.

He succeeds J.D. O'Connell (F'57), who resigned to accept the appointment as special assistant to the president for telecommunications and director of telecommunications management in the Office of Emergency Planning.

The JTAC is a Committee sponsored by the IEEE and the Electronic Industries Association. The Committee plans to publish Radio Spectrum Utilization. A subcommittee is studying the problems of electromagnetic compatibility. Another subcommittee on Microwave Radio Relay System Reliability will submit its report on questions raised by the Federal Communications Commission. At a recent meeting, JTAC established a subcommittee to consider questions raised in an FCC docket on land mobile services.

Pirate Radio:

Electronics, May 4, 1964, carried the following news item under the above title:

"The British have appealed to the International Telecommunication Union, a United Nations specialized agency, for help against a young Irishman with a Panamanian ship and two 10-kilowatt transmitters. Ronan O'Rahilly has invested $700,000 in the Caroline, a converted passenger vessel that operates in international waters off the coast of England. He plans to broadcast 12 hours of popular music daily at a frequency of 1,507 kilocycles and, by selling six minutes commercial time each hour, expects to compete profitably with the state-owned British Broadcasting Corp.

"Two other private radio ships are operating off the coast of Sweden and Holland as Radio Sud and Radio Veronica. A fourth, Radio Atlanta, is expected to begin broadcasting off the coast of England any day.

"The British have asked the International Frequency Registration Board to remind Panama that under International Telecommunication Union radio regulations, 'the establishment and use of broadcasting stations on board ships, aircraft or any other floating or airborne objects outside national territories is prohibited.' The Panamanians would be asked by the union to examine the Caroline's license for radio equipment. In two previous cases, Panama withdrew its flag from pirates of the airwaves.

"O'Rahilly, a true Irishman, insists that the British can't touch Radio Caroline."

A Better Method for Measuring Potentiometer Systems Noise:

Electromechanical Design, October 1963, carried a 9-page article, under the above title, by Hans H. Wormser, Chief Project Engineer, Markite Corporation, New York, N.Y. The sub-title and first paragraph are as follows:

"Specifying output smoothness limits instead of equivalent noise resistance can relax linearity requirements for a complex system.

"Designers of servomechanism are constantly caught between the conflicting demands of high system stability and smooth, accurate control. They must weigh their desire for high amplifier gain and immediate, practically undamped response, against the dangers of building a system which hunts, flutters or chatters and carries the seeds of its own destruction. These considerations are functions of the overall system design, but the characteristics of the feedback transducer in the system play a very important part in establishing the limits which can be reached. To obtain the best possible transducer, some users define their potentiometer requirements in fifty pages of specifications, but many others still buy on the traditional basis of resistance, linearity, noise and resolution. The resistance specification limits power source drain and prevents excessive heating. Linearity, noise and resolution are properties related to the smoothness of the potentiometer output. Noise is often given in resistance terms (ENR) and measured in a rheostat circuit, although the noise specification usually is intended to limit sudden variations in the output of a voltage divider, which will contribute to system instability."

Reprints can be obtained from the Markite Corp., 155 Waverly Place, New York, N.Y. 10014, by requesting Markite Technical Data No. TD-111.

Minimizing Electron Tube Hum:

Electronic Industries, June 1964, carries an article by Wayne Austin, Radio Corporation of America, Electron Tube Divis Harrison, N.J., under the above title. The sub-title and first par graph are as follows:

"Decisions by tube designers can have a serious effect on circuit performance. Designing tubes for low hum often means a series of compromises which should be understood by the circuit designer. This subject is treated in detail in this authoritative article.

"Hum is commonly defined as an undesired low-pitched tone in the output of audio-frequency equipment supplied by an ac power source. Although the causes of hum can be generally traced to improperly designed circuits and poor circuit layouts, electron tubes can also be a major source of hum in audio uses. Basically, the reasons for electron-tube hum are either internal effects caused by the heater current on the tube electrodes, or external effects caused by the ac power supply. Because the external effects can be readily eliminated by tube shielding, this article discusses only design considerations for the reduction of hum caused by conditions within the tube."

