IEEE NEWSLETTER

ANTENNAS AND PROPAGATION GROUP

VOLUME 15 - NUMBER 3 EDITOR: RALPH E. HIATT ASSOCIATE EDITOR: K. K. MEI SEPTEMBER 1973

MESSAGE FROM THE VICE PRESIDENT

C. H. Walter

LET'S HAVE MORE APPLICATIONS PAPERS FOR G-AP TRANSACTIONS

One of the most common comments from the membership is that G-AP should publish more applications papers in the Transactions. This also is one of our most widely agreed upon issues. It is difficult to find anyone who opposes the idea. The question is, how do we go about doing it? The fact is, these papers are not being submitted in sufficient quantity to our Transactions (Editor, Rick Ricardi). These papers must come from you, the members who want them. Submit papers on the interesting, practical A and P work that you are doing. The reviewers will not turn down a good practical paper. Besides, those of you who submit these papers may get your names on Rick's list of potential reviewers and soon find yourselves reviewing the applications papers.

AdCom has formed an Ad Hoc Committee to encourage applications papers, and this Committee recommends the following action:

1) The Transactions Editor should contact each person who presents what appears to be a good applications paper at the G-AP Annual Symposium for publication in G-AP Transactions. The Session Chairmen may aid in the selection of the people to be contacted.

2) A member of G-AP should be designated as contact man at each organization active in A and P to look for interesting practical work that is going on and encourage the worker(s) to submit a paper(s) to G-AP Transactions. This contact man might also notify Transactions Editor who would write a letter encouraging the person(s) to publish. More will be said of this contact man in other items in this and subsequent Newsletters. He can be a G-AP representative in other ways such as membership, institutional listings, employment possibilities, etc.

With regard to implementing the first item above, Rick has already contacted authors from the Williamsburg Symposium. The second item is being implemented as names of willing people are obtained. Any volunteers? Any suggestions of other ways we might proceed?

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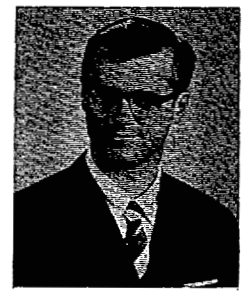
GUEST EDITORIAL

A. C. Schell, G-AP AdCom Member



SOME COMMENTS ON THE G-AP TRANSACTIONS

Recently an irate author raised a number of issues regarding the review procedures for manuscripts submitted to our Transactions. His criticism is that the reviewers are not accountable to the author, and to correct this he proposed that the reviewers' anonymity be discontinued and that they be paid for reviews.

I doubt that either of these suggestions would improve the quality of reviews. First, the amount that G-AP could pay for a review would not be likely to alter the economic position of many of the reviewers, but it certainly wouldn't help the group finances. Second, the loss of anonymity would reduce or eliminate a reviewer's willingness to impartially criticize a manuscript. Especially in a group such as ours, where many of the authors and reviewers know one another, the tendency would be to avoid personal clashes by not being overly critical of papers.

But the general problem of improving the quality of reviews deserves attention, and suggestions along these lines are always worth receiving. In particular, the issue of the reviewers' anonymity is one that periodically is raised. Perhaps one aspect of this merits a try. The names of the reviewers of an accepted paper could be published as a footnote to the paper. This would serve to identify the reviewer with the paper, either as a credit for a good review or linking him to the acceptance of marginal work. The other reviewers would be listed as is done at present.

There is, of course, a need to keep reviewers aware of the importance of their service, which is vital to the maintenance of the quality of the journal. We can be proud of the fact that in last year's readership survey the G-AP Transactions were rated as the leading publication in its field, and the editorial and review procedures were ranked sixth highest of the thirty-seven IEEE publications.

One other aspect of our transactions that causes a lot of debate is the issue of "applied" versus "theoretical" papers. I think that division misses the mark somewhat; the real issue might be termed Ph.D. theses versus industrial developments. There are many reasons why our journal is heavy with classical electromagnetic scholarship. Generally, these papers are well written: they have a clear beginning and conclusion, the graphs are neat, and the content seems to "fit the journal." By contrast papers describing a new antenna development often tend to be wordy or poorly organized, and lacking a clear presentation of the main accomplishment. They sometimes read like a quarterly progress report to the government (which they well may be). Another reason is the motivations of the authors. Behind the thesis student is a faculty advisor who steered the student on to the topic, and after two or three years of work there is a strong reaction if the paper is rejected. On the other hand, companies are often reluctant to allow new developments to be extensively described in publications, and the designer of a successful new antenna has probably received a new assignment, with little time or inclination left for writing up the former project.

But there are compelling reasons why papers on engineering development should be a significant part of the journal. First, it is important that G-AP be well represented by industry, both in terms of membership and publications. Second, we are a part of an engineering institute, not a science society. Our journal should reflect an orientation towards engineering results. Often a paper on an antenna development is criticized because it is "just another way of bending metal." However, an extension of design is just important as an extension of theory. Adding another term to an equation is not necessarily more profound than altering the geometry of a radiator. So, the reviewers should keep an open mind toward all papers, and not block from favorable consideration those papers that do not fit into a standard mold. Certainly our transactions are "open" to papers from industry, and with some effort on the part of industrial authors and the cooperation of their companies, an increasing segment of the journal can be devoted to describing the forefront of antenna engineering practice.

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THE PRESIDENT'S MESSAGE

How Can G-AP Flourish?

We all worry when membership drops a little as it has recently in G-AP. We realize that the flourishing and financing of our society require a fair membership base. More important however, this trend causes us to reexamine the value of our organization and to question why people drop out and to ask how well we are serving the membership and providing the benefits that attracted us to join. Raj Mittra has organized a panel to address these issues at the August Symposium in Boulder, Colorado. I will present some of these opinions orally at Raj's well staged panel and also attempt to defend recent AdCom initiatives aimed at building a more flourishing G-AP.

First let's look at the powerful incentives that cause us to band together. Really, how can an engineer or scientist establish himself in our profession without joining G-AP? The strongest ties are probably the associations, social and scientific, that exist within this league of kindred workers in a field that is esoteric and unknowable to the general public. This force is very apparent at our annual symposia which might be mistaken for an alumni association meeting, insurance broker convention, or even a rally of the American Legion if one only observed the social activities of the participants. This same social cement binds the local chapters and powers our interest in fellow awards and even the publication of papers. The human desires to excel in one's life work and be acknowledged for such achievement is certainly an essential part of the dynamics of our society. Of course there are other attractions more tangible than prestige and recognition. Occasionally we get some useful technical information from our oral and written papers. We make business contacts with workers in industry, colleges and government that might aid us or our firms later on. The group life insurance is a real bargain. The lobbying, portable pensions, bargaining benefits are at present rather undeveloped but don't require G-AP dues. It is my belief, however, that ambition to rise in professional standing is the primary benefit that draws our members in.

If we accept that contention, at least provisionally, then the question about how well we are serving our membership has a different twist. We can't just increase the number of awards or publish all papers submitted because that cheapens and vitiates these benefits and honors. We can however enlarge the number of offices or honorific work within G-AP (following President Kennedy's sage suggestion that in service itself lies our greatest satisfactions). One of the best ways to do this is to upgrade and encourage the Chapter units. They shouldn't be isolated entities because the road to advancement must be clearly charted from Chapter to National and International activities. New Technical Committees in the specialized sub-fields of G-AP technology could provide an avenue for engaging leaders in AdCom level work to expand our scientific scope and influence. If we confess these human motivations to get ahead personally, professionally and socially then moves to get deserving ambitious members "on stage" should be encouraged. The personalizing of the Newsletter, the expansion of the annual Symposia with its banquets, and ample opportunities for presenting papers, holding discussion panels like those organized by Raj Mittra at the Symposia, exhibiting hardware we design, are the kinds of things that AdCom management should promote.

