IEEE

ELECTROMAGNETIC COMPATIBILITY SOCIETY

NEWSLETTER

ISSUE NO. 99 FALL 1978 EDITOR: ROBERT D. GOLDBLUM

WHAT ARE WE PAYING YOU FOR?

by Herb Heller
USAB/Internal Communications

In June, Schenectady Section Newsletter Editor Ira Berman published an item from IMPACT (and the Cleveland IEEE Section News) about our image as engineers. To refresh your memory, the L.A. Times had chided President Carter for his pedantic, impractical and short-sighted "Engineer's Mentality." Division VI candidate, Dr. Thelma Estrin, had written a letter-to-the-editor which the Times published, in which she set the author straight on "occupational - like ethnic or sexual - stereotyping being demeaning." In the reprinted item, USAB had recommended involvement by you - the reader - in shaping society's opinion of who we are, instead of letting journalists perpetuate their vacuous prejudices. So far so good.

But, Ira couldn't leave well enough alone. He chided us and "the lady" for an effort that was read and remembered by "perhaps only 2%." Very little had been accomplished, since "once something is in print, it's damn hard to counteract." He also conveniently forgot to separate his editorial comment from the main body of the reprinted story and to sign it, so that it looked as if USAB had authored what was strictly his own opinion.

Then came the payoff: "Perhaps a function of the USAB should be publicity...letting the public draw its onw collective opinion about how great all members...are." "Come on, USAB," he wrote, "Stick up for us. *What are we paying you for?*"

USAB is not a bunch of PR people paid to enhance Mr. Berman's public image, as I am sure he well knows. And just like the editing of Schenectady's newsletter, USAB's work is done by member volunteers, who spend evenings and weekends trying to carry out the majority's mandate against unbelievable odds. However, I must admit that I sometimes wonder if anyone out there is listening.

The cardinal question in the recent U.S. Member Opinion Survey was what to do about USAB's socio-economic and government interface activities. 72% of you wanted to expand them or at least continue their current level. But, in a nine-part question of "Why do you belong to IEEE?" to participate in such activities tied for last place at 2%!! Unless I completely misread this, 98% of the 128,000 U.S. members want the 16 USAB members, staff and task forces to do all the work for them, while they send in 1000 pennies a year.

Well, I have news for you. The only source the American public or Congress will respond to are the individual voices and letters of yours, the 128,000 practitioners. What you get for your 3 cents a day is our exhortation and advice in telling you where your letters will be most effective on a particular subject and at what specific point in time. In a crude approximation, we are the facilities and the expertise of a bloodbank. The <u>blood</u>, however must still be your very own.

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EDUCATION COMMITTEE NEWS

Dates have been firmed up for the courses noted in the last Newsletter. The new Fall 1978 Don White Consultants course listing is available. Nine courses are offered in various locations through December 1978. This listing is given in a booklet which can be requested from their office in Gaithersburg, MD 20760 (656 Quince Orchard Rd., Suite 410).

Henry Ott is giving a course in "EMC Engineering" October 4-6, 1978 at the Academic Center, East Brunswick, N.J.

Bernhard Kaiser will lead a course in "Electromagnetic Compatibility" sponsored by the CE program, George Washington Univ. Dates are November 6-10, 1978 and March 12-16, 1978.

The IEEE CE Service will offer a course in the "Protection of Grounding of Distribution Systems" in Toledo and Milwaukee on October 23rd and 24th and November 29th and 30th, respectively. Contact Vince Giardina.

Along the same lines, the call for papers for the "Workshop on Grounding and Lightning Protection" is out. This workshop will be sponsored by US Dot/FAA with the Florida Institute of Technology in Melbourne, Florida March 6-8, 1979. Deadline is October 15th.

The proposed IEEE Press reprint book on noise sources has been dropped. After announcing the subject last summer, Dick Schulz found that Ed Skomal has a book already in print that covers much of the same material. We will be looking forward to the release of Ed's book.

An industry-government workshop concerning electromagnetic pollution will be sponsored by NBS in Gaithersburg, MD November 2-3, 1978. The extent of and possible regulation of EMI will be discussed. Contact Dee Belsher at NBS in Boulder, CO 80303.

If you have information of an educational nature, please send it to me or call at 612-574-4970.

Ken Exworthy

Kenneth W. Exworthy
Chairman, Education
Committee

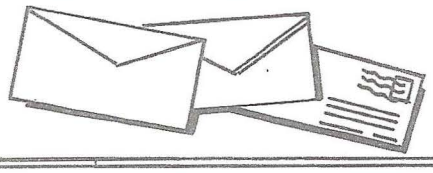
1974 EMC SYMPOSIUM RECORDS

There are a few copies of the Record from the 1974 IEEE EMC Symposium available. Persons who wish to obtain copies while they last should order by mail by sending $12.50 per copy to Andy Nalbandian, 20617 Debbie Lane, Sanatoga, CA 95070. Checks should be made payable to the IEEE EMCS.

SHORT COURSE ON SPECTRUM MANAGEMENT

NOVEMBER 27-30, 1978

The course addresses regulatory procedures and presents engineering methods commonly used to achieve efficient spectrum management. Examples of spectrum management engineering techniques which are of current interest also will be discussed. This course is designed for engineers, managers, communications specialists, and others who need a working knowledge of methods and engineering techniques to operate effectively within the constraints of modern technology and the finite nature of the electromagnetic spectrum. The fee is $470. For further information, please write to the Director, Continuing Engineering Education, George Washington University, Washington, DC 20052 or call 202-676-6106 or toll free at 800-424-9773.



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EMC PERSONALITY PROFILES

by William G. Duff

WARREN A. KESSELMAN

Warren Kesselman has been involved in EMC work since joining the Signal Corps Engineering Laboratories at Fort Monmouth, NJ in 1949. He has participated in, or supervised, R&D projects in the areas of interference measurement instruments and measurement methodology, EMC analysis and prediction techniques, interference reduction circuitry, compatibility specifications and standards and electromagnetic radiation hazards to personnel and ordnance items.

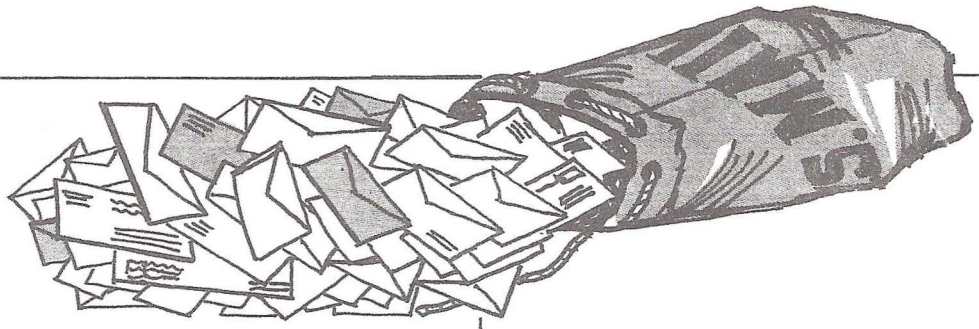
He was involved in the design and development of such test equipment as the AN/URM-3, AN/URM-7, AN/PRM-14, AN/URM-85, AN/URM-100 and AN/URM-110. He participated in the development of the measurement methodology that was incorporated in the original MIL-STD-449; and he was a member of the team that developed the first large scale EMC analysis model. Currently, he is Chief of the "COMSEC and EMC Systems Engineering Team," Center for Communications Systems, Army Communications R&D Command, Fort Monmouth, N.J. In this position, he is responsible for planning and directing a broad R&D program concerned with the optimum use of the electromagnetic spectrum for tactical command and control communications.