Military Electronics, The Quest for Compatibility:

John M. Carroll, Managing Editor of Electronics, has prepared a 7-page article in the May 18, 1964 issue under the above title. The article describes the work being done at the Electromagnetic Compatibility Analysis Center, Annapolis, Md. It ends up in the following paragraph:

"If man in the twentieth century is to reach to the planets and beyond, he must do away with the Babel that confounds his essential electronic equipment. At the Electronic Compatibility Analysis Center the first hesitant steps are being taken in that direction."

Protecting Communication Systems from EMP Effects of Nuclear Explosions:

IEEE Spectrum, May 1964, carries an 8-page article by J. B Hays, Bell Telephone Laboratories, under the above title. The s head and first paragraph are as follows:

"Electromagnetic pulses created by nuclear blasts propagate electric and magnetic fields that can damage today's complex and sensitive electronic equipment. The suggested protective measures draw heavily on lightning protection experience.

"Some communication systems are designed to resist the blast and shock of nuclear explosions. It has become increasingly apparent, however, that these effects are not the only components of a nuclear explosion about which to be concerned. Radiation effects have long been recognized and are being studied by many organizations. But it is the effect of the electromagnetic pulse (EMP) that seriously concerns engineers who must ensure that an electronic system will function properly during, and immediately after, its exposure to a nearby nuclear explosion. More equipment, sensitive to the EMP effects, is being required today to operate in such an environment. For example, transistors can be damaged by small current surges and magnetic memory devices can be disturbed by pulses of magnetic field."

Airborne Analysis Sought for RFI Prediction:

Electronic Design, May 25, 1964, has 2 pages under the a heading. The sub-title and first three paragraphs are as follow

"System on plane would verify models of radio-frequency interference environment; wideband breadboard, using four SHF receivers built to operate automatically.

"A wideband, electronically tuned analyzer of pulsed interference spectra has been developed for environmental

analysis. It was designed for automatic digital operation and could be used in an aircraft to take interference profiles over large areas.

"Government radio-frequency-interference specialists, hoping to forestall chaos in electronic operations, have been trying to model complex RFI environments. They need equipment to verify their models and predictions. The spectrum analyzer, designed and breadboarded at IIT Research Institute, Chicago, under an Air Force contract, could be used for such verification.

"The analyzer scans the 8-12 and 12-17 Gc portions of the UHF and SHF bands at a uniform rate of 500 Mc. It does this in about a half minute. Its output is a distribution of the number of pulses per second for each power level of each frequency present in the band."

Modulation: Past, Present and Future"

Frequency, May-June 1964, carries an article by F. De Jager, Philips Research Labs., Eindhoven, Netherlands, under the above title. Paragraphs of interest are as follows:

Compatibility

"In the laboratory a great variety of compandors are useful for noise reduction. In 'point-to-point' communication one is free to choose any of these; however, for general application, you're faced with the difficult problem of 'compatibility'. It's desirable to have most transmitters and receivers communicate without much alteration of apparatus and this was comparatively easy when only amplitude and frequency modulation were employed. But, with the introduction of new ideas, technical developments have diverged so much that achieving compatibility is an almost hopeless task. This is one of the main reasons why many improvements in modulation methods have been held back for a long time before put in practice. The need for more and better communication links, to be expected in the near future, will soon force us, however, to apply only the best known principles.