There are advocates of a kind of revolutionary doctrine for invigorating and enlarging G-AP. They argue that perhaps 80 percent of antenna and microwave engineers, primarily in companies, don't join G-AP mainly because our Group is dominated by an intellectual elite who are not interested in real world problems. These people contend that the economic support for our group derives largely from the reliable products this estranged 80 percent of EM engineers design and develop, and therefore this group must be recruited primarily by offering them better services and financial benefits. Certainly we must recruit these people to have a flourishing G-AP, but what is the way to do this?

We will not attract this reservoir of E.M. workers by driving out our well known Research and Development scientists and the University Professors! It is precisely because the career interested engineers respect, admire and wish to emulate the scientific leaders of our field that they will join. It is necessary, however, that our journals and conferences recognize meritorious design successes and permit these "doers" to be recognized for their creativity and accomplishments. Standards for excellence in industrial R and D and engineering must be maintained high and our reviewers must be alert for these achievements. When these workers see honors, awards, and recognition going for success in the tough competitive games they are playing, I think they will join. We must do more in communicating with these people, however. We must advertise our interest in them by deliberate actions and expenditure of money and work. Perhaps the present effort to identify G-AP Coordinators at companies will help. The word must go out that we are seeking the successful problem solvers and designers--the elite of the industrial E.M. laboratories--to put these people on pedestals along with the successful teachers and theoreticians. When these leaders join, the less established engineers will follow if the dynamics of our professional society is career advancement and its official recognition.

Specifically then, why not establish an Award for the "Best Antenna of the Year," not only for the best antenna paper of the year. Or more broadly seek out experimentalists and their hardware with an award for "The Best Antenna or New E.M. Technique?" We have badly neglected workers in the field of propagation. Why not establish focal activities and appropriate awards for this large segment of our membership.

In summary, if we are going to grow as an organization we must develop a plurality of competing sub-societies each with its standards of excellence. There is not enough room in one "tent," "one tree," "one ladder" for membership to receive recognition for the different modes of achievement and success. G-AP is not URSI or the National Academy of Sciences

Continued...

EDITOR'S COMMENTS

MOUNT MCKINLEY, ALASKA

Readers of this issue will note that there are several editorials urging you to do this or that in order to improve our group. Enough is enough so I will not editorialize. Instead I will feed you a little propaganda about my recent vacation. My wife and I and two others just returned from a four week trip to Alaska and I recommend it thoroughly for those who like natural beauty and adventure. Ever since I've known about the AlCan Highway I've wanted to drive it. I wasn't too keen, however, on driving it both ways and then too, I wanted to return by boat along the Inside Passage. The beauty of that area has been well advertized. We accomplished our objective by buying a used car which we disposed of in Anchorage. Our highway travel amounted to about 6000 miles and included stops at Banff, Lake Louise, Prince George, Dawson Creek, Whitehorse, Dawson City (the Klondike Territory), Fairbanks, Mt. McKinley, Anchorage, the Kenai Peninsula, the Matanuska Valley, etc. The mountain scenery certainly rivaled that of the Swiss Alps. Wild game and mountain flowers added to our enjoyment. From Anchorage we flew to Juneau and from there we went to Prince Rupert via one of the Alaska Marine Highway ferries. From Prince Rupert we sailed to Vancouver Island on a British Columbia ferry. Sailing the inside passage is quite enjoyable but I liked the interior mountain areas better. Using a rented car, we toured Vancouver Island and the city of Vancouver and then drove to Seattle from whence we flew to Michigan. A good time was had by all. I extend my sympathies to those of you who were hard at work all that time.

Ralph E. Hiatt

MESSAGE FROM THE VICE PRESIDENT

Let us hear from you.

Committee to Encourage Applications Papers

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MESSAGE FROM THE PRESIDENT

(NAS) but a mix of scientists and engineers akin to the National Academy of Engineering and the NAS blended together with the E.M. radiation problems and goals of mankind as our common patrimony.

All successful large organizations (like our parent IEEE canopy) have shaped their microstructures around the diverse interests and ambitions of constituents making use of technical and geographic groupings to provide work and recognition for members.

Lest you think from the above remarks that the only reason G-AP exists is to confer honors on its conceited subscribers, I may editorialize later on four altruistic functions of G-AP which I think are:

1. Stimulation of competitive striving toward excellence in technology. This function promotes better scientific products for mankind.

2. Collection and dissemination of information. We voluntarily and efficiently achieve what the DDC spends lots of tax money for, primarily through our excellent Transactions.

3. Provide an informal but very effective interface between the disparate worlds of industry, university and government organizations and their scientists.

4. Spans the world in a United Nations-like function of uniting the leaders in the electromagnetic profession.

Carlyle J. Sletten

G-AP - USRI
TECHNICAL PROGRAM

J. R. Wait, Chairman

Problems and Accomplishments

The chores of the Technical Program Committee for the Boulder symposium (22-24 August) have now been completed. This seems like a good time to bring up some of the problems that we had. But first of all, I would like to acknowledge the assistance of most of the members of the Technical Program Committee and the additional reviewers of the four-page summaries. In particular, David Chang (University of Colorado) and Randy Ott (ITS), as Associate Chairmen, were untiring in their efforts to acquire prompt reviews of the submissions. Other individuals in the Boulder area who contributed substantially were: L. A. Berry, R. Chadwick, D. D. Crombie, H. T. Dougherty, E. Dutton, R. FitzGerrell, R. L. Gallawa, D. A. Hill, A. Q. Howard, Jr., G. Hufford, D. Lucas, R. Rosich, W. F. Utlaut, L. E. Vogler, L. E. Wood, all from ITS/OT; R. Baird, H. Bussey, G. Engen, C. Manney, Jr., D. Kerns, T. Tong, P. Wacker, D. Wait, A. Yaghjian, all from NBS; D. E. Barrick and W. Klemperer, both from ERL/NOAA;* F. S. Barnes, C. T. Johnk, E. Keuster, P. Beckmann, F. Einaudi, L. Lewin, S. W. Maley, R. Olsen, J. P. Montgomery, R. Lentz, all from the University of Colorado. Reviewers from outside Boulder included: M. A. K. Hamid, R. J. Mailloux, J. K. Schindler, C. J. Sletten, L. J. Ricardi, R. W. P. King, K. Iizuka, J. T. deBettencourt, A. Hessel, L. B. Felsen, J. W. Strohbehn, A. A. Ksienski, R. G. Kouyoumjian, C. T. Tai, R. Mittra, S. W. Lee, A. Ishimaru, K. K. Mei, E. K. Miller, C. E. Baum, R. Munson, and R. J. King

The name of Mark Ma should be included with ERL/NOAA.

The announced submission deadline for the G-AP summaries was 28 May 1973. Unfortunately, since this was a federal holiday, most of the papers arrived on the 29th and 30th. Approximately 200 summaries were received altogether. About 60 of these were also submitted simultaneously to URSI. AP ended up rejecting outright about 30 papers, while 6 were picked up by URSI. Two sessions (one on Microwave Sensing, held jointly with URSI Commission II, and one on Foreign Electromagnetics Reviews held jointly with URSI Commission VI) contained only invited papers. Also, the combined, or plenary, session includes two G-AP submissions. The main difficulty was the rather cavalier attitude most authors adopt in regard to the Instructions-to-Authors. These were spelled out very carefully in both the Newsletter and in Radio Science. A contributing factor was the very abbreviated notice of the symposium published in Spectrum, while nothing appeared in the Transactions!