He received his basic formal engineering education at Newark College of Engineering and did graduate study at Rutgers Univ. and Brooklyn Poly Tech. His rounded EMC knowledge was received in the R&D lab under the able guidance of several of the "original" EMC engineers - J. Fred Chappell, Scott Shive, Sid Weitz, Ed Kavanaugh, Guy Johnson, *John Egli and John O'Neil.*

Within the organized Professional EMC community, he was there from the beginning. He served on the Tri Service Committee that sponsored the "old" Armour Symposiums; he participated in the organization of the IRE Professional Group on Radio Frequency Interference (IEEE EMC Society's predecessor); and he was on the Paper's Review Panel of the first Transactions on Radio Frequency Interference. Through the years, he has served the IEEE as International Convention Session Organizer, Editor of the N.J. Coast Section's mosthly publication, co-organizer of IEEE N.J. Coast Chapter EMCS, Chairman of that chapter, and EMCS AdCom member and treasurer since 1972. In 1974, EMCS awarded him a Certificate of Appreciation for his continued service to the Society. In addition to the IEEE activities, he participates in ANSI C-63, SAE AE-4, EIA G-46, SAE RFI Subcommittee, and CCIR Subcommittee 1. He, also, was a member of the Arrangements Committee for the 1973 Plenary Assembly of the International Special Committee on Radio Interference (CISPR) held at Monmouth College, West Long Branch, N.J.

In addition to his IEEE activities, he has been active in his local church and scouting programs. In the local church, he has served as elder or trustee for most of the past 25 years. Recently, he was appointed a member of the Ministerial Relations Committee of the Presbytery of Monmouth. In the scouting program, he has served as Troop Committee member, Scoutmaster, and District Activities Chairman. Currently, he is Exploring Chairman for the Great Northern District, Monmouth Council. In 1976, he received scouting's District Award of Merit for his contributions to the youth of the community.

MAIL



We do not receive letters for publication very often. But, when we do, they usually are very strong. With Mr. Page's permission, the following two letters are reprinted below.

Obviously, the more press the problem of EMI in home entertainment receives, the more the reaction will be. Thus, persons wishing to air their views are invited to write to the EMCS Newsletter editor, Bob Goldblum. Selected letters will be published, unless the originator requests otherwise.

August 21, 1978

Mr. Robert D. Goldblum, Editor
EMC Society Newsletter

Attached is a copy of a letter which I sent to Senator Goldwater. It is specifically sent to you in reference to your reprint of the same Electronic-News article which is discussed in that letter and which was published on page 4 of the Summer 1978 issue (No. 98) sof the EMC Society Newsletter.

The interference problem is a serious one, in today's television-broadcast environment. It is serious largely because the television set manufacturers have not considered some of those factors which really affect TV reception and especially because they seem to be taking advantage of the fact that consumers are not sufficiently well informed to demand certain characteristics before they purchase their TV sets.

Perhaps it would be well if the IEEE were to develop its own position on these problems, rather than parroting lobbyists such as former Postmaster General Edward Day; the AMST's Paul Berman, and the American Radio Relay League's Harry Dannals.

Who is speaking for 'society'?

Very truly yours,

O. D. Page

July 17, 1978

Senator Barry Goldwater
United States Senate
Washington, D.C. 20510

Dear Senator Goldwater:

Thank you for your letter of June 8 and the attached material concerning your Bill S. 864, which would bring about a worthwhile improvement in reception of broadcast television services in the presence of nearby high-power communications services such as citizen's band radio and amateur radio.

Unshielded and unfiltered television sets are now susceptible to out-of-band communications signals such as citizen's band radio.

Unshielded television sets also cause considerable difficulty whether the set is being used in connection with a cable television system or an apartment-house master-antenna system, because of the time delay between the arrival of the direct off-air signals and the signal from the antenna system or cable system. According to figures from the Census Bureau and from the National Cable Television Association, there are some 25 million homes which are either connected to a cable TV system or are receiving their television signals from a master antenna system. This is a significant portion of our population.

I am presently acting as chairman of the Broadband Communications Section of the Electronic Industries Association.

I call your attention to the attached copy of an article which was published in a recent (June 19, 1978) issue of Electronic News, and which is entitled "Bill to Mandate Filters Against CB Interference in Trouble." This article implies that your bill is receiving quite a lot of opposition. Upon examination of this opposition, however, Senator Goldwater, I see that it is opposed by so-called "special interests," and I conclude that this opposition is not from the users of these devices, but from those manufacturers who are reluctant to be the first on the market with an improved piece of equipment.

For example, it is to be expected that all manufacturers of television sets are going to oppose anything that will increase the cost of the set; this will theoretically affect the bottom line of the business in some fashion.

I wanted to call your attention to the statement by Mr. J. Edward Day who is identified as "Counsel for the Electronic Industries Association Consumer Electronics Group," and to assure you that Mr. Day is therefore only speaking for one of many divisions or groups in the EIA. In my opinion you will not necessarily find this same degree of opposition to your bill in other sections-as a matter of fact, I think you will find that the Communications Division of EIA, and especially the Broadband Communications Section, might be in favor of such provisions against interference as are contained in your bill. And I think that an enlightened consumer would also be on your side.

And finally, with respect to those manufacturers and manufacturing organizations who claim that the proposed legislation is not necessary or desirable because the manufacturers will make the necessary corrections-history has proven this not to be the case. I think that one reason is that the consumer is not sufficiently well versed and well informed to demand this type of protection as a condition of buying the set-and it is too late after he has made his purchase; the consumer must then look to other ways and means to solve his problem, and at additional expense.

My personal experience includes quite a few of the above examples upon which I can expand when time and space permit: For example the $800 set that was purchased from a leading manufacturer and would not function properly because the manufacturer had decided to save $1.50 per set removing a shielded coaxial connection. This represents a small fraction of the $800 which the consumer paid for his TV set. TV sets now costing upwards of $1,200 are being encountered which have the same problems.

Your bill is going to be subject to pressure by some extremely influential and wealthy organizations including the TV-set manufacturers and the broadcasters. The interests of the consumer, the citizens and the taxpayers (all one and the same) should prevail, and I am sure that the Senate will do what is best for the country and not just what is best for the strongest lobbyists.