"Most transmitters apply amplitude modulation and all receivers are constructed for this type of modulation. However, in this case half of the bandwidth is wasted by using the symmetrical waveform. It's already been known for 40 years that single-sideband transmission is to be preferred as regards power and frequency demands, and so this method is commonly applied in systems of carrier telephony. However, SSB requires a somewhat more complicated receiver and this difficulty has excluded the use of SSB transmission for broadcast purposes. Several solutions have been proposed for generating a 'compatible' SSB signal capable of reception by all normal broadcast receivers, but the distortion involved is usually too large for high-quality reproduction of music. Van Kessel and others from the Philips' laboratory have recently found an elegant solution to this problem, based on a careful mathematical analysis. A normal broadcast transmitter need be only slightly changed to produce SSB components of such phase and amplitude that any receiver detects the signal waveform without distortion. The result: a more effective use of transmitter power and a better reproduction of higher frequencies in any conventional receiver."

Optoelectronics Discussed:

Electronics, June 1st, 1964 has the following discussion on optical coupling making up about a column and a half of which the following is an excerpt:

"Further evidence of the growing practicality of optoelectronics (Electronics, Jan. 24, 1964, p. 5) was given in an encoder delivered to the Air Force last month, and by a new instrumentation system being developed by a California company.

"The encoder, an integrated-circuit model developed for pulse-code-modulation telemetry by Texas Instruments Incorporated, has an optoelectronic multiplex switch as an external plug-in module.

"The switch consists of a gallium-arsenide electroluminescent diode emitting light on a silicon transistor. This two-element device replaces an integrated circuit of 17 diffused components plus an external capacitor.

"Less noise. Because the light emitted by the diode (rather than an electrical path) couples the two elements, the input signal and the switch-driving current are isolated. TI says that transient switching noise is less than 1% that of a conventional solid-state multiplexer.

"Further indications of the new device's advantages were given at the National Aerospace Electronics Conference, at Dayton, Ohio, by Walter S. Chambers, of the Air Force Avionics Laboratory at Wright-Patterson Air Force Base."

G-AS Calls for Papers:

The 1965 Aerospace Conference and Exhibit, Houston, Texas, June 24, 1965, sponsored by the Professional Technical Group on Aerospace and the Houston Section of the IEEE, is calling for papers on "EMI and Its Influence on System Design". Prospective authors should get in touch with Thomas B. Owen, 635 20th St., Santa Monica, Calif. 90402 .

Army To Use Computers to Simulate Radio Frequency Interference Problems:

Missiles and Rockets, June 22, 1964, carries a 2-page article by Charles D. LaFond under the above title. The sub-title and first two paragraphs are as follows:

"EETF will use mathematical models in effort to assure electromagnetic compatibility in tactical equipment.

"Ft. Huachuca, Ariz. - Emphasis has been shifted during the past year from field tests to highly complex complex computer simulations at the U.S. Army's Electromagnetic Environmental Test Facility (EETF) here.

"The change, said Army Electronic Proving Ground officials, resulted first from a limitation in funds for expansion of the field facility and then from a growing confidence in the practicality of the mathematical models evolved during the past four years of the program.

Help Stamp Out RFI:

Electro International, Inc. P. O. Box 391, Annapolis, Md., was passing out its 3" red and yellow button with the legend "Help Stamp Out RFI". at the 6th National Symposium. Anybody wanting one of these buttons can write directly to Electro International and get one before the supply runs out.

Shielding Discontinuities in Electronic Packaging:

Copies of the paper under the above title are available from the author A. L. Albin, Fairchild Space and Defense Systems, a Div. of Fairchild Camera and Instrument Corp., Syosset, L.I., N.Y. This paper was given at the National Electronic Packaging and Production Conference, June 9-11, 1964 in New York. There are 7 pages of photographs, charts and drawings.

Open and Shut Case of Garage Doors:

An Associated Press dispatch, Washington, May 20, 1964, under the above title, states:

"Southern Californians watched bewitched and bewildered early this year as hundreds of radio-controlled garage doors began opening and closing on their own.

"It was not automation in revolt, said Capt. Daniel V. James of the office of naval communications, who explained the incident in a speech today.

" 'No doubt an eerie experience for owners of the garages,' said James, but it was all caused by 'use of a certan naval radio frequency'."

"The Navy, he said, is developing a system so that in the near future such freak incidents will be virtually impossible.

