

NEWSLETTER



ELECTROMAGNETIC COMPATIBILITY GROUP

ISSUE NO. 49

Rexford Dainels, Editor Monument Street, Concord, Mass.

JUNE 1967



The advance program of the 1967 Symposium on Electromagnetic Compatibility, to be held at the Shoreham Hotel, Washington, D.C., on July 18, 19, and 20th, has already been mailed out. It also includes the DOD EMC Conference to be held July 20th and 21st sponsored by the Department of Defense. The Classified Session of the DOD EMC Conference will be held at the Department of the Interior Auditorium, 18th & C Streets, N.W., Washington, D.C., beginning at 8:00 A.M.

Security Clearance Forms

Security Clearance forms for requesting access to the July 21, 1967 Classified Session will be mailed to IEEE G/EMC members and to IEEE Section members in Washington, D. C. and Baltimore, Maryland, the first week in June 1967. Those not on the IEEE Distribution List and desirous of attending the Classified Session may request Security Clearance Forms from:

> Lt. Colonel Curtis B. Godwin, USAF Chief, Plans and Programs Directorate ECAC, North Severn, Annapolis, Maryland 21402 COR

General Information

Symposium Theme:

The IEEE 1967 Symposium on Electromagnetic Compatibility has as its theme, "Education, Measurement, and Conservation."

Surely, this theme highlights three significant areas in the electromagnetic compatibility field which require immediate and extensive effort.

There is an urgent need to educate the general electronics community to the requirement for electromagnetic compatibility in the systems that will be produced. Concurrent with this requirement is a need to develop accurate and meaningful measurement techniques. With the rapid proliferation of usage of the electromagnetic spectrum, conservation measures must be developed and applied so that efficient utilization can be made of this resource.

A Department of Defense Conference will be held following the Symposium. This will provide an excellent opportunity for scientists and engineers attending the Symposium to gain knowledge of DOD efforts in the EMC area.

200

Registration:

Registration will take place in the lobby of the Shoreham Hotel. The desk will be open from 7 P.M. to 9 P.M. Monday, July 17th and from 8 A.M. Tuesday, July 18th continuously throughout the Symposium.

> Forms for registering in advance will be mailed by 1 June.

Hotel Reservations:

A block of rooms has been reserved at the Shoreham Hotel for Symposium attendees. Reservation cards wil mailed along with the final program on 1 June. Reservation cards will be 300

Exhibits:

A Technical Exhibit Area will be open to attendees during the following times:

200

Publications:

The Symposium Reocrd, containing complete papers pre-sented at all of the sessions, will be distributed free to all registrants. Additional copies will be available for purchase.

COR

Luncheon:

A lucheon featuring the keynote speaker will be held on Tuesday, July 18 at 12:30 P.M. in the Blue Room of the Shoreham Hotel.

200

Additional Information:

Additional information may be obtained by writing to:

Mr. James S. Hill 6706 Deland Drive Springfield, Va. 22150 Phone AC 301 - 345-8900



FRED NICHOLS STARTS NEW COMPANY

* fred J. Michols, formerly president of Genistron, Inc., *	
* has formed a new company to be known as: LectroMangetics, *	
* Inc., 7304 Westlawn Ave., Los Angeles, Calif., 90045. *	
* It will specialize in the K & D, Engineering, Design and *	
* manufacturing of shield division as non shows and	EDITOR'S NOTE
* second a combined R & D Division to continue consulting *	
* work in EMC and Shielding R & D. Mr. Nichols is a *	
* member of the Admisistrative Committee of G-EMC. *	***************************************
*****************	* Adjectives seem to be one of the "banes" of an editor's
	* life. A wide awake editor usually can catch most of
	* them but occasionally one gets past him. Your editor
	* has been deluged with forceful adjectives, which he
	word "upbiased" in the review of the book Contemporary
	RE Enclosures by Frik A. Lingren in the April 1967
	* issue of the Newsletter. Such reviews, often to save
A.P.	* your editor time, are adapted from reviews in other
X	* publications, with the adjectives crossed out. As
-	* such, they are not direct quotes and, hence, cannot be
	* referenced. This was what happened in this case and
	* your editor's apologies go both to the author and the
	* readers.
	*
	* Rerford Daniels, Editor
	* Monument Street
	* Concord, Mass. 01742
	~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~
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Reception:

A Co-Sponsor's reception and cocktail party will be open to all registrants and wives on Wednesday, July 19 from 6:30 to 7:30 P.M. preceding the banquet.

2000

Banquet:

A banquet will be held on Wednesday, July 19 at 7:30 P.M. in the Empire Room of the Shoreham Hotel.

300

Ladies:

A Hospitality Room will be open every day for the wives of attendees. Complimentary coffee and bridge tables will be available as well as information on things-to-do and sights-to-see in the Nation's Capitol.

So



Chapter Activities

Boston

A meeting was held at the Aerospace Systems Division, RCA, Burlington, Mass. on April 6, 1967. The speaker was Alfred W. DiMarzio and the subject of his talk was "EMC - Design In, Not On". A booklet containing the cartoons used in slides and also the schematics, charts and graphs is available by writing to the speaker at the above address. 24 were in attendance.

Canaveral

There was a meeting held on December 14, 1966 at which time H. Dean McKay, Federal Electric Co., Cocoa Beach, and Carl Lennon, NASA, EMC Branch, spoke on "Electromagnetic Compatibility Program at Kennedy Space Center".

Another meeting was held on February 21, 1967 and a talk was given by R.O. Morrissette, Radiation Inc., Palm Bay, Florida, on <u>"The Susceptibility of Airborne</u> Magnetic Memories to Magnetic Fields".

Huntsville

Two meetings have been held by this Chapter: September 19, 1966 a talk was given on "Electromagnetic Compatibility Awareness" by W.S. Kastoroff, Brown Engineering Company, Huntsville, Alabama: October 31, 1966 Dr. Carl Federick, Vitro Corporation, W. Orange , N.J., spoke on "Determining Requirements of EMC Using Computers".

Los Angeles

The following meetings have been held by this Chapter:

September 15, 1966 - Dr. Fred J. Morris, Electro-Mechanics Company, Austin, Texas, gave a talk on "Low Frequency Magnetic Measurements".

October 20, 1966 - Dr. E. F. Buckley, Emberson & Cuming, Inc., Canton, Mass. spoke on <u>"Microwave Absorp-</u> tive and Anechoic Materials".

November 17, 1966 - Edward D. O'Connell, Western GEEIA Region, McClellan AFB, gave a talk on <u>"Air Force</u> Logistics Commands Role in EMC".

January 19, 1967 - Raymond T. Kado, University of California, Los Angeles, spoke on <u>"Medical Electronics</u> and EMI".

February 16, 1967 - Stewart Nellis, Technical Wire Products, Cranford, N.J., gave a talk on <u>"A Comprehen-</u> sive Approach to EMI Free Enclosure Design"

Metropolitan New York

On February 21, 1967 Ralph Cacase, Fairchild Camera, gave a talk on <u>"A Simple Test Fixture for Bonding Impedance Measurements"</u>. At the business meeting, Herbert G. Bostrom, Metex Corporation, was elected Secretary-Treasurer.

Mohawk Valley

On March 30, 1967 Ernest C. Wood from the Office of Assistant Director (Communications and Electronics) DDR&E, Pentagon, Washington, D.C., gave a talk on <u>"EMC -</u> Our Objective is Peace".

New Jersey Coast

A meeting was held on December 6, 1966 and a talk was given on "Tri-Service Coordination of EMI Standards and Specifications" by Stephen Caine, Naval Ship Engineering Center, Washington, D.C.

New Orleans

The following meetings have been held by this Chapter:

January 19, 1967 - Mr. Ben Weinbaum, General Dynamics Convair Div., San Diego, California, gave a talk on "Graphical Electromagnetic Fields and Compatibility Analysis".

March 1, 1967 - A talk was given by Dr. Y. J. Seto, Tulane University, New Orleans, Louisiana, on "Controlled Thermonuclear Reactions".