Very truly yours,

O. D. Page

I note that there seems to be some distinction between "consumer electronic equipment" and "radio communications equipment"-a distinction which I cannot understand in the present context. TV sets, FM radios, and AM radios, for example, are communications receivers, operating in the VHF band. They are subject to the same type of limitations and requirements as are CB radios and amateur radio receivers, telemetry receivers, aircraft radio receivers, etc., etc. and must be shielded just as well from other undesired signals (or perhaps better in the case of TV). By classifying such devices as "consumer electronic equipment," we might tend to forget that they really aren't very much like tape decks, record players, video games, and calculators.

I would be pleased to provide any additional information which you might need in order to help clarify and resolve this problem.

USAB SPEAKER BUREAU GETS UNDER WAY

Need speakers on professional activities for your meetings? Several IEEE members have volunteered to speak on professional issues at Section, Regional and other meetings. The Washington Office will be happy to get you in touch with IEEE members in various locations. Some of the volunteers are: Richard C. Benoit, Jr., a Member-at-Large of the United States Activities Board who resides in Utica, NY' Dr. N. B. Rabbat (Wappinger Falls, NY); Professor Stella Lawrence (Bronx, NY); Robert H. Parrish (Stow, OH); William A. Coelho (Cincinnati, OH); and Raul David Rey, P.E. (Tujunga, CA). Call or write IEEE United States Activities Board, 2029 K St., N.W., Washington, DC 2006; Tel.: 202-785-0017.

IEEE AGE DISCRIMINATION BOOKLET

The goal of the Age Discrimination in Employment Act is "to promote employment of older persons based on their ability rather than age, to prohibit age discimination in employment, to help employers and workers find ways of meeting problems arising from the impact of age on employment." A booklet just published by USAB, "You and Age Discrimination," is viewed by IEEE as one small step to achieve that goal for engineers and the companies that employ them. The author is Michael D. Batten, senior staff associate of the National Manpower Institute in Washington. The booklet covers pertinent provisions of the Age Discrimination in Employment Act of 1967 with its 1978 amendments, issues warning signals on detection and assessment of age discrimination, and offers guidelines for action. An appendix provides a list of offices to contact in suspected cases. The booklet (Catalogue No. UH0131-3), priced at $3 for members, $6 for nonmembers, may be ordered from the IEEE Service Center, 445 Hoes La., Piscataway, NJ 08854.

TWO NEW FELLOWS RECEIVE CERTIFICATES AT ATLANTA SYMPOSIUM

Leonard W. Thomas, Sr. and Herman Garlan were elected to Fellow grade in January 1978 and were presented the Fellow Certificate at the recent Atlanta EMC Symposium.

The citation for Mr. Thomas is "for leadership in the field of Electromagnetic Compatibility; the development of interference measurement instrumentation, and the development of Standards and Specifications for EMC measuring instruments and measurement techniques."

He received his BSEE Degree from Auburn University in 1931 and started his professional career in 1932 as an engineer at radio station WAPI, Birmingham, AL. In 1939, he transferred to WJSV in Washington, DC.With the advent of World War II, he resigned this position and accepted a position as radio engineer with the Bureau of Ships where he reamined until 1961 when he transferred to the Electromagnetic Compatibility Analysis Center in the position of staff engineer, in the Plans and Programs Directorate. He retired from the Federal Government service in 1970 and organized the Thomas Engineering Service to offer consulting services in the EMC engineering field.

Throughout his career, Mr. Thomas has been very active in the IEEE and other organizations. Some of his more significant activities include: Charter Member of the Washington, DC Chapter of the IEEE EMC Society; Secretary of the Administrative Committee of the IEEE EMC Society; Chairman of the IEEE EMC Society Committee on Constitution and By-Laws; Vice Chairman of the IEEE EMC Society Committee on Standards; Member of the IEEE Environmental Quality Committee; Member of the IEEE Standards Board; Member, since 1944, of the American National Standards Institute (ANSI) Committee C63 on Radio-Electrical Coordination; Chairman of ANSI Committee C63; U.S.A. Representative to the International Special Committee on Radio Interference (CISPR) from 1946 to 1960; Secretary of CISPR Sub-committee A on Instrumentation and Measurement Techniques 1974 to 1977; Member of U.S. Study Group 1 of the International Radio Consultative Committee (CCIR); Member of Special Committee 135 of the Radio Technical Commission for Aeronautics (RTCA); Member of Committee G-46 on EMC of the Electronic Industries Association (EIA); Member and Consultant to Committee AE-4 on EMC of the Society of Automotive Engineers (SAE); and Member of the Personal Use Radio Advisory Committee (PURAC) to the Federal Communications Commission (FCC). He also is a Life Member of the IEEE and the EMC Society of the IEEE.

Mr. Thomas and his wife Vida May, who he met at Radio Station WAPI, have led active personal lives. In addition to raising two daughters and a son, they have been active in civic and church affairs. Vida May was elected Mother-of-the-Year for the District of Columbia in 1969. Both daughters are married, and there are two granddaughters, one of whom is a member of the Class of 1981, Auburn University. Leonard, Jr. also is a member of the IEEE EMC Society and is an Electronics Engineer at Warner Robins Air Force Base, Goergia. Mr. Thomas was a Boy Scout leader for 15 years Vida May was a Girl Scout leader for 10 years.

Mr. Thomas has authored a number of technical papers, and has lectured on Electromagnetic Compatibility before many engineering and scientific organizations in many countries over the past 30 years. He was honored at the Washington, DC IEEE National Capitol Area Awards Banquet on March 18, 1978.

The citation for Mr. Garlan reads, "for contributions toward the development of a program of national regulations to control radio frequency interferency by promulgating technical specifications, establishing measurement procedures and creating a system of authorizations." Mr. Garlan is officially retired, but he continues at the FCC as Chief, RF Devices and Experimental Branch. Only three other FCC professionals have received this honor - Edward Allen, former Chief Engineer, Edward Chapin, former Chief of the Laboratory Division, and Harry Fine, the late deputy Cheif Engineer.

Mr. Garlan received his B.S. and M.S. degrees from CCNY in 1929 and 1932, respectively, and an E.E. degree from Columbia Univ. in 1936. He is a registered professional engineer and a member of Tau Beta Pi and Sigma Xi. He started with the FCC in 1940 at the Chicago Field Office and transferred to Washington in 1945. For 8 years, he carried on engineering activities essential to the administration, regulation, and licensing of Safety and Special Radio Services-police, petroleum, taxi, etc. Then, in 1953, he was tapped to plan and supervise a program to eliminate RF interference to communications by establishing regulations to control radiation from industrial, scientific, and medical equipment. Under his direction, a set of regulations (FCC Rules Part 15) was conceived, developed, and pushed through to formal adoption by the FCC. Part 15 sets limits for the emission of RF energy from receivers and it also sets up technical standards under which many types of miniature transmitters can be developed and sold to the general public, while ensuring that these devices will not become a source of harmful interference.

By reducing the level of RF emissions from receivers, Garlan's rules help to reduce the general noise level and make possible increased spectrum usage. The rules for miniature transmitters have made a host of valuable devices available to the public: garage door openers, wireless microphones, television games, biomedical telemetry devices, and security alarms, to name a few. In addition to providing benefits directly to the public, these rules also have created opportunities for small businesses and provided employment. This all was accomplished with a negligible effect on the use of the radio spectrum for radio and television broadcasting and for conventional mobile radio communications. Part 15 has been called an outstanding example of how to squeeze in additional spectrum usage to promote electromagnetic compatibility and make for more efficient spectrum management.