"Meanwhile, watch those doors."

X-ray Hazard from Electron Microscopes:

Victor A. Phillips and J.A. Hugo of General Electric Research Laboratory, Schenectady, N.Y., authored the following letter which appeared in Science, March 13, 1964, under the above heading:

"Althought new electron microscopes are carefully checked for x-ray emission at the time of installation, it is uncommon to continue checking them on a daily basis after a period of years has elapsed during which no hazard has developed. We therefore wish to alert electron microscopists, particularly those engaged in high voltage operation, to a hazard which may develop. First, a word about normal behavior. On Switching on our instrument on the 100-kilovolt range after it has been shut down over night, a semicontinuous discharge occurs in the gun, and a high level of x-rays is emitted,

accompanied by a gun-current reading which may exceed 60 microamperes although the filament is unheated. The x-ray emission and current fall with time and become negligible within 4 minutes or less. This 'transient emission of x-rays' is believed to be normal behavior and results in only a small cumulative dose to the operator since the high level (which may exceed 200 milliroentgens per hour close to the gun) is encountered for only a short time on switching on and gradually decays. On two occasions during the last 6 years, however, x-ray emission was observed which persisted for long periods.

"The first incident occurred when oil vapor was drawn from the diffusion pump into the column because of failure of a sealing ring in the column. For a week or two after this occurrence, continuous x-ray emission was observed in an upward direction from the base of the gun whenever 100 kv was applied, accompanied by a gun-current reading due to the ion current. The level of x-ray emission and the gun current gradually decreased with continuous pumping as the column 'cleaned up,' and became negligible after 2 or 3 weeks. A film radiation badge was placed against the gun after this occurrence and gave no appreciable reading until the following incident occurred.

"On routine checking about 2 years later, continuous emission of x-rays was again detected at 100 kv. A cone of x-rays was emitted, inclined about 20 degrees downward from the horizontal and slightly to the right of the operator in this vertical-column instrument. A radiation level of 250 mr/hr was measured at a distance of 0.3 meter from the gun on switching on and did not decay below about 100 mr/hr. corresponding to a gun-current reading of about 10 microamperes. No x-rays were emitted at 80 kv, presumably because they could not penetrate the gun casing. A further observation was that the continuous x-ray emission could be stopped by reducing the operating pressure in the column to between 10^{-3} and 10^{-4} torr, either by putting a controlled leak in the column or by closing off the column from the pumps with poorly outgassed plates loaded. X-ray emission recommenced when the vacuum reached 10^{-4} to 10^{-5} torr. The x-ray level was substantially reduced by cleaning the vacuum system and changing the pump oil. However, it was not until the manufacturers replaced the insulator, to remove a suspected oil leak from the high-voltage cable, that x-ray emission returned to normal transient behavior.

"We suggest that x-ray generation results from decomposition of oil vapor in the potential field of the gun, probably at rough spots on the cathode assembly, giving rise to positive ions which impinge on the cathode (-100kv), exciting secondary electrons which then impinge on the grounded iron gun casing, generating x-rays. For the minimum wavelength generated at 100 kv of). 12 angstrom, about 6 percent of the radiation would penetrate the 1-centimeter-thick casing.

"Continuous emission of x-rays apparently requires at least three things: (i) a higher than usual amount of oil vapor in the column, (ii) a vacuum better than about 10^{-5} torr, (iii) a gun casing not thick enough in relation to the kilovoltage employed. If these conditions exist, gun-current readings exceeding 1 or 2 microamperes indicate a need for caution and for monitoring of x-ray levels, although they can be due to leakage along the high-voltage insulator rather than to ion current. The safest procedure is to place additional shielding around the gun if its thickness and material are such that appreciable penetration of x-rays could occur. Although observed on a particular instrument, the hazard is possibly existent in other instruments and should bear watching where continued high-voltage operation is a practice.

"We take the opportunity of noting that additional lead glass protection has been found desirable over the viewing window on our instrument when lining up the column with 100 kv applied and the condenser aperture removed, because of x-ray emission from the screen."