April 12, 1967 - There was a panel discussion on:

"New EMC/EMI Specifications" "The Discipline of Magnetics as an Important Environment "EMI Considerations in Applying Medical Instrumentation"

The panel members were John C. Hughes, Sr., Engr., Charles H. Norris, and V.E. Haywood, Super. EMC/EMI Unit, Chrysler Corp., Space Division, New Orleans, Louisiana.

A general business meeting was also held with the election of the following officers:

Chairman	-	J.	ι.	Hughes, Jr. (Carysler)
Vice Chariman		J.	₩.	Joyner (Bell Telephone)
Program Chairman	-	Ρ.	Α.	Shaw (Boeing)
Secretary	-	с.	R.	Short, Jr.

San Fransicso

There was a meeting held on Januray 25, 1967 and D.R.J. White, White Electromagnetics, Inc., Rockville, Maryland, gave a talk on "Automating EMI Measurements".

Philadelphia

On February 9, 1967 a meeting was held and W.F. Simon, UNIVAC-Sperry Rand, Blue Bell, Pa., spoke on "System Design Problems Related to Crosstalk, Noise and Grounding"



G-27 Los Angeles Chapter

197Ó Symposium

The next meeting of the 1970 Symposium on Electromagnetic Compatibility will be held Monday, August 7, 1967, at 7 p.m. at Genistron, 6320 W. Arizona Circle --Westchester, Los Angeles 90045 (Centinela and the San Diego Freeway)- There will be selected at this time the first National Chairman of the 1970 Symposium, which will be held in Los Angeles, his supernumerary and the other necessary officers.

GEMC Elections

During May, 1967, Southern California Chapter G-27 members will receive ballots by mail for the annual election of Chariman, Vice Chairman and Secretary-Treasurer. Please submit names to George Ufen for listing on the ballot.

National Committee Nominations

We have been requested to submit names of persons for nomination to the National Committee of Electromagnetic Jowpatibility of the IEEE. Fifteen signatures are required to accomplish the listing of each nominee for as national voting. Please send names of individuals to be nominated to George Ufen. They will then be affixed to a signature sheet. We will request that you sign this sheet the night of the open house meeting at TRW -- May 18, 1967, 7p.m. All signatories must be members of the GEMC and IEEE.

In Retrospect

By the way -- at our last meeting in the Mission Room of the Pabst/Eastside Brewery, it was decided (after a number of free beers) that at least one meeting per year should be held there. Great idea!

It was also decided, after considerable discussion, that at least half of the meetings should have speakers from other disciplines -- medical, power, magnetic, etc. Please let us have your good ideas regarding locations, speakers, types of meetings.

April Offers

On April 20, Ben Weinbaum of General Dynamics/Convair will direct our meeting at the Sitting Room of Vacation Village in the Mission Bay area of San Diego. The usual cocktail hour will begin at 6:30 p.m., with dinner at 7:00 and the meeting commencing at 8:00. Two papers will be presented: "Measurements of Man-made EMI from an Orbital Aspect" by Herb Mertel, also of GD/Convair ... and "Modern Analysis of Electromagnetic Fields" by Al Mills, another GD engineer.

Reservations for the San Diego meeting will close April 17, and you will be accountable for your reservations. Wives are welcome, too. Look for the map of directions in our regular meeting release next month.

Your Chairman Relocates

For all those sending in suggestions or corresponding with us, please note that there has been an address change; All items now should be sent to --

> George R. Ufen 1616 Victory Boulevard Glendale, California 91201 (213) 345-9617



AN IMPORTANT P. S. --

We want to thank Honeywell, Inc., Annapolis Division, for all their help in handling the mailing of our GEMC releases. This means a lot to us.



The Electromagnetic Compatibility group of Los Angeles was very fortunate to have as their guest speaker Raymond T. Kado, who is a senior engineer at the Space Biology Lab., University of California, Los Angeles.

The meeting was held January 19. There were many aspects of interference problems discussed during his lecture, and the question and answer period following his talk almost lasted as long as his talk itself, which was aptly illustrated by very colorful slides.

Mr. Kado has requested that some meeting of the minds be accomplished between the EMC community and the biological research and/or medical electronics community to achieve a greater understanding of one another's problems and to arrive at some mutually satisfactory results.

from Chairman, L. A. chapter

The statement was made that we are too often talking among ourselves to ourselves about ourselves. And we of the EMC community are not the only ones guilty; this is the same concensus of opinoin of other professional groups within our society.

To this end, Mr. Kado has offered his services and the services of associates of his throughout the United States and Europe to achieve a greater mutual association of one another's problems in trying to go down the problematical paths together to seek a common solution to these problems.

We sincerely hope that a number of you have an opportunity to avail yourselves of the services offered by Mr. Kado. He may be contacted at the University of California at Los Angeles, Brain Research Institute, Los Angeles, California 90024 -- or, in view of, perhaps, some expediency, the telephone number is Area Code 213, GR 8-9711, extension 3454.

-XKC

LETTER TO THE EDITOR

(CONTINUED)

Discussions among our own executive group here in Los Angeles have led us to believe that ensuing years will direct us to at least one-half of our meetings having speakers outside of our own discipline, and allowing them to indicate to us their problems so that, finally, we can reach some joint solutions.

It is my sincere hope that somehow, through this offer of services by one of our speakers, we may have solved one or two of your speaking engagement problems, or that somewhere this idea will be nurtured and brought into full bloom so that all our symposia and national meetings will reap the benefits of such an exchange.

May I wish all of you a successful year.

Sincerely,

George R. Ufen Chairman G-27 Group Los Angeles Chapter



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Something

for Everyone

FLOATING BODY IMPROVES S/N RATIO

EDN, April 1967, has a 3-page article by Ralph Morrison, President of Dynamics Instrumentation Company, 583 Montercy Pass Road, Monterey Park, California 91754, under the above title. The sub-title and first two paragraphs are as follows:

"The high impedances encountered when working with the human body make it easy for unwanted signals to foul up the instrumentation. Here are some guidelines to prevent these problems.

"The skin of the human body yields many signals. Some are spurious and some yeilded medical information. Useful signals result from information being transferred to the muscles over various nerve trunks.

"The most commonly encountered are the chest signals (EKG or electrocardiogram data) that indicate a great deal about heart function. These signals are low level; therefore, care must be taken in the instrumentation. However, much difficulty can be encountered because the body is associated capacitively with its environment.

This includes power-line potentials and unkown earth potentials. These external associations permit unwanted current to flow with resultant unwanted pickup. Instrumentation practices that keep this current flow to a minimum are the subject of this paper." PLANE-WAVE SHEILDING EFFECTIVENESS STUDIES OF THIN FILMS

The Proceedings of the IEEE, April 1967, contained a 3-page letter from Robert A. Weck and Carl J. Lump, Electronic Components Lab., U.S. Army Electronics Command, Fort Monmouth, N.J., under the above title. The Abstract and first two paragraphs are as follows:

"Abstract - A novel technique for determining the planewave shielding effectiveness of thin films utilizing a TEM mode structure has been previously described. This letter presents some of the results obtained. In addition, note is made of an error which existed in the original measurement setup and its effect on the results is discussed.

"The data presented are comprised of plane-wave shielding effectiveness measurements of copper, aluminum, silver, nickel, and gold thin film. For completeness, the measurement technique is described briefly. However, the reader is referred elsewhere for a thorough discussion."

HARMFUL INTERFERENCE FROM GARAGE DOOR OPENERS (GDO)

For the record, although the following letter is about a year old, harmful interference from garage door openers is still being experienced.

Installations and Logistics

OFFICE OF THE ASSISTANT SECRETARY OF DEFENSE

Washington, D.C. 20301

15 June 1966

Dear Mr. O'Connell:

"This letter provides additional information regarding harmful interference from Garage Door Openers (GDO).

"It is our understanding that further action as referenced by FCC Docket No. 15657, RM-524, of 7 March 1966, is delayed until 7 September 1966.