Garlan was a Charter Member of the Washington EMC Chapter, served as Chairman 1961-62. He has been active in all EMC Symposia held in Washington. Since 1958, he has participated in the work of CISPR, an international committee which develops recommendations for limits and measuring equipment to control interference (the PR of CISPR is for Perturbations Radioelectriques, just one more way to say interference).

Technically, he's now a "reemployed annuitant," which means he works as hard, but only 4 days a week. He and his wife spend many of their longer weekends at their place on Skyline Drive where they have fixed up an old house and enjoy gardening.

Summing up his career, Herman Garlan says it has been "exceedingly interesting. I've enjoyed it very much."

SPECIAL SERVICE NOTE ON AUTOMOTIVE ELECTROMAGNETIC COMPATIBILITY PROBLEMS

From time to time, you may have questions concerning electromagnetic compatibility of your company's products when installed on General Motors vehicles. To help avoid such questions from arising, it is urged that care be taken to follow any applicable GM service procedure. The local GM service manager for the car or truck division whose vehicle is involved should be contacted for information about such service procedures.

If you are unable to obtain such assistance locally or if questions nevertheless arise, we have established a central contact point for all such inquiries. Accordingly, you should direct your inquires to: Mr. Henry J. Lambertz, GM Service Research (G.M.S.R.) Transportation Systems Building, GM Technical Center, Warren, MI 48090; Tel.: 313-575-1086.

He will direct your inquiries to the appropriate divisions or staff within GM and follow up to see that appropriate action is taken.

(From *IEEE VTS NEWSLETTER*)

IN MEMORIAM

VICTOR SIEGFRIED, IEEE Fellow, EMCS member, past Chairman of the 1974 EMC Symposium held in San Francisco, died on June 8, 1978 of an apparent heart attack.

Vic obtained his Bachelor's Degree from Stanford University in 1930, and an Electrical Engineering Degree in 1972. He also attended Harvard University and taught for seven years at Worcester Tech in Massachusetts until 1944. He later did research for several firms before joining Lockheed Missiles and Space Co. in 1963. Vic worked at Lockheed until his retirement in 1975. His contributions to the EMCS were many.

Book Reviews

by Jim Hill, EMXX Corporation

In this issue, our focus is on fiber optic systems, a technique that is finding increased uses in the solution of EMC/EMI problems. Progress in using this technique seems to be slow, possibly because optical engineers have not been readily available to the engineering groups dealing with this type of problem. We have been asked to review a book dealing with fiber optics so we enlisted the expertise of Dr. Larry Campbell of Digital Communications Corporation. With his co-worker, Dr. Elizabeth Rutz, the following review was prepared. It incorporates a short treatise on optical systems to bring the non-optically trained engineer on-board.

In the last issue, Dr. Clayton R. Paul did a very thorough review of "Multiconductor Transmission Lines" by Sidney Frankel. Dr. Frankel has written me that he is "somewhat disconcerted by the reviewer's preoccupation with his negative impressions" and has requested that I publish his letter commenting on Dr. Paul's review. In fairness to Dr. Frankel, I have agreed to this request. His letter appears in place of our usual second review.

"Planar Optical Waveguides and Fibres"

BY

H. G. Unger

Oxford Science Engineering Series
Oxford University Press, 1977
200 Madison Ave., NY, NY
Price $45.00

This book, written by the Dean of the Technical University of Braunschweig, West Germany, is tutorial. The book covers the theory of transmission lines for integrated optics and fiber optics, and it further covers the theory of the devices required to couple to and from these lines.

The advent of the laser and the fabrication methods developed for integrated circuitry has made it possible to extend microwave techniques to optical frequencies. Optical waves which in earlier days have propagated in free space, can now be guided by optical fibers or by optical waveguides. Optical fibers guide the light over long distances in optical transmission systems. The optical waveguides can connect the components of an integrated optical circuit which perform such functions as modulation, switching mixing and up-conversion.

The optical guiding structures can be separated into two classes by their modal properties, i.e., single mode guides for spatially coherent light and multi-mode guides for partially coherent or incoherent light. To guide the light, the fibers and the waveguides consist of a center region of transparent and optically dense dielectric material that is surrounded by an optically less dense dielectric. The cross section of the fiber, in general, is round. The optical waveguides have the form of films or strips of higher refractive index which are deposited on a substrate. The modal property of an optical guide is determined primarily by the dimension of the center region.

In this book, a complete and detailed theory of wave propagation in planar optical waveguides and optical fibers is developed with a view to their applications in integrated optics and optical communications. The analysis of wave propagation in the multi-mode optical guides uses the simple geometric optics concept of rays and their total reflection at the guide boundaries. From the phase condition for self consistent field distribution, the quantization into a finite number of discrete modes of propagation is developed. For optical guides with uniform properties,

and perfect geometry, the propagation characteristics observed in integrated optics and optical communications are derived from the ray picture, together with the quantization into modes.

The ray picture also is used for the analysis of wave propagation in optical guides where the refractive index is not constant over the center region, but gradually decreasing from the center to the sidewalls.

The analysis of wave propagation for the single mode optical guides or low-order optical guides uses field solutions of Maxwell's equations. From these field solutions, the effect of imperfections in the optical guides are evaluated and the physical principles of prism and grating couplers for converting free space waves to guided waves, are explained.

The subjects covered in the book are planar guides with and without transverse confinement, film-lens guides, strip loaded films and rib guides. Guided and leaky mode characteristics are obtained for multi-mode and single-mode optical guides. Interface scattering and curvature loss for film modes are evaluated and a dispersion analysis is performed.

A section of waveguide technology is included, which has the form of an introduction to the many different methods of fabrication of optical guides.
The book, with its emphasis on a sufficiently complete and detailed theory on wave propagation in optical guides, should be of equal value to the scientist and to the student.

Dear Mr. Hill,

I was pleased to find my book reviewed in the EMCS Newsletter, but somewhat disconcerted by the reviewer's preoccupation with his negative impressions, with only passing acknowledgment of the positive aspects of the book. I believe your readers are entitled to a better-balanced exposition of the facts.

But, first, I should like to clarify a statement in Dr. Paul's report tnat might tend to be misleading. At the outset he states that "this report seems to be an assortment of several other technical reports published" by me. Naturally, one cannot be responsible for how things seem to Dr. Paul. The fact is that approximately half of the book, as indicated by his own comments, is concerned with "traditional synthesis of microwave circuits" (Chapter 3); a "fairly conventional treatment" of conductor losses (Chapter 6); "conventional results..for capacitance parameters..." (Chapter 8); "a rather traditional treatment" of conformal mapping (Chapter 9); and "well-known determination of per-unit-length quantities from analogous experimental measurements" (Chapter 11).

If Professor Paul is suggesting that I have written reports on all of the subjects, and copied them verbatim into the book, he is badly misinformed.