The bulk of the final decisions on the technical program and the all important coordination with URSI took place on June 8th and 9th at a busy meeting in Boulder. We were very fortunate in having Akira Ishimaru, Rick Ricardi, Raj Mittra, and Leo Felsen attend in person. Also, Is Katz (Chairman of URSI Commission II) and Art Ksienski (Chairman of URSI Commission VI) lent their assistance to the AP program deliberations, particularly with regard to the joint sessions. We were also pleased to have Dick Johnson (Chairman of the Technical Program Committee of the Atlanta symposium) in attendance. Of course, Gordon Little, as Secretary of the U.S. National Committee of URSI, and Sam Maley, Chairman of the Symposium Steering Committee, were very active at this preparatory meeting. Our President, Carl Sletten, while not in attendance at the June 8th/9th meeting, provided valuable guidance, particularly on matters of policy.

I feel that we didn't really have enough time to review the submitted summaries before the final decisions on the program were made. Possibly in the future, the submission deadline for regular papers should be fixed as the date of receipt of material with no exceptions permitted. Howevever, in order to permit exposure of very recent research, special sessions of very late submissions could be handled separately. The titles of these could be announced on the first day of the symposium.

In spite of comments in the last Newsletter, we did encourage applications papers. For example, many of the propagation papers are heavily oriented toward applied geophysics. Also, antenna hardware papers were given special attention, and if any redeeming feature could be found, they were included.

I hope our efforts were not in vain.

James R. Wait, Chairman
1973 Joint Technical Program Committee

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* Code:
ITS/OT - Institute for Telecommunication Sciences of the Office of Telecommunications
NBS - National Bureau of Standards
ERL/NOAA - Environmental Research Laboratories of the National Oceanic and Atmospheric Administration

G-AP STANDARDS' COMMITTEES' REPORTS

Peter Hannan is chairman of the Standards Coordinating Committee of G-AP. In 1949 he joined Wheeler Laboratories which is now a part of Hazeltine Corporation where he is a Consulting Engineer specializing in antenna design. Areas to which he has contributed include Cassegrain antennas, monopulse antennas, phased array theory and practice and more recently antennas for Air Traffic Control. He has published a number of papers in the G-AP Transactions and he served on the G-AP AdCom from 1966 to 1969. He served as Chairman of the Antenna Standards Committee from 1963 to 1965 and has been an actively contributing member of the Antenna Standards Committee for 17 years.

Speaking on behalf of all G-AP members we wish to express our sincere thanks for your loyal service, Peter.

The Editor ●

Peter Hannan

Kurt Toman, Chairman of the Wave Propagation Standards Committee for the past two years, has been working hard with the main committee and its subcommittees to help them in their efforts to produce Standards in the ever-changing field of radio wave propagation. Dr. Toman's early work concerned meteorological effects on tropospheric radio propagation. Since 1955 he has been at Air Force Cambridge Research Laboratory studying auroral morthology and the effects on radio propagation of waves in the ionosphere. From 1963 to 1973 he was Chief of the Ionospheric Radio Physics Branch at AFCRL, where he is presently Senior Scientist. He is a member of Commission III of URSI, and has published papers in the IEEE Proceedings, the Journal of Atmospheric and Terestrial Physics, and Radio Science. He has been a member of the Wave Propagation Standards Committee for 13 years and has actively participated in the work of its main committee and its subcommittees. Keep up the good work, Kurt●

Kurt Toman

Herman Cottony, Chairman of the Antenna Standards Committee for these past three years, is well known to G-AP. Ten years ago he was Chairman of the Technical Program Committee of the first G-AP International Symposium. From 1959 to 1962 he was Associate Editor and from 1963 to 1965 he was Editor of the G-AP Transactions. He has served on the G-AP AdCom from 1960-1963 and from 1969-1971. He has been an actively contributing member of the Antenna Standards Committee for 13 years.

In 1937, Herman Cottony joined the Central Radio Propagation Laboratory of the National Bureau of Standards, which was moved from Washington, D.C. to Boulder, Colorado in 1954. This later became the Institute of Telecommunication Sciences where he was Program Leader for Antennas. During World War II, on leave from NBS, he served with the U.S. Army Signal Corps where he was Project Officer for Radar AN/TPS-3, Officer-in-Charge of the Antenna Section, and Chief of the Termionics Branch. Herman has just retired from the Institute of Telecommunication Sciences; he plans to work now as a consultant, and is considering moving to Washington, D.C. All of us in G-AP wish him well●

Herman Cottony

Continued...

G-AP STANDARDS COMMITTEES

Personnel and Activities

For many years our Group has been served by the talented and dedicated men and women who comprise the G-AP Standards' Committees. These committees have been working productively and quietly with no time out to "toot their own horn." At my suggestion, Mr. Peter Hannan, the Coordinating Committee Chairman, has provided a status report on the committees and a list of participating members. His report follows. Accompanying the report are photographs of the three chairmen and a brief resume of their past activities.

The Editor

I would like to acquaint the Newsletter readers with the hardworking people who develop the Standards that are appropriate to the Group on Antennas and Propagation. This is done through two committees of G-AP: the Antenna Standards Committee and the Wave Propagation Standards Committee.

The Antenna Standards Committee consists of the following people:

Herman V. Cottony (chrmn)	Wolfgang H. Kummer
Charles C. Allen	Donald J. Le Vine
Keith G. Balmain	Delmer C. Ports
Patricia L. Burgmyer	Leon J. Ricardi
Georges A. Deschamps	Allan C. Schell
Peter W. Hannan	Carlyle J. Sletten
Henry Jasik	Phillip H. Smith
Walter K. Kahn	William V. Tilston
Edward M. Kennaugh	Myron S. Wheeler

This committee regularly reviews and contributes to the progress made by a set of subcommittees containing highly-talented experts. These subcommittees are as follows:

Definitions of Terms for Antennas.

Allan C. Schell (chrmn)	Carlyle J. Sletten
Charles C. Allen	Phillip H. Smith
Leon J. Ricardi	

This group recently completed a revision and expansion of IEEE Standard No. 145, "Definitions of Terms for Antennas," which is the basic document that defines the significant antenna terms that are in use today.

Test Procedure for Antennas.

Wolfgang H. Kummer (chrmn)	
Herman N. Chait	Arthur F. Seaton
Edmond S. Gillespie	Gus P. Tricoles
Tad Mukahata	Alfred T. Villeneuve

This group is hard at work on a major revision of IEEE Standard No. 149, "Test Procedure for Antennas," which describes all the tests that are commonly made of antennas and some precautions to be observed.

Measurement of Radar Cross-Section.

Edward M. Kennaugh (chrmn)
David L. Moffatt

This group is organizing to write a comprehensive document describing the measurement of scattering and radar cross-section. Some significant work has already begun.

Measurement of Noise Temperature of Antennas.

Allan C. Schell (chrmn)	MacGregor S. Reid
Donald A. Guidice	Charles T. Stelzried

This group plans to describe the methods for measuring the noise at the terminals of antennas, including large antennas, small antennas, and active antennas.

Antennas in Physical Media.

Keith G. Balmain (chrmn)	Keigo K. Iizuka
Robert E. Collin	William V. Tilston
Richard E. Haskell	B. Riley Tripp

This group recently completed a set of definitions for antennas in physical media that appears for the first time in the new IEEE Standard No. 145, "Definitions of Terms for Antennas." Also in the new Standard is a comprehensive set of definitions for polarization terms originated by Georges A. Deschamps and Paul E. Mayes.

The new IEEE Standard "Definitions of Terms for Antennas" has just been published by IEEE and is now available. Its designation is IEEE STD 145-1973, and it can be purchased from IEEE as indicated at the end of this article. This new standard will also be published in the G-AP Transactions in January 1974.