"In preparing for the Government-Industry GDO Technical Conference held at FCC on 11 October 1965, the Chief of Naval Operations made inquiry of activities where harmful interference was still being experienced from GDO devices in the 225-400 Mc/s band. In reply it was reported that:

a. In the Seattle, Washington, area 15 cases of GDO interference developed in August and 10 cases in September 1965. These were located in areas surrounding NAS Seattle. Warning letters have been issued by the FCC in each case and follow-up investigations made to enforce compliance with the FCC Rules.

b. Interference in the Miramar. Los Alamitos and Santa Ana, California, areas is still being experienced by aircraft at altitudes varying from 1500 to 10,000 feet. Ten specific reports were submitted over the time period 30 September to 6 October. The reports have beep forwarded to the FAA for further corrective action by the FCC.

"The flight test program mentioned in the FCC Docket has been completed and a report made by the FCC Laboratory at Laurel, Maryland. The report indicates that DGO receivers currently being manufactured and sold to the public may radiate sufficient energy to be a source of harmful interfere. To safe air navigation.

"On 1 Feb mary 1966, the Chief of Naval Operations requested that the Bureau of Naval Weapons provide a report to specify the maximum signal form GDO regenerative receivers (in microvolts per meter at 100 feet) which could be radiated without causing harmful interference to airborne UHF communications and homing beacon recievers in the 225-400 Mc/s band. Harmful interference for the purpose of the evaluation would be a signal of sufficient intensity to open the squelch of a typical airborne UHF communication or homing receiver. A report on this matter is expected by 1 July 1966.

"The Federal Aviation Agency (FAA) advises that harmful interference from GDO recievers is still being experienced in the Los Angeles area. A tape recording of a typical case of interference has been made and was presented by the FAA at a recent meeting of the Aerospace Flight Test Radio Coordinating Council in Washington, D.C. to demonstrate the seriousness of the interference problem. Since GDO interference is continuing in the 225-400 Mc/s band this information is forwarded at this time to ensure that the matter receives priority attention and to augment previous information provided by your office to FCC. "At such time as the aforementioned Navy GDO interference analysis report is recieved and evaluated, additional information will be forwarded together with recommendations on levels of GDO receiver radiation that can be tolerated in the 225-400 Mc/s band.

Sincerely,

HAROLD W. GRANT Lieutenant General, USAF (Ret) Director of Telecommunications Policy

Honorable J.D. O'Connell Director of Telecommunications Management Executive Office of the President Washington, D.C. 20504

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EFFECTS OF CW INTERFERENCE ON NARROW-BANK SECOND-ORDER PHASE-LOCK LOOPS

Charles L. Britt and David F. Palmer, Research Triangle Institure, North Carolina have authored a 13-page articl in the January 1967 <u>IEEE Transactions on Aerospace and</u> Electronic Systems.

"Abstract

This paper describes an experimental study of the effect of continuous wave (CW) interference and white noise on a second-order phase-lock loop. The reciprocal of the loop mean-square phase error is used as an index of performance, and the effect of interference levels that do not cause cycle skipping or loss of lock is described in terms of this index. Loop thresholds are determined by measurement of cycle-skipping rates.

Stationary or slowly-sweeping CW interference caused a degradation in loop threshold of roughly 3 dB for every 6 dB of interference power above the noise power level. The effective loop signal-to-noise ratio was decreased approximately 1 dB at interference-to-noise power ratios of -3 dB. Interference levels equal to the signal level consistently caused loss of lock, regardless of the loop signal-to-noise ratio."

3

NOMOGRAMS SOLVE TOUGH PROBLEMS OF SHIELDING

Robert B. Cowdell, Genistron Division of the Genisco Technology Corp., Los Angeles, has written an 8-page article under the above title for Electronics, April 17, 1967. It contains four nomograms and several charts. The sub-title and the first two paragraphs are as follows:

"Even nonexperts can design shielded enclosures. Charts help any engineer to quickly determine the thickness of metal required to eliminate interference or eval uate design.

"Protecting sensitive electronic systems and circuit against extraneous fields is a difficult and complex design problem because a detailed analysis of a shielding problem usually requires cumbersome equations or time-consuming graphical methods. Since the results are not always satisfactory, the work is usually left to specialists in shielded enclosure design.

"Now, armed with a newly developed set of nomograms, an engineer who has a knowledge of the frequency and the type of field to be suppressed can determine quickly the thickness of metal shield needed to do the job or to evaluate the effectiveness of a shield. Herbert H. Reed, Systems Engineer, Collins Radio Co., Dallas, Texas, has a 4-page article with 9 figures in the April, 1967 issue of Microwaves. The sub-title and the first two paragraphs are as follows:

"Computer-generated curves for seven noise factors speed analysis and design of parab;loidal and Cassegrain antenna systems.

"Ever-more quiet microwave receivers challenge antenna engineers to reduce the noise contributions of their designs.

"Not too long ago; the best receiver noise figures were in the neighborhood of 10 dB; an assumption that' antenna temperature was 290°K had negligible effect on system analysis. But with receiver noise figures now improved to 3 dB and below, accurate knowledge of antenna noise temperature is imperative."

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THE CHARACTERISTICS OF SLIP RING NOISE

Kenneth R. North, Electro-Tech Corporation, Balcksburgh, Virginia, presented a 9-page paper for presentation in the Third International Research Symposium on "Electric Contact Phenoma" at the University of Maine on the above subject. Copies of the paper may be obtained from Mr. North at the above address. The introduction to the paper is as follows:

"INTRODUCTION

Electrical noise introduced by sliding contacts is probably the least understood of all slip ring operating parameters. This is partially due to the fact that the noise signal is generally random in both frequency and amplitude and no exact analytical expression for the wave exits. Random waves having no period are probabilistic and are usually defined in terms of the functions of power spectral density, auto-correlation and amplitude probability density.

In an effort to simplify slip ring test procedures and specifications, the industry has ignored the principles of random wave analysis and resorted almost exclusively to direct voltage measurements as a single criteria for acceptable performance. The resulting noise data, therefore, is incomplete and often inadequate for general analysis purposes.

A second misconception is that slip rings are electrical noise generators. This assumption is incorrect as it implies that the noise results from a voltage generated by the sliding contacts. Generated voltages have been found to be insignificant in most slip ring applications and account for a very small fraction of the total noise which is primarily resistive.

This article discusses the sources of slip ring noise and describes various methods used for measurement and analysis. Oscilloscope noise traces are presented to illustrate noise behavior patterns as affected by contact design, mode of operation and testing procedure. It should be noted that this article deals principally with signal type slip rings and more specifically with the smaller capsule designs used in typical aerospace applications."

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EDN March 1967 carried a 2-page article by Max H. Applebaum, Technical Writer, Thomas Organ Company, Sepulveda, California under the above title. Part I has a sub-title "Constnat K." If you are asked to design an LP constant-k filter to cut off a 7 kHz, where would you start? There are tow figures and one Nomograph.

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TAKE THE BITE OUT OF SWITCHING TRANSIENTS

EDN March 1967 issue carries a 2-page article by Richard A. Aldrich, WDL Division, Philco-Ford Corporation, Palo Alto, California, under the above title. A work-saving graph for the selection of transient supression capacitors which is useful for determining the power-supply filtering at the circuit location is included. Paragraphs of interest are as follows:

"Put lead inductance and current change together and you are sure to get a transient spike. Selecting the proper capacitor to control it need not be a cutand-dry operation. Here is a simple, convenient graph that relates current, capacitance and slew rate. It is useful in designing power supply filtering at the circuit location in digital logic systems.

This graph may be used when the following assumptions are valid:

1. The subject capacitor supplie all of the transient current.

2. The transient current is of a constant amplitude (average transient current amplitude is normally sufficient).

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GETTING THE MOST OUR OF MICROWAVE NOISE SOURCES

Beryl A. Wheeler and Keith Olson, Signalite Inc., Neptune, New Jersey have written a two-page article in the March 1967 issue of <u>Electronic Products</u> under the above title. A survey of common mounting methods is presented in tabular form with advantages and disadvantages noted. The sub-head of the article is as follows:

"The success of any combination of gas discharge noise source, mount and termination will depend as much on the mounting methods as on any other single feature."