This is not to imply that the chapters cited are devoid of material that at some time appeared in some one of my reports as an original contribution. For instance, Chapter 6 (Conductor Losses) is concerned with material from an earlier report dealing with the dependence of conductor-loss attenuation constant on the nature of line excitation. My own discussions with workers in this field indicate that it has not been generally realized that one cannot assign a fixed value to conductor resistance except in certain special cases; or that one cannot resolve the line excitation into independent modes, determine conductor resistances for each mode, and then hope, by super-position, to determine the conductor losses for arbitrary excitation. This is the sort of "fairly conventional material developed in Chapter 6.

Similarly, Chapter 9 contains results published in my "report" in the Proc. I.R.E. of April 1942.

Incidentally, this same Chapter 9 is some 55 pages long, contains 23 illustrations, and covers such subjects as parametric representation, conformality, magnification factor, proof of the equivalence of line parameters in conformally corresponding configurations, and an heuristic derivation of the important Schwarz-Christoffel transformation. It derives line parameters for almost a dozen configurations, including one or more conductors between parallel planes, a round conductor in a rectangular shield, and stripline. Yet, Dr. Paul sees fit to dismiss this array of information with a single, uninformative statement about "traditional treatment." Is this consistent with his complaint that in Chapter 8 "the important problem of determining...inductance is only allocated one sentence...?"

About this same subject of inductance, Professor Paul fails to point out that that same sentence (page 216) refers the reader to Chapter 2, which devotes to that subject a section (2.2.4 Inductance Coefficients and Matrix; about two pages) in which the self- and mutual inductance coefficients are defined in terms of magnetix flux linkages between conductors. In my opinion, these considerations are sufficient for an adequate development of the subject. We are, after all, talking about a book on transmission lines, not about one on inductance.

I suppose I almost feel flattered that Dr. Paul characterizes sections of the book that contain some of my original contributions as traditional, etc. Somehow, I have the impression that flattery was not intended.

But let us return to the description of the book as an assortment of other reports. From this kind of loose statement, one may easily be led to believe that this is one of those useful compilations of mutually-related reports or articles that are published from time to time (certain publications of the IEEE and certain other publications of my own publisher fall in this category). Whatever the merits of this type of publication, it is, for the record, simply not true that my book is such a compilation. It is not even true for the half of the book not previously discussed. It is true that much of the material is lifted from previous reports, and an attempt made to blend these excerpts into a continuous logical fabric. After all, for a given amount of detail, it is not easy, or necessarily productive, to attempt to paraphrase a mathematical derivation previously considered satisfactory. In no instance, however, has any earlier report been transferred in toto to this book.

There is no point in belaboring Dr. Paul's review item by item, some of which I find to be merely matters of taste, others to be of small significance. However, I should like to conclude with a brief discussion of two of Dr. Paul's complaints.

The first, in Chapter 1, deals with his dislike of a summary of basic electromagnetic-theory equations without word discussions and pictures. For those who are familiar with the equations (he states), there is no need to compile them; for the unitiiated they are uselèss without word discussion and pictures.

Well, perhaps it would have helped, had I explained my attitude about this matter in an introductory paragraph. The presentation of a structured development such as presented in this book is, to me, a fascinating drama. The summary of equations in Chapter 1 represents a sort of "dramatis personae." While the analogy is not perfectly apt, the listing of the field-theory equations appears to me as basic to the ensuing development as is the listing of the cast of characters to the unfolding of a play. In contrast to Professor Paul's view, I believe that, for those familiar with field theory, just the appearance of the equation (a kind of art form in themselves) triggers in their minds an immediate picture of the base from which they are starting. For the uninitiated, I strongly urge that they seek enlightenment in field theory elsewhere than the introductory chapter of a book on multiconductor transmission line theory.

Finally, I must confess myself thoroughly baffled by Professor Paul's complaint about the matrix, (E), on page 27 of Chapter 2. This, he states, is a 2n x 2n matrix which has been written incorrectly as a 2 x 2 matrix; "n x n identity matrices are needed for it to be a proper matrix for multiplication in Equation (2-34). Perhaps the author intended for this to be simplified notation; as is clear from the remainder of the text, and his many years of work, he certainly knows better..."

Since Professor Paul does not explain why (E), as written, is not a proper matrix for multiplication in Equation (2-34), I shall to guess. I guess that he is looking at the matrix that (E) pre-multiplies, which contains n x 1 vectors as elements. If the indicated multiplication is to be permissible (I imagine the professor reasons), the elements of the matrix, (E) and those of the following matrix must be conformable. Hence the elements of (E) must have n columns, and the only way to accomplish this without changing the values of the elements is to multiply them by n x n identity matrices.

But wait a minute! That can't be right. That is just the sort of multiplication he won't permit me to do. Well, I suppose he really means that the scalar quantities in (E) should be replaced by n x n equivalent scalar matrices. That would do it.

But is it necessary? It happens not to be. It is equally permissible (as I'm sure Professor Paul knows) to multiply a matrix of any dimensions by a scalar, which is all that happens when the indicated multiplication in Equation (2-34) is executed.

Professor Paul has created a mountain out of an infinitesimal molehill. Unfortunately, he cites this case as an "example" of "numerous vector-matrix products (that) are not written correctly." Since the validity of his criticism in the cited example is doubtful, to say the least, he may have misled your readers seriously regarding the correctness of "numerous" other expressions.

I believe that, in the best interests of your readers, and in fairness to me and my publisher, you ought to print this reply in an early edition of the Newsletter.

Sincerely yours,

Sidney Frankel

Sidney Frankel

Logo Contest

We wish to thank Mr. B. Schenker of Sunnyvale, CA for submitting the following for mastheads for the EMCS Newsletter. Since these were the only two entries, we will run it off against our current masthead.

EMCS members are requested to clip the coupon, vote for the best masthead and logo, and return it to: Robert D. Goldblum, Editor, EMCS Newsletter, P. O. Box 328, Plymouth Meeting, PA 19462.

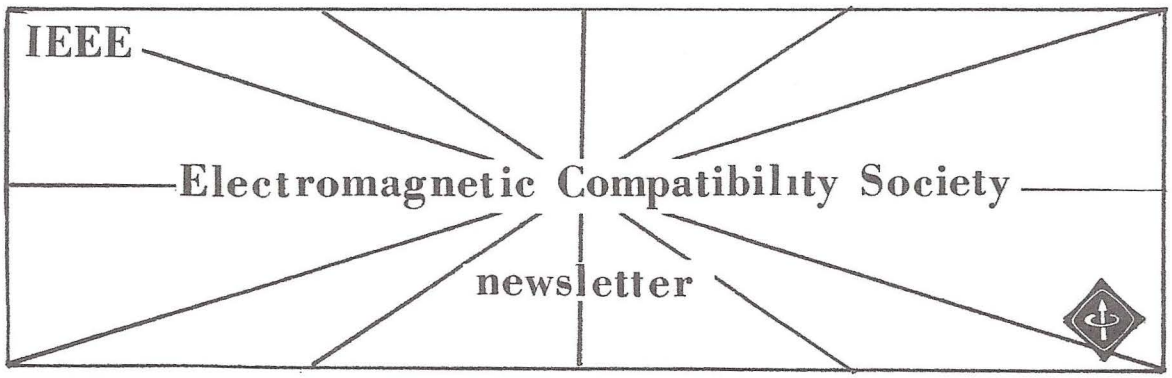
BALLOT COUPON

- ☐ Masthead No. 1
- ☐ Masthead No. 2
- ☐ Current masthead which appears on the cover.