The Wave Propagation Standards Committee consists of the following people:

Kurt Toman (chrmn)	
Brad R. Bean	Martin Katzin
Harold H. Beverage	John M. Kelso
Sidney A. Bowhill	Alfred H. LaGrone
Ken Bullington	Chao H. Liu
Tom J. Carroll	George H. Millman
Robert C. Cohen	Marcella L. Phillips
Herman V. Cottony	Phil L. Rice
Lloyd B. Craine	Erwin R. Schmerling
Robert K. Crane	Ralph J. Slutz
David Davidson	Ernie K. Smith
Joseph T. deBettencourt	Archie W. Straiton
Harry Fine	Carson K. H. Tsao
Frank M. Greene	Victor Twersky
Don A. Guidice	James R. Wait

This committee also regularly reviews and contributes to the work of its expert subcommittees which are as follows:

Definitions of Terms for Radio Wave Propagation.

Chao H. Liu (chrmn)	
Don A. Guidice	Erwin R. Schmerling
Martin Katzin	Kurt Toman

This group is beginning the task of revising the basic document, IEEE Standard No. 211, "Definitions of Terms for Radio Wave Propagation." They are also planning to extend the scope of the Standard to include radio astronomy terms and some optical terms.

Methods of Measuring Earth Conductivity.

Joe T. deBettencourt (chrmn)
Dave Davidson Jim R. Wait

This group has just completed a most interesting document entitled "Guide for Radio Methods of Measuring Earth Conductivity." The document has

Continued...

been approved by the IEEE Standards Board and has been designated IEEE STD 356. It is scheduled to be published by IEEE toward the end of 1973. This new Standard will also be published in the G-AP Transactions early in 1974. Congratulations to the subcommittee on Earth Conductivity Measurements for this fine work.

Ionogram Standardization.

Marcella L. Phillips (chrmn)
Erwin R. Schmerling John M. Kelso
Sid A. Bowhill

This group has prepared a report dealing with the historic background, recent progress and new approaches to ionospheric measurements, and containing more than 70 references. The report has been submitted to the main committee for comments.

Information Storage and Retrieval.

Lloyd B. Craine (chrmn)
Kurt Toman

A list of Keywords in Wave Propagation has been prepared by this group to facilitate literature searches and retrieval of information. A draft of this list with recommendations for its use should become available soon.

Propagation Curves and Prediction Techniques.

Phil L. Rice (chrmn)
Bob K. Crane

This group is organizing the scope of its work and is considering the possibility of a standard set of propagation curves and standard methods for gathering propagation data.

Radio Meteorology Measurements.

Brad R. Bean (past chairman)

As part of the material to be considered in the revision of IEEE Standard No. 211, Dr. Bean has submitted to the main committee C.C.I.R. definitions of terms related to propagation in the troposphere. Other objectives may include reference atmospheres, the refractive index formula and standards for measurment of refractivity.

The following Standards produced by the two G-AP committees are available from IEEE:

STD 145-1973 (Order Code SH00802) "Definitions of Terms for Antennas," $4.60 ($3.45 single, member); also will appear in G-AP Transactions, January 1974.

STD 149-1965 (Order Code SH00836) "Test Procedure for Antennas," $5.00 ($3.75 single, member); also in G-AP Transactions, May 1965.

STD 211-1969 (Order Code SH02394) "Definitions of Terms for Radio Wave Propagation," $3.00 ($2.25 single, member); also in G-AP Transactions, May 1969.

STD 291-1969 (Order Code SH01800) "Standards Report on Measuring Field Strength in Radio Wave Propagation," $4.00 ($3.00 single, member); also in G-AP Transactions, November 1970.

STD 356 "Guide for Radio Methods of Measuring Earth Conductivity"; date, order code and price not yet available; also will appear in G-AP Transactions early in 1974.

The price in parenthesis is for a single copy to an IEEE member for personal use. Additional copies are available at full price. Orders with payment are sent to IEEE, 345 East 47th Street, New York, N.Y. 10017. Other procedures for ordering are described in the Numerical List of IEEE Standards, available from IEEE at the above address.

Report Submitted by: Peter W. Hannan
Chairman
Standards Coordinating
Committee of G-AP

IN MEMORIUM

Dr. LAN JEN CHU died of cancer on July 24, a month before his 60th birthday. He was a professor of electrical engineering at the Massachusetts Institute of Technology, with which he had been affiliated since coming to the United States in 1934. He is noted for his formulations of electromagnetic fields, in collaboration with J. A. Stratton, and studies of basic electromagnetic radiators, such as the horn. During World War II he was an active participant in the design of antennas at the MIT Radiation Laboratory. He was a co-author of a two-part series of texts on electromagnetic fields and forces. In 1955 he founded Chu Associates, a firm that is actively engaged in the design and manufacture of antennas and related components. During his years at MIT he was concerned with the welfare of students and with developing and sharpening their imagination and insights into physical phenomena. Dr. Chu is survived by his wife, two sons and a daughter.

From Your MEMBERSHIP CHAIRMAN

Have you ever found yourself in hot pursuit of an argument, presenting facts, making telling points, countering thrusts of reason--all aloud and to an empty room? As convincing and earnest as your words are, they beat empty air and lead no one to action. The frustration of such argumentation is akin to the frustration I feel in addressing you in the Newsletter as Membership Chairman of G-AP. All my facts, all my telling points, all my verbal parring are misdirected, beating the air so to speak, because they do not reach the audience for whom they are mainly intended. Who is this audience? They are precisely those who, by virtue of their work and their interests, could very well be members of G-AP and yet are not. They may be from the academic ranks or they may be from the industrial ranks; they may be former members or they may not. One thing is certain--they do not receive the Newsletter and so cannot be exhorted to action directly through this medium.

If direct communication by Newsletter is impossible, indirect communication certainly is not. You, our present members, collectively are the only medium in contact both with G-AP and with potential members. You are in a position to encourage individuals whom you know to become members of G-AP, or at least to inform them of its aims, problems, and changes. You can treat the Newsletter as an informational note, not only for yourself, but also for those potential members around you who are unknown to me. I encourage you to use your unique position to help me and to help G-AP reverse its precipitious enrollment drop.

Asking you to bring new members into G-AP is the main purpose of this letter, but it is not the only one. Since I am suggesting an extra effort on your part, it is only fair that I make an accounting to you of my own efforts to stem our membership decline. That is the secondary purpose of this letter.

I have been using the dirct approach. I secured the names of about 500 members, domestic and foreign, who dropped G-AP recently, and wrote to each of them. My letter was a rather long one, explaining G-AP's position and encouraging them to reconsider membership and to return a very short questionnaire to me, answering the question, "Why did you terminate membership?" A remarkable number of them have responded thus far (perhaps this was because the mailing cost of the questionnaire was prepaid!) and when the results are digested, I shall convey them to you in a future Newsletter. I think you will find them interesting.

I have also sent letters to about 175 electrical engineering departments around this country and Canada who support graduate studies, encouraging their electromagnetics faculty to advertize G-AP to appropriate students. Together with this letter, I also enclosed a small questionnaire, inquiring about the local Chapter activity, the availability of G-AP lecturers, etc., at their school. Clearly, G-AP's future lies with the young blood which G-AP attracts today, and we had better make certain it is attractive.

G-AP's future also lies with our members in the industrial ranks, and it is here that I feel especially inadequate, being from the academic ranks. I hope that my appeal to individual members to encourage their colleagues is heard and acted upon by our membership in industry for it is here that our greatest potential lies. I understand that Carl Sletten and Phil Blacksmith at AFCRC are corresponding with key people in industry, just as I have corresponded with universities, in the hope that these nuclear people will act as representatives and sounding boards for G-AP. Together, perhaps all these efforts will compound and be effective.