Using Negative Feedback to Measure Transistor Noise:

Electronic Design, May 11, 1964, had an article under the above title by C. M. Hayward, Chief Engineer, Standard Products Group, Epsco, Inc., Westwood, Mass. The sub-title and first paragraph are as follows:

"Here's a method of evaluating transistor noise that minimizes biasing problems and eliminates the need for periodic calibration. The technique can be applied in equipment so versatile and foolproof that even persons with little technical training can use it for fast and accurate incoming inspection.

"A feedback technique for evaluating transistor noise can be incorporated in equipment so versatile and reliable that it can be used by non-engineering personnel, such as members of the Incoming Inspection Department. The method is particularly suitable for measuring transistor noise at frequencies of 0.5 cps or less up to about 50 Kc. It is also readily applicable when widely varying transistor source impedances are encountered."

Influence Of External Noise On Antenna Temperature:

Microwaves, June 1964, carries a 4-page article under the above title by Albert R. Giddis, Engineering Specialist, System Development Dept., Western Development Labs., Philco Corp., Palo Alto, Calif.. The sub-title and first paragraph are as follows

"Useful design curves show how to determine noise performance of antennas for communications satellites and space telemetry links.

"To compute the minimum signal-to-noise ratio of a satellite communications or telemetry link, one must know the maximum antenna noise temperature that will be encountered during the mission. This prediction of antenna temperature is especially important if the satellite is a solar probe or will transit the sun at medium altitude.

Paragraph headings are:

"Evaluating Noise Sources"
"Solar Noise Calculated"
"Carrier-to-Noise Calculated"

Magnetic Fields from Power Lines:

Electrical Design News, May 1964, carries a page article by George Feinman, Andrea Radio Corp., Long Island City, N. Y., under the above title. A derivation of the field-strength equation is shown together with a magnetic-field nomograph.

Three Nomographs For the Evaluationof Attenuators and Matching Networks:

Electrical Design News, May 1964, carries an article by J. H. Fasal, Asst. Chief Engr., Kidde Ultrasonic & Detection Alarms Di Walter Kidde & Co., Clifton, N. J., under the above title. The firs three paragraphs are as follows:

"These three nomographs simplify the design of common attenuators and matching devices.

"The nomograph 'Attenuators' is for the design of symmetrical attenuators such as T, II and X-type, in both balanced and unbalanced configurations.

"The 'Ladder Attenuator' nomograph assists in the design of the most frequently used dissymmetric T-network. This circuit has a constant load resistance for all attenuation steps, provided the output impedance has been matched properly.

Decibels Debugged:

H. R. Holtz, in the July 1964, issue of Radio-Electronics, has written a 2-page article under the above title. The sub-head and the first two paragraphs are as follows:

"Cringe at the thought of figuring ratios to db and the other way 'round? It's easy!

"Converting a decibel figure to a power or voltage gain (or loss) is a simple mathematical proposition. But it assumes that you have a slide rule or table of logarithms handy. That may not be true, particularly in the field. If you need only normal accuracy, as is usually the case, there is a simple method that gives pretty good accuracy, in most cases, and may be performed mentally or, at worst, with a hasty scrawl on any convenient surface.

"To master the system you need to know only that any 2:1 power ratio is equal to 3 db or a 2:1 voltage ratio to 6 db, and that $10^0 = 1, 10^1 = 10, 10^2 = 100$, etc."

NEW PRODUCTS:

Tecknit Brings Out Teckfelt:

Teckfelt is a new RFI Gasketing material made by Technical Wire Prods. Inc., 129 Dermody St., Cranford, N.J., which is a sintered fiber metal version of wool textile felt. It provides a reliable RFI gasket, or, when impregnated with silicone or other elastomeric materials, provides both an RFI and fluid seal. Further information may be had by writing for Preliminary Data Sheet RF-204.