Signature: _____

№ 1

№ 2



EMCABS

In this issue we are publishing 36 abstracts. In a future issue, we hope to publish a large number of abstracts, many of which are on Bonding and Grounding. These are still in the review process at this time.

If any of you have ideas or suggestions for improvement of the EMCABS, please contact one of the below listed EMCABS Committee Members. We are particularly interested in further suggestions that we can pass along to our readers on retrieval of abstracted articles.

The EMCABS Committee is listed below:

L. F. Babcock
J. S. Hill
J. R. Janoski
D. R. Kerns
R. B. Schulz
E. L. Bronaugh
R. N. Hokkanen
M. Kant
G. R. Redinbo
R. M. Showers

In this issue, we are publishing 30 abstracts. One of these, #06-78-27, is a corrected abstract. It was published in the last issue of the Newsletter without the heading. Several of the abstracts being published this time are of primary interest to equipment designers. These abstracts cover the subjects of noise and distortion in receiving and transmitting equipment, and while such topics are not usually included in EMC engineering, these articles offer means for the engineer to understand EMC problems with the external environment of a system or equipment due to distortion and other effects within the equipment.

We are still interested in your ideas and suggestions for improving the EMCABS. If any of you wish to pass along your thoughts, please contact Ken Exworthy or any other members of the EMCABS committee listed below:

L.F. Babcock
J.S. Hill
J.R. Janoski
D.R. Kerns
R.B. Schulz
E.L. Bronaugh
R.N. Hokkanen
M. Kant
G.R. Redinbo
R.M. Showers

EMP NOTES

The following EMP related notes have been published and distributed:

Sensor and Simulation Note 235, "An Analytical Investigation of the Method of Using an Extrapolation Function in Finding Criteria Response from Simulation Response," K. M. Lee, MRC, 12 Dec. 1977.

Interaction Note 225, "Computer Models for Antennas," E. K. Miller, LRL, 21 Jan. 1974.

Interaction Note 326, "Stick-Model Characterization of the Natural Frequencies and Natural Modes of the Aircraft," G. Bedrosian, Dikewood, 14 Sept. 1977.

Interaction Note 327, "Stick-Model Characterization of the Total Axial Current and Linear Charge Density on the Surface of an Aircraft Subjected to an EMP: Frequency-Domain External-Interaction Current and Charge Transfer Functions," G. Bedrosian, Dikewood, 13 Sept. 1977.

Interaction Note 332, "Experimental Characterization of Multiconductor Transmission Lines in Inhomogeneous Media Using Time Domain Techniques," A. K. Agrawal, H. M. Fowels, and L. D. Scott, MRC, Feb. 1978.

Mathematics Note 49, "Suboptimal System Approximation/Identification with Known Error," T. K. Sarkar, J. Nebat, D. Weiner, 3 Sept. 1977.

Switching Note 24, "High Speed Breakdown of Small Air Gaps in Both Uniform Field and Surface Tracking Geometries," J. C. Martin, Apr. 1977.

Switching Note 25, "An Auto Irradiated Pulse Charged Divertor Gap," T. H. Storr and J. C. Martin, May 1977.

Switching Note 26, "Four Element Low Voltage Irradiated Spark Gap, J. C. Martin, Aug. 1977.

Copies of these notes are available at many universities and companies doing research in EMP and electromagnetic theory.

The EMP note series actively solicits contributed papers in this area for publication. For such contributions, contact Dr. Baum for particulars.

WANT TO BE PART OF THE ACTION?

Calls for action by IEEE members on legislative issues of concern to the engineering profession can be heard on USAB's Information Line. Want to know what's happening in Washington? Call 202-785-2180.

SAE AE-4 EMC COMMITTEE TO MEET

The next meeting (No. 44) of the SAE AE-4 Committee on Electromagnetic Compatibility will be held on November 2-3, 1978 at Rockwell International, Satellite Systems Div., 2201 Seal Beach Blvd., Seal Beach, CA. A block of rooms have been reserved at the Long Beach Hyatt House, 600 E. Pacific Coast Hwy., Long Beach, CA; Tel.: 213-434-8451. Mention the SAE meeting when making reservations. The rooms will be reserved for the SAE through October 18th.

Representing the host, Elden Hughes has asked that he be advised of your plans to attend so that he can have badges made up in advance. Contact Elden at Rockwell International, Mail Zone SL-10.

NBS EMI WORKSHOP

A second EMI workshop sponsored by the National Bureau of Standards will be held on November 2-3, 1978 in Gaithersburg, MD. The registration fee will be $85 before October 6th and $105 thereafter.

The objective of the workshop is to address current and future EMI technical problems and regulatory actions. It also will explore potential solutions and what is needed for progress. There will be five concurrent Working Group Sessions in the areas of transportation, communications, medicine, industry and consumer products.

For additional information, call Mrs. Dee Belsher, Workshop Coordinator at 303-499-100, Ext. 3981.

EIA G-46 EMC COMMITTEE TO MEET

In conjunction with the SAE AE-4 Committee on Electromagnetic Effects, the EIA G-46 Committee on Electromagnetic Compatibility will conduct its next meeting on November 1, 1978. The meeting will be held at Rockwell International, Satellite Systems Div., Advanced Programs Conference Room, 2201 Seal Beach Blvd., Seal Beach, CA 90740. Persons interested in attending should contact the committee chairman, Elden Hughes at 213-594-3151. The SAE AE-4 meeting is scheduled for November 2-3, 1978.

FIRST CALL FOR PAPERS

The 1979 IEEE MTT-S International Microwave Symposium will be held at the Sheraton-Twin Towers Hotel, Orlando, Florida. The Symposium theme is "The World of Microwaves" and will emphasize the ever-increasing role of microwaves in today's world.

Papers are solicited describing original work in the field of microwaves. Material submitted should not have been previously presented or published. Although any papers concerned with microwave techniques, devices, systems and applications will be considered, the following subject areas are regarded as particularly appropriate for this conference:

- Computer Aided Design and Measurement Techniques
- Low Noise Techniques
- High Power Techniques
- Radiometry and Remote Sensing Systems and Applications
- Satellite Communication/ Microwave Systems
- Integrated Optics, Fiber Optics and Optical Techniques
- Microwave Acoustics
- Microwave Field and Network Theory
- Microwave Bioeffects
- Technology Forecasting and New Ideas

Authors are requested to submit both a 35 word abstract and a 500-1000 word summary explaining their contribution, its originality, and its relative importance. Abstracts and summaries (5 copies) must be received on or before December 1, 1978 by:

Dr. James T. Allen
TPC 1979 MTT-S Symposium
Electrical & Electronic Systems
University of South Florida
Tampa, FL 33620

Notices of acceptance or rejection will be mailed to authors by January 20, 1979. At that time, authors of accepted papers will receive forms and instructions for preparing material to be printed in the Symposium Digest.