One other place where direct appeal to non members will be made is the G-AP/URSI Symposia. During the next symposium in Boulder, I intend to work with local arrangements people to staff a membership desk to encourage those non members who take advantage of the symposium to also take advantage of the Group by becoming members.

I earnestly hope, in closing, that my words are not to an empty room, beating empty air, but rather are to a responsive and responsible membership who will lend not only an ear but also a hand to their professional organization.

Sincerely,

R. J. Garbacz
G-AP Membership Chairman
Electrical Engineering Department
The Ohio State University
Columbus, Ohio

PANEL DISCUSSION on EM Part II

As explained on page 13 of the June 1973 G-AP Newsletter a record was made of the entire discussion on education in electromagnetics. In that issue the talk given by Professor Leo Felsen was published. The second panel member to speak was Professor Curtis C. Johnson of the University of Utah. His talk with minor editorial changes is presented below.

The Editor

Dr. Felsen discussed many of my thoughts on graduate education, so I will discuss first the undergraduate part of electromagnetic education. I believe that undergraduate electromagnetics is one of the hardest and most feared courses by students in the undergraduate curriculum. The irony is that most undergraduate students never use the material learned in an undergraduate course in field theory after the B.S. degree. Thus, the extent and nature of a required fields course should be carefully reexamined. If an undergraduate electromagnetic fields course is deemed necessary by a department, it should be an introductory course which minimizes use of the more complicated vector and differential algebraic manipulations, concentrating on field concepts and an expansion and broadening of circuit concepts. For those students who elect a continuing fields sequence, and for those anticipating an entry into graduate school, the more traditional courses would be appropriate.

I believe the primary reason why fields is so difficult for most students is that the course is taught in an abstract manner. A typical fields course includes applied math, with statements of electrical and magnetic principles, manipulated mathematically into several convenient formulations for solving problems, and culminating in solutions to several wave and boundary value problems, most of which have little if any practical value. The question before us is how to teach a fundamentally mathematical and abstract course yet include applications to contemporary technological problems. Dr. Carl H. Durney, a collaborator and professor of undergraduate fields courses for many years, has been involved in a new approach to teaching undergraduate fields which I would like to mention briefly today. The course is considerably different from the conventional fields course, utilizing an extensively written and carefully prepared study guide which confronts the students with several realistic problems which require an understanding and ability to use the fundamental principles of electromagnetic field theory. The students are free to discuss with the instructor, and the several T.A.'s which are assigned to this course, the principles of the course as they relate to the problems. Narrative type problem solutions similar in format to a professional journal article are turned in and graded. The problem is then brought back to the students and the solution discussed in detail for thorough understanding.

Electromagnetic fields instruction is a prime candidate for some of the new teaching techniques. Dr. Durney has stated that as engineers, it is ironical that we pride ourselves in the design of engineering systems, but ignore the engineering design of our classroom teaching system. The new teaching techniques such as the Keller Method, personalized instruction, the self-paced system, and others, need to be examined in the context of undergraduate fields courses. By bringing reality into the teaching of fields, we will not only attract student interest, but provide the most important ingredient of all, motivation. For example, Maxwell's equations and the wave equations could be taught not from the point of view of vector differential equations, but in terms of antennas, wave guides, and lasers. Rather than teaching Coulomb's Law as an abstract vector equation, discuss it in terms of its application to the electric precipitator problem for controlling air pollution. Microwaves may be associated with radiation patterns and personnel hazards associated with microwave ovens.

One important perspective that needs to be carefully considered in the course design is the behavioral objective. In other words, what change in the student's behavior and ability to act is the object of the course. The student's approach to a fields problem and his methods of solving problems will be governed in large measure by the actions which he undertakes while in the course. Students learn best by what they do, not what they hear. Thus, it is most important to provide meaningful course activity designed to start them on the way towards accomplishing the course behavioral objectives. It would be helpful to require solutions to realistic fields problems, simple enough to focus on the physics and engineering but not obscured by the mathematics, yet realistic enough to require approximations, and in certain cases the realization that accurate answers are not available. Another valuable activity would be laboratory experimental work, if the space, expense, and extra effort is available.

It might be helpful to share some of my recent experiences in teaching an undergraduate course in applied fields. The students were told they must perform adequately on a series of short quizzes, demonstrating that they had mastered a set of clearly stated basic fundamental principles of the course. The passing grade on these quizzes was 80 percent. Grades below 80 percent constituted failure, but a second trial was allowed. Failure the second time resulted in zero points for that particular quiz. With this expectation to perform, and with the level of the material adjusted appropriately, the quiz results were outstanding. With four quizzes during the course, only one student out of a class of 32 failed a quiz twice. Along with the mastery portion of the course, more difficult design problems were given which required making approximations, combining basic principles, and numerical evaluations. I was pleasantly surprised with the results obtained in these design problems, and much of the good results I believe was due to the psychology of success developed in

Continued...

the quizzes. Another interesting aspect of this course was the feeling on my part of teaching success in seeing the students perform so well.

Graduate courses in electromagnetic fields is an area I have not been involved in for the last several years. However, since research interest in electromagnetics has changed so rapidly in the last ten years, I am convinced that in all fairness to the students the course must be broad in its applications and concentrate on fundamentals. The mathematics and electromagnetic fundamentals must be presented in entirety, and I expect that some of the teaching concepts just described would apply equally well to graduate courses. Student interest and motivation must be heightened by realistic problems, and there are many such problems suitable for consideration in a graduate fields course today. Examples which come to mind are in the area of Geophysics, Environmental Engineering, Bioengineering, Ocean Engineering, as well as the more traditional areas of antennas and propagation, microwave devices, and optics. Graduate courses afford opportunities for the introduction of interdisciplinary considerations into the course. I would hope that in graduate fields courses we would give students a flavor of interdisciplinary research, and train students for contemporary problems in industry, universities, and government.

Curtis C. Johnson, Professor of
Biophysics and Bioengineering
Director, Institute for Biomedical
Engineering
The University of Utah

NSF workshop

NSF WORKSHOP ON THE FUTURE DIRECTIONS OF ELECTROMAGNETICS OF CONTINUOUS MEDIA

A workshop, sponsored by the National Science Foundation, was held in Williamsburg on December the 10th, 1972 on the Sunday before the G-AP Symposium. The workshop was organized by D. J. Angelakos, University of California, Berkeley and W. K. Kahn, George Washington University. A summary of their report follows.

The scope of this Workshop was the "Future Directions of Electromagnetics of Continuous Media." The terminology "continuous media" was employed to exclude from the scope of the Workshop electromagnetic interactions which produce photochemical modifications in material media, that is, quantum electronic effects were excluded. These areas were felt to be so varied and important as to require separate consideration. The domain of the Workshop, therefore, did not exclude coherent optical processing, but excluded generation of light in a laser oscillator. The task of the Workshop was to define the present state of electromagnetic theory and to identify areas where important and critical unsolved problems exist. It is hoped that recommendations resulting from the Workshop will assist the NSF in its evaluation of support for further investigations in electromagnetic theory.