V

NEW FAILURE MODES OF INTEGRATED CIRCUITS

Glen R. Madland, President of Integrated Circuit Engineering Corporation, Phoenix, Arizona has wirtten a 10-column article on the above subject in the March 1967 issue of <u>Electronic Products</u>. A section on incompatibilities is as follows:

"Carelessness. The extremely small size of the IC and its delicate structures sets obvious limitations. Their fine metallization and wiring will not withstand high current of high voltage. Even the monentary applica tion of 20 or 30 v on some of the control leads can cause an instantaneous failure or, at least, substanially and permanently alter the characteristics of the circuit. Repeated bending of the leads or the failure to attach the packaged device properly within the assembled system are other outstanding examples of user carelessness.

NEW FAILURE MODES OF INTEGRATED CIRCUITS (CONTINUED)

There are numerous ways to be careless about electrical design limits. The engineer may find that some IC's of a given type designation will work in his application. It may then come as a surprise that others --the same type designation -- will not. He immediately blames the supplier, although all of the subject units satisfy the type designation specifications. Of course, the manufacturer has, at times, drastically altered some of the device characteristics without bothering to inform the user. The characteristics he changed may not be those that are included on the published specifications, but they may be crucial to certain users. In this case, the user cannot be blamed either for inadequate design, carlessness or lact of diligence. Rather, it represents a lack of communication and breach of faith on the part of the manufacturer. The manufacturer, on the other hand, is reluctant to give undo publicity to these changes because they might raise questions about previously shipped products.

It might seem unusual to list a manufacturer's failure to inform his customer of internal changes as a failure mode. For specific applications, however, changes in device characteristics can cause system failures. Trivial changes, even improvements, may produce this result. This is perhaps one of the most severe communication problems in the industry. The manufacturer cannot and must not alter his product without informing the user."

*88

FLAT GASKET MATERIALS

Willem F. Bakker and Albert H. Cohen of Metex Corporation, Clark, New Jersey have written a six-page article in the March 1967 issue of <u>Electronic Packaging and</u> <u>Production</u> under the complete heading "Flat Gasket Materials -- A Survey of Shielding, Sealing Properties." There are 18 fugures and 3 tables. The sub-title and paragraphs of interest are as follows:

"Five thin (.062 in. thick or less) gasketing materials capable of providing an electromagnetic, as well as environmental seal were compared to determine how well they performed their required functions. Evaluations were made in a quantitative basis of resistivity, compression deflection, pressure sealing capability, water sealing capability and electromagnetic attenuation.

The shielding of an opening in an enclosure, where two mating surfaces are relatively flat and where the gasket shape is Gomplex, has been a major design problem for the packaging engineer. Because of the rapid increase in the use of electromagnetic interference control specifications in the design of electronic systems and because of the miniaturization trend, packaging of electronic equipment requiring electromagnetic interference control, as well as environmental isolation, has become considerably more difficult. Until recently only a limited number of materials were avialable, most of which lacked one or more necessary properties to provide both the proper degree of electromagnetic interference control as well as environmental control.

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New Materials

Over the past year or so several materials have been developed and marketed which embody combinations of properties not previously available. In this survey five thin, flat sheet materials were compared against each other and against referenced materials for the purpose of determining the following properties."

RF CONNECTORS

William E. Mayo, Unites States Army Electronic Co…mand Fort Monmouth, New Jersey has written a nine-page artiunder the title "RF Connectors: A Design Plan for Increased Reliablilty" in the March 1967 issue of <u>Electr</u> <u>Packaging and Production</u>. There are 10 figures and 1 table which gives vibration tests results. The subtitle and the first two paragraphs are as follows:

"This report contains a review of design features used for RF connectors in general. It includes a discussion of the problem areas found in present military designs with new design considerations featuring a connector cable clamp and an improved mating to increa performance and reliability

COMMON COMPLAINTS reaching this Command consist of cable assembly field failures involving standard milit BNC connectors. The failures were of a mechanical nat and consisted of premature cable breakout. From past experience these connectors also present a connector coupling problem since their bayonet couplings are inadequate for present-day upgraded frequency applicatio An internal task has been initiated to (1) primarily resolve the cable clamping problems of BNC connectors and (2) to consider new improved connector coupling de signs suitable for military connectors to increase reliability and performance.

Connector Reliability

Radio frequency connectors presently used by the military contain many desirable features commensurate with general purpose use. However, they have proved t be deficient in other qualities for increased reliabil ity application. For example, the BNC series connecto lack good contact stability above frequencies of 5,000 MHz. This has been attributed to the rocking effect of its two-pin bayonet coupling design. These connect also lack a sound cable clamp mechanism since they can easily be twisted and pulled from the cable with very little force. Any handling of these connector assemblies during normal use contributes accumulatively to the degradation of the cable clamp's physical strengtl and electrical continuity (Ref. 1).

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ATMOSPHERIC DISTORTION OF SIGNALS ORIGINATING FRO SPACE SOURCES

IEEE Transactions on Aerospace and Electronic System Vol. AES-3, no. 2, March 1967 carried the following paper under the above title by P.G. Smith:

"The phase-front distortion imposed on space sig by fine-grained refractivity variations of the atmos is an important consideration in the design of large aperture antennas, antenna arrays, antenna systems f measuring space-craft position and position rate, an radio-astronomy systems. The distortion caused by i spheric and tropospheric refractivity variations imp fundamental limitations on the capabilities of these antennas and antenna systems, particularly on system that must operate at low elevation angles. Numerica estimates of distortion imposed on signals passing through the atmosphere are presented. Atmospheric mc based on available literature are slected for this p

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PROPAGATION OF AN ELECTROMAGNETIC PULSE FROM A NUCLEAR BURST

IEEE Transactions on Antennas and Propagation, Vol. AP-15, no. 2, March 1967 carried the following article by J.R. Johler:

"The general study of nuclear detection clearly identifies the theoretical problem of predicting the effect of the propagation medium on the form or shape of the low-frequency electromagnetic pulse of nuclear origin propagated to great distance in the terrestrial waveguide. This is accomplished with a theory of propagation into which an arbitrary electron density profile of the ionosphere can be introduced using a quite general cold magnetoplasma theory. In a previous paper by the author, the propagation of the ground-wave electromagnetic pulse was discussed in detail and the engineering significance of the propagation theory to nuclear detection systems was considered quantitatively. At distances from the source greater than approximately 100km, the ionosphere reflections become an important consideration. The theory of propagation for ionospheric waves is in-troduced into this analysis. A transient wave-form reconstructed theoretically at great distance from the source can be analyzed in the time domain with the aid of a geometric series expansion of the solution in the space domain. Thus, different times on the propagated pulse can be identified with particular reflection regions of the ground and ionosphere along the propagation path. In the geometric-optical limit, the individual ionospheric waves correspond approximately to rays traveling to and fro between the ionosphere and the ground, and the composite pulse at great distance can be considered to be a superposition of a mulitplicity of pulses, each pulse delayed in time by the delay time of the ray."

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ON THE DETECTION OF TRANSISTING BROADBAND TARGETS IN NOISE OF UNCERTAIN LEVEL

<u>IEEE Transactions on Communications Technology</u>, Vol. COM-15, no. 1, February 1967 carried a paper under the above title by F. B. Tuteur as follows:

"The fact that the signal received from a transisting object first rises and then falls in intensity can be used to detect the presence of such an object even though the signal emitted by the object and the background noise are otherwise indistinguishable. If the strength of the background noise is not known, detectability is reduced by the uncertainty in the noise level; however, means can be incorporated in the detector to estimate the noise level. If this is done, and if the background noise can be assumed to be stationary, then the effect of the noise uncertainty can be made as small as desired. In practice, the background noise is not stationary, and therefore the improvement in detectability that can be realized by estimating the noise level depends on the length of time that the noise can be assumed to be essentially stationary."