A special conference on Gigabit Logic will be held May 3rd and 4th. For information on paper submission, contact Dr. Paul T. Greiling, Hughes Research Labs, 3011 Malibu Canyon Rd., Malibu, CA 90265.

SPECIAL PROCEEDINGS ISSUE TO COVER EFFECTS AND APPLICATIONS OF ELECTROMAGNETIC ENERGY

The PROCEEDINGS OF THE IEEE plans to publish a special issue in January 1980 on biological and ecological effects and medical applications of electromagnetic energy. The emphasis of the issue will be on both the status of the field and its future directions. Survey papers are solicited reviewing the various areas, such as electromagnetic fields in the environment; current safety standards; dosimetry; EM biological, behavioral and ecological effects; and medical applications, such as hypterthermia, microwave radiometry, etc.

Prospective authors should discuss their plans by calling or writing the Guest Editor: Prof. EOm P. Gandhi, Dept. of Electrical Engineering, Univ. of Utwah, Salt Lake City, UT 84112; Tel.: 801-581-7743.

A three to four-page summary of the proposed paper should be submitted no later than Jan. 1, 1979. Complete manuscripts incorporating the comments of the Guest Editor and the reviewers are due by March 31, 1979.

TABLE OF CONTENTS FOR THE NOVEMBER, 1978 TRANSACTIONS

NAVAIR FILMS ON EMC

The following films on EMC are available for purchase from:

Chief of Sales
National Audio Visual Ctr.
National Archives and
Record Service (GSA)
Washington, DC 20409

MN10932A - Review of EMC
MN10932B - Build in EMC
MN10932C - Shielded and Anechoic Chambers
MN10932D - Receiver Susceptibility
MN19032E - Operational EMC
MN19032F - EMI Control Methods
MN19032G - Theoretical Aspects of EMI
MN19032H - EMC Program Considerations

In addition to the above, there are four films on the subject of lightning. The source for the following is the same as given above. Order by name only.

Lightning: Precipitation Static Causes and Effects on Aircraft

Research, Development and Testing

Future Aircraft Design Problems

Damage and Protection

Flash and Glow

Ms. Jacqueline R. Janoski, President, Electromagnetic Compatibility Society, would like to be informed if you received copies of the films when they were published in 1973 and 1974 and still have them. You can contact her at: 790 Fairview Ave., Apt. C, Annapolis, MD 21403.

The films are also available for short term loans through R & B Enterprises, P. O. Box 328, Plymouth Meeting, PA 19462. Write or call Mrs. Judith Krause (215-828-6236) for additional information.

U.S. CONVERSION TO METRIC SYSTEM INEVITABLE

If voluntary metrication efforts fail, the federal government will step in. This was an overriding message at the recent annual meeting of the American National Metric Council (ANMC), a privately funded organization coordinating and encouraging metrication in the U.S. Dr. Louis F. Polk, Chairman of the federal government's U.S. Metric Board, said that "the private sector properly has taken the initiative in metrication....," but warned that "we either adapt to constructive change voluntarily, if needed change is indicated, or we'll be deserted."

NEWSLETTERS

In the United States at least, newsletters are now, perhaps, the most popular and effective print medium. So says an article by Albert Walker, Professor of Journalism at Northern Illinois University, in a recent issue (1977/1) of the Journal of Organizational Communication, quarterly publication of the International Association of Business Communicators.

Walker estimates that 50,000 organizations, agencies, businesses, and other groups in the U.S. are represented by newsletters, which publicize some 5,000 activist causes, 2,000 commercial interests, and more than 6,000 subjects from abrasives to zoological parks. There is even a Newsletter of Newsletters.

The IABC article points out that the newsletter is a very old and respected print medium. Newsletters were printed by Chinese rulers around 200 BC to keep the court retinue informed, and by banks and insurance companies in seventeenth-century England to tell investors about shipping activities. The first newspaper in the North American colonies was not a newspaper at all, but the Boston Newsletter of 1704.

Newsletters are published to inform, persaude, advise, and encourage. They differ in purpose, content, format, and method of delivery; that is, they may be commercial or promotional; contain news, reviews, or summaries; advocate special causes or support particular interests; have newspaper or magazine format; appear as inserts in magazines, bills, or pay envelopes.

Every typist is now a potential typesetter. Anyone can become a publisher by using a low-cost duplicating process. Readers tend to scan and skim through a newsletter as soon as it is delivered, laying magazines aside to be read in "time that never comes." Newsletters, in short, are "creating a revolution in journalism."

REPRINTED FROM: Professional Communication Group Newsletter, Vol. 20, October 1977.

IEEE MEMBERSHIP GROWING AT RECORD RATE THROUGH JUNE 1978

According to IEEE membership statistics through June 30, 1978, Institute overall membership is growing at a rate which will far surpass 1977's year-end record of 183,021. June 30th membership for 1978 was 176,777 - an advance of 6,371 (+3.7%) ahead of the same time last year. Technical Society membership also continues to grow, with 173,217 memberships held - (including Affiliates) - an increase of 10,247 (+6.2%) over the previous year's June 30th figure. IEEE Student membership at June 30th was 22,282 - a gain of 1,475 (+7.0%) compared to 1977.

GENERAL NEWS

Foreign Students Favor Engineering

Approximately 179,000 students from foreign countries were enrolled in U.S. colleges and universities during the 1975-76 academic year. The single largest group came from oil rich Iran, and Asia was the continent most represented.

Most of the foreign students who come to this country for higher learning are interested in engineering, medicine, biology, the physical sciences and teacher training.

Foreign student enrollments in the U.S. for 1975-76:

Iran	19,630
Hong Kong	11,764
Nigeria	11,282
Taiwan	10,071
India	9,497
Canada	9,289
Thailand	7,300
Japan	6,974
Venezuela	4,616
Mexico	4,553

REPRINTED FROM: AESS Newsletter, April 1978

U.S. Engineers Salary Trails Others

According to a survey by The Conference Board, a business research organization, the U.S. no longer is the industrial world's salary leader. Based on a 1975 12-country study, Denmark, with an average starting wage of $20,400, placed No. 1. The United States, with an average of $14,940, was a distant fifth, also trailing West Germany, Switzerland, Norway and Belgium.

Denmark's wages were 37% higher than in the U.S. and 192% more than in the United Kingdom, which placed last in the rankings. In 1971, the last time the Conference Board studied international salaries, the U.S. held a comfortable lead over all other nations.