In arranging for the Workshop we were assisted by a Committee including:

David Cheng, Syracuse University
L. B. Felsen, Polytechnic Institute of Brooklyn
J. Keller, New York University
Ken Mei, University of California, Berkeley
Raj Mittra, University of Illinois
A. A. Oliner, Polytechnic Institute of Brooklyn
Victor Rumsey, University of California, San Diego
Chen-To Tai, University of Michigan

In addition, several other people lent their guidance at an early stage, including: W. R. Croswell, NASA Langley; G. Devey, M. S. Ghausi, NSF; N. Marcuvitz, New York University; C. Sletten, AFCRL; and T. Tamir, Polytechnic Institute of Brooklyn. Many thanks are due D. Beckler, Office of Science and Technology, and E. G. Fubini. The IEEE/AP and USNC/URSI Committees for the Williamsburg meeting gave their indispensible cooperation in the scheduling of the Workshop.

E. Weber, National Research Council; J. M. Richardson, Office of Telecommunications, U. S. Department of Commerce; and S. Silver were scheduled in the Plenary Session.

The Workshop discussed the directions of electromagnetics under four headings:

1. Remote Sensing of Observables in Geophysics and Astrophysics (J. R. Wait)
2. Traffic Control, Radar and Communications (R. C. Hansen; W. Wasylkiwskyj)
3. Bio-Engineering and Electronic Instrumentation (C. C. Johnson)
4. Advances in Basic Electromagnetic Theory (R. Mittra; T. Tamir)

Under each of these heads and in overall plenary sessions attention was given the social context and perceived needs of industry and government as well as the fundamental technological and scientific potentialities to be realized. It is important to institutionalize mechanisms through which the top minds in the discipline have freedom of inquiry and support. It is important at the same time to put a bound on the support for free inquiry; first, to avoid expenditures on pedestrian work; second, to assure a reasonable allocation of limited resources between basic and more immediately applied work; and third, to assure that public funds produce public benefits, by and large. It seems clear that, on the one hand, the electromagnetics technical community should be responsive to and derive a substantial portion of support from industry and mission-directed government agencies. On the other hand, the National Science Foundation should be aware of and particularly support applications that fall in between the missions of these agencies and uniquely needs to provide the funds for free inquiry so that the discoveries and techniques required by the future, for the solution of future problems, will be available in the measure we have come to expect and depend on.

Continued...

G-AP NEWSLETTER

In this connection, several suggestions were made during and subsequent to the workshop in favor of gatherings of active workers for informal discussions of then on-going research. The perspective of this past workshop was found to be valuable and was recommended as a periodic procedure.

Where do the new fields for fertile research lie and what new problems must electromagnetics and electromagneticists address? First, it must be understood that any list of new fields and areas is of necessity incomplete. This is unfortunately due to the limitations of participants in foretelling the ultimate course of developments, and is due fortunately to the inherent creative power of science and technology. Second, it must be stipulated that the established fields are by no means worked out and that worthy problems remain.

Perhaps nearest at hand is the fertile field to which we have recently gained access through the digital computer. Through the computer we have the potential solutions to problems involving:

1. Scattering by large bodies
2. Antennas or arrays on complex shapes
3. Scattering from non-spherical inhomogeneous particles
4. Multiple scattering in high density media comprising several species of structures

Thought must be given to the understanding and organization of numerical results. Such organization may not be a trivial matter and may demand re-examination of canonical problems by classical techniques or new facility with approximate methods for estimating parameter ranges.

Another fertile field might be described as interactive or interdisciplinary electromagnetics. Here the electromagnetic field interacts with other acoustic or fluid dynamic fields. Examples of areas where such problems and/or activities which deserve financial support arise are:

1. Piezo-electric surface waves
2. Propagation in plasma
3. High energy laser beam propagation in the atmosphere and in fibres
4. Self-induced transparency

Most of these problems involve non-linear and/or stochastic equations and are therefore of a new order of difficulty.

The strong motivation for electromagnetics research in the next decade provided by problems encountered in remote sensing of environmental parameters and search for natural resources was clearly brought out.

Many of the areas of electromagnetics which are active and vigorous now were felt to be applicable to practical problems covered by the panel on traffic control, radar and communications. This panel also included the field of transportation and aids in crime prevention and detection. These active areas include very short pulse radars, synthetic aperture techniques, the newer numerical methods and the singularity expansion methods in radiation problems.

For significant advances in electromagnetic engineering applied to biology and medicine, new technology instrument research and development must have a high priority. The application of integrated circuits to the development of extremely small biologically implantable devices for a variety of functions has just begun. Large discrepancies still exist in accepted safety levels for human exposure to electromagnetic radiation and even static field intensities.

Much of the emphasis in discussion of basic advances in electromagnetic theory centered on attaining an understanding of complex processes. For such understanding, analytical techniques usually have definite advantages over numerical methods especially when the complex problem can be considered as an interconnection of simpler canonical problems.

Finally we may simply list, without implications of priority, a number of topics of varying breadth and character which were brought forward during the discussions.

1. Inverse scattering -- radar target identification -- resonant region scattering.
2. Object detection and identification at short range with forensic and bio-medical application.
3. Detailed experimental evaluation of electromagnetic properties of geological or biological materials such as different kinds of earth and various body tissues.
4. Precise synthesis of high directivity antennas with accuracy in structure -40 to -80 db.
5. Limited range electromagnetic propagation.
6. Super-conductive electromagnetic transmission lines.
7. Adaptive (array) antennas capable of optimal adaptation to time varying stochastic phenomena; large finite arrays.
8. Ultra-miniature antennas for bio-medical applications.
9. Ultra-broadband antennas.
10. Various extremum -- synthesis problems, e.g., minimum material beam waveguide.
11. Optical fibres, integrated optics, finite electromagnetic beams for optical communications.
12. Coherence theory, optical data processing, holography.
13. Fields in stable and unstable open resonators.

Many points which could be given only brief mention in the preceding summary and more detailed recommendations are contained in the report of the Workshop, copies of which may be obtained from Dr. M. S. Ghausi, National Science Foundation or the authors.

Professor D. J. Angelakos
Department of Electrical Eng. and Computer Sciences
University of California
Berkeley, California, 94720

Professor W. K. Kahn
Department of Electrical Eng. and Computer Science
The Geo. Washington Univ.
Washington, D. C. 20006

MESSAGE TO ORGANIZATIONAL LEADERS IN ELECTROMAGNETICS

"The letter below is a follow-up to an effort described in the March 1973 G-AP Newsletter for discovering the organizations active in the technologies of interest to G-AP. It has been been mailed directly to a very limited number of persons. Companies, colleges, or agencies responding will be reported one-time-only in the Newsletter and G-AP AdCom will try to work through these people in the future for finding applications papers, recruiting members and seeking higher grade or award candidates. Thanks are due to those who have already replied to this request.

"If you wish to respond as a G-AP Coordinator, please fill in blank and mail to the President, G-AP. This is not to be a "listing" - only organizational information for G-AP management to use.

"Concurrently we are actively soliciting companies for Institutional Listings to appear in the Transactions of G-AP. Those organizations wishing to have Institutional Listing should apply to Dr. Emberson according to the accompanying letter from P. Blacksmith. Please act promptly to benefit from special reduced rates for Institutional Listings. The results of these two campaigns to date are given following each letter of instruction."

REPLY TO:

Mr. Carlyle J. Sletten
Microwave Physics Laboratory
AFCRL/LZ
L. G. Hanscom Field
Bedford, MA 01730

Leading Laboratory in Electromagnetics

Techniques Anywhere in the World

Attention: Leading Scientific Worker and Present Member of G-AP

Gentlemen:

Your company or laboratory has been identified as deeply involved in the electromagnetic technologies of interest also to the IEEE Group on Antennas and Propagation. I am writing personal letters to as many of these companies and laboratories as possible asking them to list their organization in a future G-AP Newsletter as contributing devices, design data, or R and D in the areas of antennas, radar cross section control or calculations, propagation in earth, sea or atmosphere, millimeter wave techniques, EM theory, EM plasma technologies, and other electromagnetic sciences.