X

IEEE Transactions on Industry and General Applications, Vol. IGA-3, no. 1, January-February 1967 carried the following paper under the above title by C.F. Hedlund:

"The rules for the installation of lightning protection systems are available in published national codes and standards. For such systems to be effective an adequate grounding system is essential, and this phase of the subject is primarily considered. The lightning loss experience for industrail buildings shows that the record is not a serious one in general, but the need for a lightning protection system for any particular building should be considered on its own merits. Due to the variations in the resistivity of the soil on which a building is erected and the avialability or absence of extensive buried piping systems, or other buried objects that could be used for grounding purposes, different methods of providing an adequate grounding system must be employed. Ground rods in multiple or extensive counterpoise and combinations of both are used, depending upon the building and other local conditions. Inter-connecting the lightning protection grounding system with other grounded piping systems, electric and telephone services, is also most important to help dissipate a severe stroke and prevent dangerous differ-ences of potential which may occur between these sys-tems. High-rise steel-frame buildings are usually inherently well grounded, but where the lightning exposure is severe the best protection is afforded by connecting the steel columns to a uniformly distributed grounding system."

MAN-MADE NOISE

25

FREQUENCY Magazine has carried a 2-part article by E. N. Skomal, Aerospace Corporation, El Segundo, California. Part I: Sources and Characteristics appeared in the January/February 1967 issue the sub-title of which is as follows:

"Automotive ignition noise is well-known as the largest contributor to the UHF and UHF radio noise leve, in much of industrialized U.S.A. What are the other major sources? You'll find out in this first part of a two-part series in which the author takes a detailed and comprehensive look at incidental radio interference. Here, he lists the various noise sources and their identifiable characteristics and develops expressions for the noise source's spectral power density in the frequency ranges between 150 and 500 MHz and below 20 MHz. In the next issue, the author compares the theory against experimental data taken over the two frequency ranges."

Part II: Experimental Data appeared in the March/ April 1967 issue. The sub-title is as follows:

"In Part I, the author explored the frequency ranges between 150 and 500 MHz and below 20 MHz, explaining how to identify the various noise sources present and developing their spectral power densities. Here he concludes his investigation of incidental radio interference by comparing the cy against experimental data taken over the two frequency ranges."

X.

CORRECTING THE RECORDS

Electronic News, April 17, 1967, carried an article mentioning a talk given by Carl Pearlston, Aerospace Corporation, before the Institute of Environmental Sciences. The title of the article was "EMI Specs for Black Boxes Too Strict: Aerospace Corp.".

Carl writes your editor as follows:

"I didn't really say that - only that too much attention paid to component testing and not enough to system level. Plus we need a study of how component level spec compliance relates to system compatibility".

S.

A NASA DEVICE TO PROTECT MOS TRANSISTORS

Popular Electronics, April, 1967, carries a 2-column article which describes a simple device used by NASA to protect MOS transistors. A description of the device is as follows: "This is a simple device used by NASA to protect MOS transistors from being accidentally damaged by the application of an electrostatic potential across the leads while the transistor is being handled or assembled in a circuit. A loop of flexible nickel wire is attached to a music wire spring that is slipped over the transistor's case and released, shorting together all of the leads."

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UNDESIRED CLOSURE IN MERCURY RELAYS

Electromechanical Design, March 1967, carries an article by guest columnist Dug Roy, Industrial Products Group, Texas Instruments, Inc., Houston, Texas. The first two paragraphs are as follows:

"Ever wonder why a perfectly designed switching circuit containing mercury relays occasionally experiences misoperation and/or component damage? Ever had transient problems in a system that was carefully designed to be transient-proof? These problems may seem from a little-known idiosyncrasy of mercury relays - self energization.

"Under specific operating conditions, the relay may actually energize itself, thereby producing an undesired closure. This closure, which is of a transient nature, may upset system timing, and create timing errors in the system, inadvertently contributing to component failures. Fortunately, we have a number of cures for the self-energization phenomena. Let us first analyze the behavior of mercury relays and then develop a basis for designing-out the trouble."

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FCC

RELEASES

WASHINGTON, D. C. 20554

98182 PUBLIC NOTICE - G March 30, 1967

PIONEERING FCC REPORT REVEALS POTENTIAL INTERFERENCE AREA IN SATELLITE COMMUNICATIONS

A heavy rain storm could cause disruption of service and create severe communications problems in satellite earth stations and microwave facilities sharing the same frequency-bands.

This is one of the vital facts revealed in a pathfinding FCC study into interference in shared frequencies. The six-month investigation, carried out by the FCC Chief Engineer's Office under the direction of Roger B. Carey, indicated that rainstorms are but one of a series of phenomena that might create reception problems. Identified generally as "off-path scattered interference," these disruptive elements could seriously affect satellite system communication plans. The project, carried on in conjunction with the POPSI Program (Precipitation Off-Path Scatter Interference) was designed to follow up basic research pointing to these interference problems. Working in cooperation with the Air Force, the FAA, the Coast Guard, NASA and the Weather Bureau, the FCC engineers conducted measurements from Air Defense Command Radar at Highlands, New Jersey, along a path extending 190 miles southward to Wallops Island, Virginia. The measurement indicated that interference from precipitation, air turbulence, temperature and humidity changes and aircr: occurs more frequently and is more severe than had bee: anticipated.

FCC Chief Engineer Ralph Renton states that the result of the survey indicate an urgent need for a two-pronge attack on the technical problems. He calls for a meas urement program similar to the one just completed to b conducted in other meteorological areas. Such program would supply further information upon which domestic communications satellite frequency assignments may be based. Second, in the event that higher frequencies may be required for a domestic satellite service, he asks for a concurrent study of the communication capabilities of the frequency spectrum above 10 GHz.

Satellite and microwave facilities currently operate f the 4 to 6 GHz range. Radar and aviation flight syste also operate here. The 10 GHz range is a much higher frequency area.

The FCC is cooperating with NASA and the Director of Telecommunication Management in developing plans for handling these technical problems.

98917 PUBLIC NOTICE - G

April 13, 1967

PROPOSAL TO REDUCE INTERFERENCE ON SHARED RADIO FREQUENCIES SUBMITTED BY F.C.C.

The Federal Communications Commission has proposed consideration of a new regulation designed to curb interference on frequencies shared by Citizens Band and nonlicensed radio operators. The action, officially designated a Notice of Proposed Rule Making, would resolve a major source of interference by assigning new frequencies for use by operators of nonlicensed equipment known as Part 15 devices.

A Notice of Proposed Rule Making is an invitation to the public, including manufacturers, distributors and users of Part 15 devices and citizens radio equipment, to comment on a proposal. It does not represent final action. After comments are recieved, the Commission again considers the proposal, taking into account the public views expressed, before deciding on additional steps to be taken.

The Notice of Proposed Rule Making contemplates moving the Part 15 devices from a frequency of 26.97 - 27.27Mc/s to a new band at 49.9 - 50.0 Mc/s. This would separate the nonlicensed equipment from the licensed stations in the Citizens Radio Service and alleviate the enforcement and interference situation which has resulted from sharing of the same frequencies by the two kinds of equipment.

Designed to permit a smooth and orderly transition period, the proposal permits persons now operating the Part 15 devices in the 27 Mc/s band, to continue operations on these frequencies for a period of seven years. It also allows manufacturers of Part 15 equipment a minimum of two years in which to redesign and tool-up for manufacture of equipment to operate on the newly allocated frequencies.

To avoid the problems that have developed on the frequencies currently in use, and to insure that the nonlicensed devices will not become a wide-spread source of harmful interference on the 49.5 - 50.0 Mc/s band, equipment will be required to meet tighter technical specifications and will have to be submitted to the F.C.C. laboratory to be tested and type approved under the proposed new regulation.

Part 15 devices get their name from the section of the F.C.C. rules governing their use. They consist primarily of the kind of equipment commonly referred to as walkie-talkies. Operators do not require licenses and the devices are restricted to a maximum power of 100 milliwatts and a maximum antenna height of five feet. They have a limited range of operation. They are used by construction and demolition crews and in similar specialized areas. Large numbers are sold for children's gifts and for use as toys.