Small 50 Ampere Feed-Thru Capacitors Available:

RF Interonics, Inc., 15 Neal Court, Oceanside, N.Y., 11572 is bringing out a small 50 ampere feed-thru capacitor. These capacitors have a threaded body size of 11/16" diameter, and a body length of 1/13/16". Capacitance values and voltages range from 0.15 MFD at 250 VAC to 1.5 MFD at 100 VDC. These parts are designed to meet the electrical requirements of MIL-C-11693B."

Stoddard Brings Out Two RFI Antennas:

Two conical log-spiral antennas designed for RFI measurements in 200 mc to 10 gc range have been developed by Stoddart Aircraft Radio Co., Inc., 6644 Santa Monica Blvd., Hollywood 38, Calif. They are identified as 93490-1 and 93491-1 antennas. These antennas are 50-ohm broadband type requiring no tuning adjustments. Directional patterns are designed for back lobe suppression of signals originating behind the antennas with circular polarization assuring equal response to signals radiated in the horizontal and vertical planes.

New Instrument Extracts Signals from Noise:

Nuclear Data Inc., P.O. Box 451, 100 West Golf Road, Palatine, Illinois , has brought out a new receiver called the "Enhancetron 1024". It is basically an oscilloscope with storage of the digitized input signal during each sequential sweep. Operating in this manner, input noise tends to average to zero while the signal of interest adds linearly.

Attenuation Measurement Using Sperry Microline:

Sperry Microwave Electronics Co., Clearwater, Fla. has brought out an Application Note No. 1 titled "Attenuation Measurement Using the 61A1 Microwave Receiver". The introduction to the Application Note is as follows:

"Attenuation measurement is fundamental to many microwave measurements. Besides the primary application to calibration of attenuators and microwave components, the technique is used for measuring relative power, absolute power (using a reference standard), SWR, impedance, cavity Q and other similar parameters where two related power levels are involved. This discussion will deal with the primary use of attenuation measurements, to calibrate microwave components and devices."

Fairchild Coaxial Attenuators:

Electro-Metrics Corp., a subsidiary of Fairchild Camera and Instrument Corp., 88 Church Street, Amsterdam, N.Y. 12011, has brought out a broad range of coaxial attenuators. Different variations of the attenuators are available from DC to 4 KMC and from 1 to 4 watts.

EDITORIAL NOTE

Your editor has been asked to head up a Task Group of the Joint Technical Advisory Committee's 63.1, identified as 63.1.4, to search for and collate any and all information on the side-effects of electromagnetic energy. The purpose of this search is to try and find what effects each frequency, from D.C. to daylight, may have on all disciplines in nature as well as to man-made products and activities. The reason is that there has been no known attempt made to try and catalogue such side-effects, under one heading, for the benefit of all.

It is planned to assemble all information on side-effects into a report which will present the findings by frequency so that anyone may refer to it when planning to design or use equipment operating in those frequencies. It is desired that as much technical information, as possible, be supplied in each instance. Amplitudes, waveforms, times of exposure, etc. are of great value.

To date, many interesting side-effects have been accumulated. It has been found that most of them had not been the subject of any formal report or mention, as they did not apply to projects at hand, but came from personal experiences of the engineers or technicians involved. No side-effect will be considered too fantastic or too trivial - if it is handed in.

Examples of side-effects are: germination of gladioli bulbs at 21 mc; 3-4 mc influencing the behavior of cells in reproductive tissue; 700 cycles which can anaesthetize the brain; 5 mc which can double the mass of a tumor; erasure of intelligence from magnetic tapes in either storage or transit; triggering of flash bulbs, squibs and blasting caps by radios and radars; the pearl-chain reaction in minerals and chemicals, and the unintentional formation of positive and negative ions.

Information is especially desired on the effects of radiation and conduction on the migration of birds, on fish and on animals in the ground. Your Editor will appreciate any and all information which any member of the EMC Group can send in.

Rexford Daniels, Editor
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Concord, Massachusetts