We would also like a coordinator or contact point at your firm to aid G-AP in the following ways:

a. Encourage engineers and scientists to join the IEEE and G-AP. How else can an engineer or scientist establish himself in our profession?

b. Be on the lookout for Senior Member and Fellow Grade candidates in your firm.

c. Identify useful papers for oral or written presentations in G-AP Transactions or G-AP Symposia.

d. Express to the AdCom, G-AP, your organization's views on policy matters.

A letter was published in the June 1973 G-AP Newsletter with additional reasons for this request. There is no obligation for financial support to G-AP or any reporting necessary. The main purpose of this campaign is to better reach the organizational base of G-AP and try to interest a large group of non-member workers in our technical fields in the services and benefits that our international professional society provides.

If interested in being mentioned in the Newsletter and aiding us as explained above, please send back this letter to the above address with name and address of a contact man in the space provided below.

Sincerely,

CARLYLE J. SLETTEN
President,
Group on Antennas and Propagation

_____
Company or Laboratory

_____
G-AP Coordinator (Name)

_____
(Address)

_____
(Zip Code)

The following are the first to respond:

Mr. Jerome E. Hill, Director RF
Systems Department
Radiation Systems, Inc.
McLean, Virginia 22101

Dr. Reuben E. Eaves, Code TEC
Transportation Systems Center
U. S. Department of Transportation
55 Broadway
Cambridge, Massachusetts 02142

Dr. Larry D. Scott
Mission Research Corporation
Post Office Box 1886
Office: 5601 Domingo Road, N.E.
Albuquerque, New Mexico 87103

Mr. John Seavey
Adams-Russell
1380 Main Street
Waltham, Massachusetts 02154

Dr. Robert E. McIntosh
Dept. of Electrical and Computer Engineering
University of Massachusetts
Amherst, Massachusetts, 01002

Professor David K. Cheng
Department of Electrical and Computer Engineering
Syracuse University, Link Hall
Syracuse, New York, 13210

Continued...

Dr. Elery F. Buckley
Emerson and Cuming, Inc.
Microwave Products Division
869 Washington Street
Canton, Massachusetts 02021

Dr. Ivan Faigan
Chu Associates
Post Office Box 387
Littleton, Massachusetts 01460

Mr. Robert Rivers
Aircom, Inc.
Main Street
Union, New Hampshire 03887

Mr. W. Dennis Swift
Intelcom Rad Tech
P. O. Box 80817
San Diego, California, 92138

Mr. Charles Pankiewicz (OCTA)
Rome Air Development Center
Griffiss AFB, New York, 13440

Mr. J. Robert Bounds
ITT Electro-Physics Laboratories, Inc.
9140 Old Annapolis Road
Columbia, Maryland, 21045

Professor E. T. Kornhauser
Division of Engineering
Brown University
Providence, Rhode Island, 02912

Dr. Oren Kesler
Texas Instruments Inc.
Post Office Box 6015, M/S 327
Dallas, Texas 75222

Mr. Mats Viggh
Transmission Lines, Inc.
Post Office Box 292
Ipswich, Massachusetts 01938

Dr. A. R. Sindoris
Harry Diamond Laboratories
Conn. Ave. and Van Ness Street
Washington, D.C. 20438

Dr. J. H. Moran
Schlumberger Doll Research Center
P. O. Box 307
Ridgefield, Connecticut, 06877

Mr. Harvey Schumm
Syracuse University Research Corporation
Merill Lane, University Hgts.
Syracuse, New York, 13210

Mr. Leo G. Darian, Engineering Manager
R F Systems, Inc.
155 King Street
Cohasset, Massachusetts, 02025

Dr. Gaspar R. Valenzuela, Code 8344
Naval Research Laboratory
4555 Overlook Avenue, S. W.
Washington, D. C. 20375

Dr. Joseph D. DeLorenzo
Sperry Research Center
100 North Street
Sudbury, Massachusetts, 01776

MESSAGE FROM PHILIPP BLACKSMITH, FINANCE AND INSTITUTIONAL LISTINGS CHAIRMAN

To

Leading Laboratory in Electromagnetic Techniques Anywhere in the World

Attention: Senior Management Officers

Gentlemen:

The IEEE Antennas and Propagation Group Transactions is the technical journal for antenna and electromagnetics engineers. It has over 900 pages per year of Engineering and Research results. It is the place where engineers look for accurate technical information and advanced concepts on antenna technology, diffraction, plasmas, and on electromagnetic theory.

There are 6,400 members and organizations receiving and using the Transactions on Antenna and Propagation six times per year. Your institutional listing in the back of the Transactions will be seen by these active, specifying, and product buying engineers and scientists.

The rate on institutional listing is $200 for 6 consecutive issues or $50 for a single listing.

Can you think of any better way of exposing your name and product line to this select group of engineers?

A sample copy of a page of listings is included for your information. May we have your listing? Checks should be made payable to Institute of Electrical and Electronics Engineers, Inc., and sent to R. M. Emberson, Groups Secretary, The Institute of Electrical and Electronic Engineers, Inc., 345 East 47th Street, New York, N.Y. 10017. Include Company name, address, and a brief product list.

SPECIAL: LIMITED TIME OFFER - Deadline date: 30 September 1973 - We will list your advertisement at half the above rate

Sincerely,

PHILIPP BLACKSMITH, AFCRL/IZ
L. G. Hanscom Field
Bedford, Massachusetts 01730
Chairman, Finance and
Institutional Listings Committee
IEEE Group on Antennas and Propagation

Recent New Institutional Listings:

R. C. Hansen, Inc. (Continuing)
17100 Ventura Blvd., Suite 218
Encino, California 91316

KMS Industries, Inc.
P. O. Box 1778
Ann Arbor, Michigan 48106

Radiation Systems, Inc.
1755 Old Meadow Road
McLean, Virginia 22101

General Electro-Magnetics
2808 Alcazar Street, N.E.
Albuquerque, New Mexico 87110

Diamond
Antenna and Microwave Corporation
Winchester, Massachusetts 08190

Robert S. Gordon Associates, Inc.
221 Tudor Road
Needham, Massachusetts 02192

Microwave Filter Company, Inc.
135 Manlius Street, E.
Syracuse, New York 13057

Microwave Control Products Division
of Eastern Microwave Corporation
139 Swanton Street
Winchester, Massachusetts 01890

Transco Products, Inc.
4241 Glencoe Avenue
Venice, California 90291

Teledyne Micronetics
7155 Mission Gorge Road
San Diego, California 92120

G-AP NAMES IN THE NEWS

GEORGE SINCLAIR, Chairman of the Board of Sinclair Radio Laboratories, Ltd. and Professor of Electrical Engineering at the University of Toronto and also a former G-AP AdCom Chairman is to be congratulated for two honors recently awarded. The Ohio State University has conferred on him the honorary Doctor of Science Degree and he has been elected Fellow of the Royal Society of Canada.

IEEE ANNOUNCES FIRST CONGRESSIONAL FELLOW

RONAL W. LARSON

Congratulations to G-AP Member, Ronal W. Larson. He has been selected as the first Congressional Fellow of the Institute of Electrical and Electronics Engineers, Inc. Dr. Larson is currently an Associate Professor of Electrical Engineering at the Georgia Institute of Technology.

As IEEE's Congressional Fellow, Dr. Larson will spend approximately nine months in Washington. He will work closely with a Congressman or committee concerned with legislation on subjects for which an understanding of electrical engineering is important. Dr. Larson described his future role in Washington as being one "of service to the nation at a time of great promise for the subject of technology assessment, which I consider to be of prime importance both to technology and society."