Action by the Commission, April 12, 1967. Commissioner Cox issued a concurring statement; Commissioners Wadsworth and Johnson dissenting. NOTES FROM FCC FIELD ENGINEERING REPORTS

Husband-Wife Team in Impromptu Radio Debut

Engineers from the .FCC Boston district office, aided by the Commission's monitoring net, located and closed an unlicensed "broadcast" station having very unique programming. It intermittently retransmitted programs of local broadcast station but interspersed them with unex purgated live conversations between a husband and wife team. A mobile unit did the final tracking to a home where husband and wife were totally unaware that they h been featured on the air. They helped in finding a tra mitter hidden in their basement, and a microphone consealed under the dining room table. Their teen-age son, interested in communication-electronics and dissat fied with frequent parental arguments, had taken this means to "air" his problem. This resulted in a high unorthodox family situation drama. The FCC engineer This resulted in a highly after giving appropriate warning departed with a definit impression that another form of husband-wife teamwork was imminent. In any event, that particular family series is now lost to radio and any possibility for TV.

<u>Competition Even in Unlicensed Broadcast</u> <u>Operation</u>

A rare case of competition in unlicensed broadcast operation was revealed when engineers of the FCC Buffalo office closed down an illegal operation on 1600 kc which used the call letters "WINO". Little difficulty was encountered, and its 19-year old operator -- a licensed amateur -- was cooperative in answering questions. He seemed proud of his exceptionally well equipp studio and other facilities, which included an air-coole final amplifier stage, power input of 150 watts, and an expertly-guyed 35-foot antenna. He volunteered the information that the FCC action had come just in time to avert a "RF War" because another illegal station -using the dual call "WCNG/WKRA" and operated by an acquaintance -- had selected the same frequency and refused to enter a "time-sharing arrangement". Accordingl the FCC engineers visited and terminated operation of the rival station. Verbal warnings were administered to the youthful competitors in the presence of their parents, and official letters of warning followed.

Another Undercover Operation

A member of the Maryland state legislature asked the FCC Baltimore district office to help identify the source of interference to his AM reception. He reported that the trouble was noticed only between 11 p.m. and 7 a.m. Two trips to his home failed to reveal the cause. However, the investigating engineer requested, and received, a tape recording of the interference. After listening to it the FCC investigator made another visit and quickly identified the culprit as an electric blanket which the complainant turned on each night after retiring. As the balnket warmed up, the noise on his also tuned-in radio increased. Though a bit chagrined, the legislator was profuse in this thanks.

Hi-Fi Interference Also Reveals Odd Lingo

A research professor reported inability to cope with interference to his Channel 5 TV reception. Upon investigation, an engineer from the FCC San Francisco office reported a unique case in these technical terms: "A neighborhood hi-fi buff was using, in place of the usual 'tweeters', a RF oscillator designed to operate on 27 Mc/s. The oscillator was screen-grid modulated by the audio output of an FM stereo receiver. The modulated signal, when fed into a quartz cell, caused ionization of air within the cell. As ionization varied, pressure within the cell varied in direct proportion to oscillator output. A small horn was used for efficient coupling of the pressure within the cell to the outer air. The RF oscillator was radiating a third harmonic causing severe interference to channel 5 TV over a wide area". The operator of the equipment scemed to understand this explanation for he agreed to take his hi-fi out of service until the desired radiation could be eleminated. But this did not save him from a formal letter of warning.

Piece of Wire Causes 56 Complaints

A petition with 56 signatures was recieved by the FCC Los Angeles district office complaining of disruptive interference to TV reception. An engineer roamed the area in a mobile investigative unit. Signal strength comparisons and visual observations narrowed the search to a short piece of wire draped over a power line which contacted a crossbar brace. A power company crew brought quick remedy. The complaints and power company were equally pleased. The latter had spent about \$500 in previous vain attempts to locate the trouble.

Inside Job

The FCC's Santa Ana monitoring station and San Francisco district office collaborated in resolving interference to an intercity TV relay link to a college ETV When FCC engineers arrived on the scene the station. trouble had ceased. However, at the other end of the microwave relay system they determined that the annoyance was not from an outside source as reported, but within the relay receiving equipment itself. The unit was disassembled and the receiving reflector shielded, but the condition but the condition continued. It was only when an FCC engineer remarked that the interference appeared to come from an electrical heater that the operator revealed an internal heating unit in the equipment. A defective heating element in the combined reflector and tuning head was discovered. The FCC engineers de-parted after receiving embarrased thanks for their find.

Unattended Transmitter Delays Interference Solution

Responding to complaint of interference from a continuous unidentified signal, the engineer in charge of the FCC Los Angeles district office, after making quick directional check with receiving antennas, started out to find the source. Taking bearings on the signal at various points en route, he traced it eventually to Johnstone Peak, a 4000-foot elevation in a national forest. There he found not one transmitter but four, each with a cluster of antennas, for operation in the industrial radio service. Since nothing was visible to identify the licensee, it was necessary to trip the circuit breakers in the power line outside the transmitter building one by one until the signal ceased. It required later inquiry to identify the licensee in order to serve violation rotices for off-frequency operation and failure to deactivate the transmitter when not in use.

Remote Uncontrol

Naval air stations at Corpus Christi and Kingsville, Texas, complained of interference on a Navy frequency during a carrier landing drill off the Gulf coast. The FCC's Kingsville monitoring station confirmed that the source was local, since the signal was not heard by other monitoring stations. After taking bearings on naval stations participating in the landing exercise, Kingsville determined the unwelcome sound came from the Corpus Christi naval air station. The Navy was advised searched the airfield and found an aircraft with a tran mitter left on.

Long-range Detection of Hoax

When advised by the FCC Dallas district office that an amateur had reported hearing a marine distress signal, the FCC Ambrose monitoring station alerted the direction-finding net which heard transmissions implying that a steamship was afire in the Gulf of Mexico. However, direction-finder bearings proved that the signal was coming from the New Orleans area. This enabled the FCC New Orleans office to trace the calls to a suburban licensed amateur station. Its operator admitted the hoax calls that caused unnecessary alarm and expense.

On-and-off Tests Reveal Faulty Member

While conducting general mobile monitoring operations in the San Francisco area, an FCC engineer received radiotelephone work from the San Francisco district office that Stanford University at Palo Alto was experiencing interference to its pulse radio operations from a radar-type signal. Using a microwave receiving horn as a directional antenna, the engineer obtained bearings from some of the higher elevations in and about the city and found that the signal was originating across the Golden Gate Bridge in the vicinity of Fort Baker. Army authorities there cooperated by ordering on-and-off tests of some 10 radar units. This proved that one of them was producing the spurious emissions.

TV Channel 12 Tries to Join Police

Interference to the Massachusetts police radio network was sufficiently strong to completely disrupt communication. An engineer from the FCC Boston district office traced its source to a private home where it was found to be coming from the family TV set. Tests showed that tuning in Channel 12 caused the strongest radiation. The owner agreed to ignore that channel's programs until corrective measures could be taken. It was later reporte that installation of RF filters on the AC power line, a high-pass filter on the antenna input and a telescoping sheild over the oscillator tube resolved the problem. FCC monitoring and direction-finding services do not stop at the Nation's borders and coastline. This is indicated by the following terse log entries of the Operations Branch of the Monitoring Systems Division:

Jan. 26, 1313 GMT: Vessel "Sun Clipper", LMDF (Norwegian), between Florida and the Bahama Islands reported DF and radar out of order and requested a fix. (Vessel bound for Freeport Bahamas from Halifax, N.S.). Two fixes furnished. Coast Guard plane dispatched to home in on the vessel. Alert secured at 1411 GMT.

Jan. 27, 0916 GMT: Vessel "Adolph Sperling", WLOT, off Maryland-Delaware coast, reported DF out of order and requested fix due to zero visibility. One fix furnished. Alert secured at 1001 CVT.