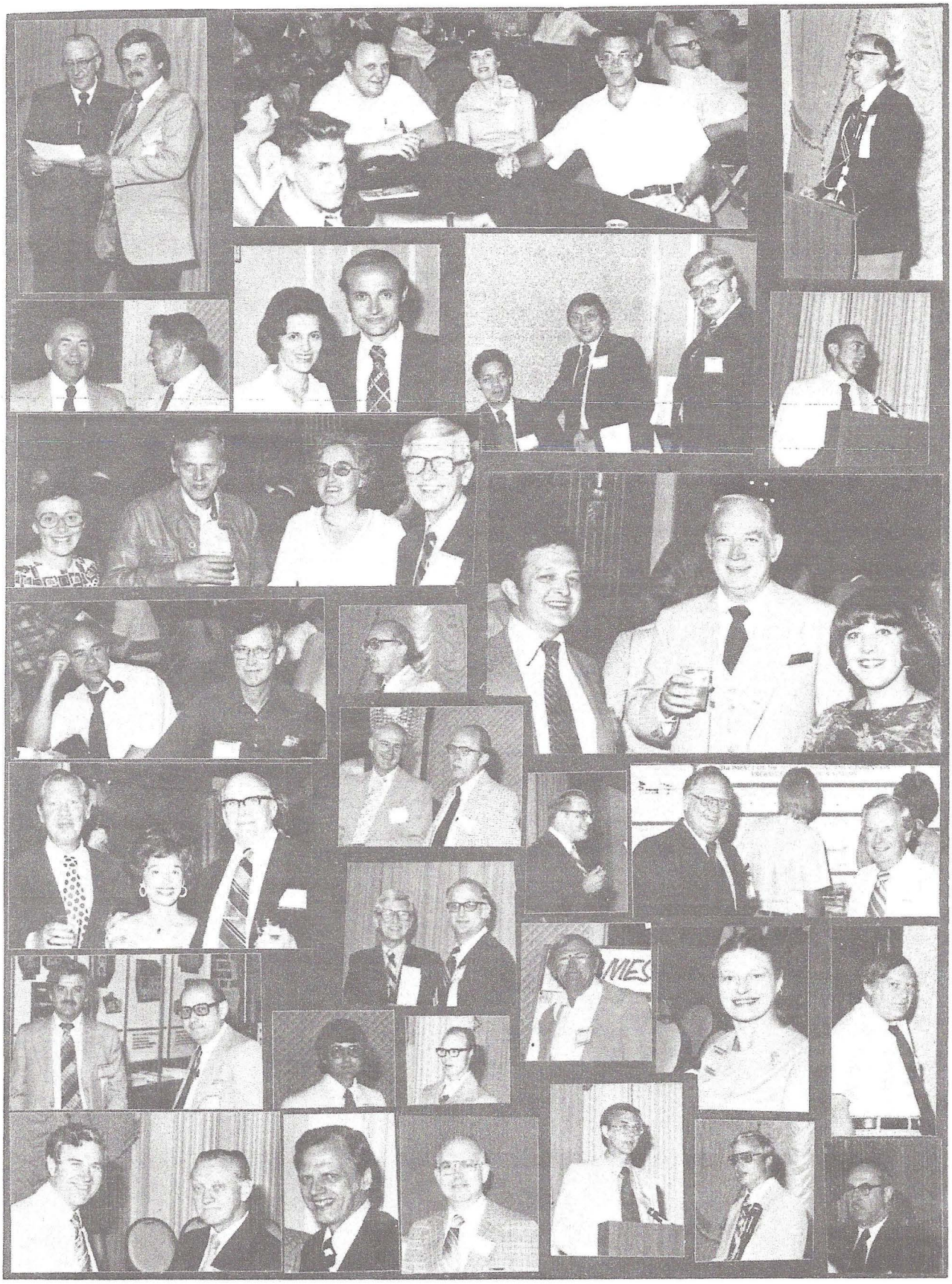
REPRINTED FROM: AESS Newsletter, March 1978

MBA LOSING ITS VALUE

There are indications that the master's degree in business administration may be losing some of its clout in the job market. So many new MBA programs have been created by colleges and universities in the past several years that corporate recruiters have had little trouble filling their vacancies. Meantime, the number of job offers for MBA's has leveled out and even dropped a little, forcing some new graduates to accept positions that would normally be filled by candidates with bachelor's degrees.

1978

SYMPOSIUM SNAPSHOTS



INSTITUTIONAL LISTINGS

The IEEE Electromagnetic Compatibility Society is grateful for the assistance given by the firms listed below and invites application for Institutional Listings from other firms interested in the electromagnetic compatibility field.

SERVICE DIVISION, AMERICAN ELECTRONICS LABS., INC., Richardson Rd., Montgomeryville, PA 18936
EMI/EMC, shield, enc. consult. test & anal.; Scrn. rm. (incl. for large veh.); Comp. instr. for Mil. EMI test.

SINGER INSTRUMENTATION, 5340 Alla Road, Los Angeles, CA 90066
Computer operated/automatic/manual EMI test system, EMI meters, antennas, and components.

SPECTRUM CONTROL Inc., 152 E. Main St., Fairview, PA 16415
Telephone (814) 474-5593 Telex 510/699 6848

EMC test and consulting VDE, CISPR, MIL 461, FCC. Mfr. RF. filters, RFI capacitors, chips, variable caps— in stock at HALLMARK

ELECTRO-METRICS, Division of Penril Corp., 100 Church St., Amsterdam, NY 12010
EMI meters and automated systems incl., calculator/computer based;20 Hz-40 GHz *Mil STD/CISPR/VDE/SAE/FCC.

LECTROMAGNETICS, INC., 6056 W. Jefferson Blvd., Los Angeles, CA 90016
Telephone (213) 870-9383.

RF shielded enclosures, modular, prefabricated & all welded. RFI/EMI power line filters; signal line filters.

EMERSON & CUMING, INC., Canton, MA—Gardena, CA—Northbrook, IL.

Eccoshield RF shielded chambers - Eccoshield EMI/RFI gaskets and materials Eccosorb anechoic chambers.

METEX ELECTRONIC SHIELDING GROUP, A Unit of Metex Corporation, 970 New Durham Road, Edison, NJ 08817

EMI/RFI, EMP & EMC Shielding Materials, Custom-Engineered Conductive Components, and Coatings.

CENTRALAB/USCC, 4561 Colorado Blvd., Los Angeles, CA 90039
EMI/RFI Filters, Monolithic Ceramic Capacitor (Chips).

TECKNIT, INC., 320 N. Nopal St., Santa Barbara, CA 93103

EMI/RFI Shielding Products, Conductive Components, Textiles, Coatings, Adhesives, and EMC Windows.

HONEYWELL, ANNAPOLIS OPERATION, P. O. BOX 391, Annapolis, MD 21404
Telephone (301) 224-4500

EMI/EMC/TEMPEST, R & D, Test and Analysis, Communication and Digital Design

An Institutional Listing recognizes contributions to support the publication of the IEEE Newsletter and TRANSACTIONS ON ELECTROMAGNETIC COMPATIBILITY. Minimum rates are $75.00 for listing in one issue; $200.00 for four consecutive issues. Larger contributions will be most welcome. No agency fee is granted for soliciting such contributions. Inquiries, or contributions made payable to the IEEE, plus instructions on how you wish your Institutional Listing to appear, should be sent to M. Bonaviso, The Institute of Electrical and Electronics Engineers, Inc., 345 East 47 Street, New York, NY 10017.