Jan. 28, 0837 GMT: Tug "Seeflake", - DSR (German), bound for Spain and towing an object at the end of an 1800 foot cable, reported it was "hove to" due to adverse weather and awaiting abatement of rough seas. Fix requested; two fixes furnished. Position approximately 300 miles east of Boston. Alert secured at 0943 GMT.

Jan. 28, 2320 GMT: Tug "Seeflake", DDSR, losing tow; radar, and loran inoperative; having rudder trouble. Requests Coast Guard send plane and ship to find it. Two fixes furnished. Alert terminated at 0036 GMT, Jan. 29.

Jan. 30, 2249 GMT: Vessel "Robin Goodfellow", KQTT, off Delaware Bay reported lost in storm and DF inoperative. One fix furnished and alert terminated at 2308 GMT.

March 1, 0628, GMT: Coast Guard requested fixes on aircraft N5YACY en route to Santa Maria, Azores. Plane not sure of position and compass not usable. Seven fixes furnished between 0635 and 0912 GMT. Following message received from Coast Guard, 1100 GMT: "REFERENCE N5YACY... COMEASTAREA COAST GUARD APPRECIATES THE EFFORTS ON YOUR BEHALF IN DETER-MINING THE POSITION OF THE LOST AIRCRAFT. HAVE RECIEVED WORD THAT ACFT NOW UNDER FIRM CONTROL OF SANTA MARIA AND EXPECTS TO LAND ABOUT 12352... PLEASE ACCEPT OUR THANKS FOR SERVICES RENDERED".

GRAPHICAL COMPARISON OF MILITARY RFI SPECIFICATIONS ON THE BASIS OF FIELD INTENSITY

The Microwave Journal, September, 1966, carried an 8page article by Robert J. Ertman and Jacob Z. Schanker Reconnaissance/Countermeasures Laboratory, General Dynamics, Electronics Division, Rochester, New York. Th Introduction is as follows:

"Because of advances in the state-of-the-art of equipment 'black-box' antenna-receiver noise figures, radio frequency interference (RFI) or more broadly EMCelectromagnetic compatibility is very often the limiting factor which determines the sensitivity and effectiveness of passive reconnaissance and communications receiving systems. Although some comparisons of power line conducted portions of the various military RFI specification limits have appeared in the literature, an integrated graphical comparison of the radiated limits in terms of common units most useful and significant to those engaged in the intitial conception and design of such receiving systems was not available.

"The RFI field intensities are derived from the specified antenna induced voltage and either specified antenna effective heights or calculated effective heigh where not specified, or substitution of standard dipole where not specified and not subject to calculation (broadband discones).

"The RFI specifications analyzed and included in th graphical comparison are: MIL-STD-826 (USAF), MIL-I-26600 (USAF), MIL-I-11748B (Sig C), MIL-I-16910A (SHIPS and MIL-I-6181D (USAF).

"It is anticipated that all military RFI and EMC specifications will similarly adopt the field strength approach."

SUPPRESSION DEVICES, A NEW COMPANY

Raymond C. Straessle, formerly with the Filtron Company and the Sprague Electric Company in Los Angeles, has formed a new company called "Suppression Devices" of which he is president. The product line is in the fiel of switch and relay contact suppression filters exclusively which utilize the latest filtering techniques and the smallest components available. Bulletin No. 82 may be obtained by writing to 212 Pier Ave., Santa Monica, California 90405.



Resonant Absorption of Microwaves in Ferromagnetic Materials

Ferromagnetic Resonance by S. V. Vonsovskii - translated from the Russian edition (1961) by S.H. Massey - Pergamon, New York, 1966, \$10.00. A review of the book, which appeared in Science, 13 January 1967, contains, as a first paragraph, the following: "This book is a collection of review articles on the phenomenon of resonant absorption of microwaves in ferromagnetic materials. As the editor points out in the foreword, the authors of these chapters have themselves made significant conbributions to the subject and therefore the work is (at least in part) original. It is a very lucid collection and contains a sufficient amount of detail so that it will make not only a good reference work but also an interesting book for new students who wish to start work on ferromagnetic resonance. It is somewhat dated in that few if any reference later than 1963 are cited, and the papers more recent than l960 that are cited are, very naturally, Russian."

To The Editor:

"1. I am sending you a copy of Air Force Systems Command Manual 80-9, Vol. IV, Electromagnetic Compatibility and a Brochure on the USAF Design Handbook Program. These manuals are revised four times a year to update information or to add new material.

2. The EMC Manual is available at no cost to qualified Non-Government and Government organizations for official use. All requests for copies should include justification as explained in paragraph 4 of the attached brochure.

"3. Requests for copies should be directed to-

SEG(SEPSM, Mr. P. Marth) Wright-Patterson AFB, Ohio 45433

"4. I would appreciate it, if you would publish a note in the GEMC Newsletter on availability of the EMC manual and instruction for ordering.

"MICHAEL D. SLUSNY Actg Chief, Radio Interference Control Br. Communications Division Directorate of Avionics Subsystems Engr."

The attached brochure is as follows:

USAF DESIGN CRITERIA HANDBOOK PROGRAM

"1. The design criteria handbooks (implemented by AFSCR 80-14) serve as primary documents for the expression and application of Air Force technical experience and for the efficient translation of technical effort into effective.aerospace systems.

"2. The working knowledge presented or to be presented in these design criteria handbooks contributes directly and significantly to the nature and capability of Air Force systems, equipments, components, materials, and processes. Continual test and evaluation are necessary to verify this working knowledge, maintain its currency and keep it in consonance with the Air Force needs and technical efforts it serves. Design criteria are tester every time they are applied to a pertinent purpose; efficiencies or inaccuracies are reported through feedback processes which result in the generation of correct ive or advances criteria for inclusion in the handbook concerned. Technical evaluation is accomplished through the normal development process, through coordination of new or advanced criteria, and through continual review of pertinent areas by the users of more than 25,000 handbooks in current distribution.

"3. Attached is a sample page (attachment 1) from the Electromagnetic Compatibility Handbook and lists the current handbooks. Constant reevaluation and realignmen of the handbooks are necessary to ensure that the desigr criteria advance with the state-of-the-art.

"4. The handbooks are for official use in support of USAF technical interests and objectives. Government organizations must justify requests based on need for th handbooks in carrying out assigned missions and functior Requests by non-Governmental organizations must satisfy one of the following requirements:

a. Compliance with a specific handbook is required under an active Air Force contract or current 'Invitatic Bid' (state contract or IFB number).

b. A specific handbook is needed as guidance on Air Force or other Governmental contractual effort (state contract or title of work and responsible Governmental Office).

c. A handbook is needed as guidance in private or educational technical efforts, the results of which will directly benefit the Air Force (describe work and expected benefits to the Air Force).

"5. Use the attached pre-addressed 'Reader's Service Letter' (attachment 2) to submit your requests and/or inquiries."

NEW PRODUCTS

Isolator Blocks Stray Signal

Electronic News, March 27, 1967, describes a new product as follows:

"Melbourne, Fla. - Radiation Inc., here has developed a solid-state photon-coupled isolator capable of blocking the flow of stray signals inadvertently coupled on to data transmission lines.

"When this isolator is inserted into a communications system, the isolator introduces less than one per cent distortion at 10,000 bits per second, while providing 10 db attenuation of interfering signals up to at least 1000 perceptes, a Radiation spokesman said.

"The special input circuit of the isolator produces a driving signal to actuate a galium arsenide (laserlike) light emitting diode. The emitter radiates energy at 9000 angstroms but differs from a laser in that it is not completely coherent light. There is no physical connection of the input to the output except this light beam coupling.

"Photons produced by the emitter are transmitted by a special optical system to a silicon light sensor where they are reconverted to electrical energy. The output of the light sensor is then amplified to drive the output lines."

Chrysler Corporation's Modulated Power Supply

Chrysler Corporation, Space Division, Huntsville, Alabama 35807, has brought out a Modulated Power Supply, Model CH50, which has been developed to accurately simulate the 28 vdc bus power encountered aboard aerospace vehicles The Model CH50 supplies 28 vdc power with controlled noise or transient modulation for test purposes. This compares with the NASA specifications which require flight hardware to function under certain noise and transient power source conditions. Modulation capabilities include white noise in the 10 cps to 150 KC telemetry spectrum and transient and spike waveforms. Custom models can also be supplied for other related requirements in modulated power sources.

Magnetic Susceptibility Measurements

Cahn Instrument Company, 7500 Jefferson St., Paramount, Calif. 90723, publishes two technical bulleting Tll and Tl4 on the Faraday method for the determination of magnetic susceptibilities using the Cahn GRAM Electrobalance and an electromagnet equipped with constant gradient pole pieces. This is claimed to have several advantages over the GOUY method

Static Controller

Science News, April 15, 1967, contains the following product made by the General Scientific Equipment Co., P.O. Box 3038, Philadelphia, Pa. 19150:

"A strap arrangement of butyl rubber that slips over the toe of the shoe and along the sole prevents the accumulation of static electricity on the body of the wearer. especially desirable in areas containing explosive fluids and gases, the device is also useful for workers in hotels, theaters and restaurants where heavy carpeting generates static. The strap comes in small, medium and large sizes."

Gasfilled Surge Voltage Protectors

Siemens America Incorporated, Empire State Building, 350 Fifth Avenue, New York, New York 10001, makes a series of gasfilled Surge Voltage Protectors which are intended to protect communication systems, signaling systems, open-wire lines and cables, as well as solid state components and other delicate equipment against overvoltages to prevent damage to the equipment. External overvoltages may be caused by electrical fields in the atmosphere, traveling waves initiated by lightning hits, short circuits, and direct contact with power lines. Internal overvoltages are due to the switching of inductances and capacitances. The voltage arresters made by Siemens consist of a discharge gap sealed-in with a rare gas atmosphere. Typical advantages are their short reaction time, small tolerances of striking voltage, high current carrying capacity, long life, no maintenance and their small size. Additional information may be obtained from G. Zappe at the above address.

Motorized Scan X-Y Modification for NF-105

Electro-Magnetic Measurements Company, 50 Baiting Place Road, Farmingdale, L.I., N.Y., has developed a modification for up-dating existing NF-105 Interference Meters to comply with sweep requirements of new MIL specifications by adding a built-in frequency scanning and signal readout. Instruments modified in this manner are capable of performing the automated measurements which are a feature of current specification requirements and obsolescence of existing equipment is eliminated.

The modification consists of incorporating into the Basic Unit an automatic motor drive for the Tuning Unit, together with suitable detector and hold circuits so that signal levels may be recorded on an X-Y graphic recorder. The tuning drive coupling is placed over a portion of the Tuning Unit front panel. No changes are made in the basic functioning of the instrument and, when the automatic system is not used, all functions remain as they were originally.

Additional information may be obtained by writing to David Fidleman, President.

Wideband Detector of Interference

Electronics, May 1st, 1967, has the following description of a new wideband detector of interference:

"An instrument to detect electromagnetic and radiofrequency interference receives signals from 1 to 600 khz in a single band. A 25-in. calibrated metal-tape tuning dial affords superior resolution at i-f bandwidths of 1, 6, 20 and 50 khz.

"The reciever has a minimum image rejection of 70 db, minimum i-f rejection of 60 db, and a minimum dynamic range of 55 db (agc or manual). Incidental f-m is less than 10 hz peak deviation.

"Powered by 115/230 v a-c, 50-400 hz, the reciever draws 5 watts. Intended for standard rack mounting, it is 3.5 in. high, 19.5 in. deep, and weighs about 20 lbs."

Communication Electronics Inc., 6006 Executive Blvd., Rockville, Md. 20852.

New Products by TECKNIT

Technical Wire Products, Inc., 129 Dermody St., Cranford, N.J. 07016, has brought out a new EMI/RFI Shielded Viewing Window which will permit the viewing of read-out devices placed within the shielded electronic enclosures without disturbing the shielding integrity of the enclosure. The continuous loop pattern of the wire mesh has no straight sections to cause annoying interference patterns or optical illusions when straightline presentations must be read.

A new Intermediate Bar has been specifically designed to shield EMI/RFI between front panels of 19" or 24" EIA cabinet enclosures. Available with TECKNIT'S SN/CU/FE gasketing material is Neoprene sponge which provides an air/fluid seal also. The cold rolled steel bar frame, which is cadmium plated, contains two set screw fasteners for easy installation.

Pyle-National has New Connector

The Pyle-National Company, 1334 N. Kostner Avenue, Chicago, Illinois 60651, has brought out a new connector to suppress RFI "noise" by a peripheral shielding system where all points of ground continuity are made within the environmentally sealed connector. They are called Pvle-Star-Line Neptune Series and further information may be obtained by writing for Bulletin No. 7.

New Method Cable Shielding

B & B Electronics Corporation, 17360 S. Gramercy Place, Gardena, California, has developed a new method of attenuating electromagnetic interference over an extremely wide frequency range 60 cps to 10 kmc. It is called the <u>Electro-Mag Lo-Hi Frequency Shield</u> and can be applied over power cable and assemblies to reduce noise. More information may be obtained by requesting Bulletin 303.

RFI-EMI Cabinet Cooling

ECDI, Electronic Cooling Devices, Inc., Van Nuys, California 91409, has developed a new series of <u>RFI-EMI</u> <u>shielded cabinet blower units</u>. They are designed to be the same size as standard cabinet units and require no redesigning for extra cabinet depth or height. Additional information and shielding effectiveness charts are available on Sheet 1300.

New Flexible Shielded Duct

A new <u>Flexible Shielded Duct</u>, designed to protect cable installations against <u>RFI/EMI</u> radiation, has been brought out by the Danex Corporation, Walnut Avenue, Clark, N.Y. 07066. The Flexible Shielded Duct allows for equipment misalignment and eases interconnections at difficult locations yet assures <u>RF</u> integrity. It is available with a wide range of custom and standard connections.

New Magnetic Field Intensity Meter

The Electro-Mechanics Company, P.O. Box 1546, Austin, Texas 78767, has brought out a low frequency magnetic measurement instrument known as EMCO Model 6640. This instrument together with the <u>Variable-Mu-Magnetometer</u> were developed for various uses including evaluation of magnetic shielding, site surveys, as a laboratory instrument, or prospecting for ores or oil. The MFIM Meter Model 6640 is further described in Data Sheet No. 31367-5 and the Variable-Mu Magnetometer in Data Sheet 654.

New Literature Available from Emerson & Cuming, Inc.

Emerson ξ Cuming, Inc., Canton, Mass. 02021, has brought out the following literature:

Dielectric Materials Charts:

Now available from all Emerson & Cuming, Inc. sales offices are two handy charts in full color for notebook or wall mounting that show the dielectric constant and loss tangent at microwave frequencies of a host of materials. Not only are Emerson & Cuming, Inc. products shown

Not only are Emerson & Cuming, Inc. products shown on a chart, but all-well-known materials such as paraffin wax, water, sulfur, etc. serve as bench marks in selecting a dielectric material.

New Literature on Microwave Anechoic Chambers:

A four page folder describing some of the latest innovations in high performance Eccosorb Anechoic Chambers is now available from Emerson & Cuming, Inc. It is the 6th in the New Design series. The folder contains some pertinent remarks about safety.

Microwave Absorbing Materials Brochure:

A new quick-reference brochure describes the complete line of Emerson & Cuming, Inc. Eccosorb microwave absorbers for free space, waveguide and high temperature applications. The handy six page folder is designed for notebook or wall mounting to provide the engineer with a concise description of physical properties and performance characteristics.

New Designs for Anechoic Chambers:

Now available is a new 12 page illustrated booklet in color describing some of the most recently built Eccosorb Anechoic Chambers. For those interested in the use of anechoic chambers for antenna pattern and radar cross section measurements, the booklet provides and up-dating of the technology in this area. It is the 5th of a series of booklets on this subject.

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