After receiving his doctorate from the University of Michigan in 1966, he was appointed to the Environmental Science Services Administration. He returned to the University of Michigan as an Associate Research Engineer before joining the faculty of Georgia Tech. in 1968. Two years later, Dr. Larson received two faculty awards. He was the recipient of the major annual award presented by the student government for his contributions to student life as well as an award from a representative faculty committee for his teaching ability.

Dr. Larson has been the Electrical Engineering advisor for two groups of special students at Georgia Tech. One group is of high school joint-enrollees and the other is a group of dual-degree candidates from a predominately black school, Morehouse College. He is also a member of the college-wide dual-degree committee and has taught, on a volunteer basis, at Morehouse.

IEEE's Congressional Fellow program was started in response to the Institute's membership voting to expand the aims of the society. This is one of several new programs being explored by IEEE that are sensitive to the engineer's responsibility to the public interest.

LESTER C. VAN ATTA, G-AP's only Life Member and our first AdCom Chairman, is on retirement from the position of Associate Dean of Engineering at the University of Massachusetts. He continues his association with the University as Adjunct Professor of Electrical and Computer Engineering. In addition, he is now Consultant to Industry and the Government and a Gentleman Farmer on his estate in northern California. His address there--Box 251, Laytonville, California, 95454.

DONALD E. BARRICK, is to be congratulated for receiving the G-AP Best Paper Award for papers appearing in the AP Transactions in 1972. The paper, entitled "First Order Theory and Analysis of MF/HF/VHF Scatter from the Sea", is the second one appearing in the January 1972 AP Transactions. Dr. Barrick's degrees are from Ohio State University. From 1965 to 1972 he was a Fellow with the Electromagnetics Division of Battelle's Columbus Laboratories. He worked in the areas of phased arrays, radar signal processing, radar clutter, and clutter rejection techniques. He also served as Adjunct Professor of Electrical Engineering at the Ohio State University. Dr. Barrick later served as Technical Director to the Advanced Research Projects Agency Strategic Technology Office for the May Bell Program. In 1972 Dr. Barrick joined the Wave Propagation Laboratory of the National Oceanic and Atmospheric Administration in Boulder, Colorado where he is presently a Supervisory Electronic Engineer. He is in charge of their Sea Scatter Program and is developing and testing radar techniques for remotely sensing sea state.

Dr. Barrick is a Senior Member of IEEE and has been active with G-AP and G-AES. He is a member and Secretary of U. S. Commission II of URSI. He also is a member of the American Society for the Advancement of Science, Eta Kappa Nu, and Sigma Xi.

Dr. Barrick is the co-author of the "Radar Cross Section Handbook" and he has published many papers in the field of propagation and RF measurements.

CHARLES W. HARRISON, Jr. is leaving the scientific staff of Sandia Laboratories where he has specialized in applied electromagnetics research for more than 16 years. He is establishing a firm called General Electro-Magnetics (GEM) of which he will be the Director. Members of the Technical Advisory Board are :

Ronald W. P. King, Harvard University, Chairman
David C. Chang, University of Colorado
Charles H. Papas, California Institute of Technology
S. R. Seshadri, University of Wisconsin
Liang-Chi Shen, University of Houston
Glenn S. Smith, Harvard University
Clayborne D. Taylor, Mississippi State University
Tai Tsun Wu, Harvard University
Harold V. Catt, CPA

The new organization will undertake scientific studies, consulting and research in the broad areas of electromagnetic phenomena. Of immediate interest are problems in electromagnetic compatibility (EMP and EMR), antennas, the electromagnetic aspects of high-speed rail travel, underground communications and exploration.

We learn also that Charles is to be congratulated for being the first recipient of the Best Transactions Paper Award of the Group on Electromagnetic Compatibility for his paper "Excitation of a Coaxial Line Through a Transverse Slot". The paper appeared in the November 1972 issue of EMC-14. Also noteworthy--nine papers appearing in the August 1973 issue of EMC Transactions were authored or co-authored by Dr. Harrison.

BOOK REVIEWS

A Handbook of Conical Antennas and Scatterers
by R. M. Bevensee, Gordon and Breach, New York, 1973; 173 pages; $19.50.

This rather specialized monograph on conical radiators is an interesting change of scope for the author from his previous book on slow wave structures. Until recent years, conical antenna theory and in fact conical antennas were mostly of interest to graduate students. In the '50s, the vigorous efforts on conical scatterers with reduced RCS reawakened interest in cones. And in the '60s, the work of Ross and VanEtten showed that conical antennas can be extremely good for very broadband and very short pulse applications. This book is apparently a result of these factors, as one obvious application of conical antennas is in the simulation of EMP.

The first chapter is an excellent historical survey which covers both the early Schelkunoff work as well as the cross section programs. In this work, the cone is solved as a boundary value problem using spherical harmonic series. Since most of the problems in this type of approach are computational, the author devotes considerable effort to explaining the details. The results contained in the book would be virtually impossible without such long word-length and powerful machines as the CDC 7600.

Chapters 2 and 3 discuss the spherical mode formulation and the algorithms used to calculate the requisite associated Legendre polynomials and spherical Bessel functions.

Conical monopoles are treated in chapters 4-6, with the theory detailed in the first of these chapters including formulas for gain, while the other two chapters give computational results for solid and hollow conical monopoles. Information given includes convergence checks and field continuities at the cone base as well as gain vs frequency, patterns for a number of angles, and input admittance. The hollow monopoles are computed with several different dielectrics contained within the hollow cone. One of the weaknesses of the book is apparent here. The results are presented with a minimum of discussion, and from this wealth of data the author must have obtained considerable insight which would be useful to the readers. The input admittance, as one might expect, has a violent first resonance, and for higher frequencies subsequent resonances are rapidly damped. However, the 30 deg. hollow cone exhibits an asymptotic value of conductance of around 12 mmho, whereas all of the other solid and hollow cones are in the range of 1 to 2 mmho. If this is not a typo, discussion would have been useful.

Chaps. 7 and 8 are for a coaxial horn in which 2 concentric cones are excited as a dipole. These are located over a ground plane, with the larger cone connected to the ground plane near the tip. It would be interesting to know the effect of removing the ground plane; it probably has a small effect.

There is next a chapter on a biconical antenna in which the outer cone is capped by a sphere with the sphere concentric with the cones.

Chapter 10 is somewhat unexpected as it covers the reciprocity theorem for transmitting and receiving antennas which is so thoroughly covered in text books by Jordan and Kraus. However, its presence here is not amiss, as a famous author and educator once remarked to me that every five years it was necessary to convince a new crop of engineers and military administrators that reciprocity was really true.

Three chapters follow on cone structures. The theory of a cone with concentric spherical end cap is given, followed by an excellent compendium of RCS measurements. The flat base cone data of Kleinman and Senior are given, and the cone sphere data from Ruck et al are included.

Finally, a very short chapter explains how the time response is conputed, given the spherical harmonic results.

Since the primary uses of conical antennas are for EMP testing and for picosecond pulse radars, it is a disappointment that the book stops short of any transient results. It is reasonable to suppose that such work is in progress and the author is encouraged to come out with a second monograph which contains short pulse response data. In the meantime, this book will be useful to graduate students who are interested in a modal approach and to the designer of conical antennas. From a philosophical standpoint, it would be interesting to compare the relative formulation time, computer time, and convergence of the moment method with the modal method since conical antennas can be solved using a suitable number of wires to represent the metallic surface. This might be a good MS thesis topic for someone, somewhere, someday.

Reviewed by: Robert C. Hansen
Consulting Engineer
Encino, California

Statistical Antenna Theory by
Y. S. Shifrin (Translated by Petr Beckmann)
Golem Press, Boulder, Colorado (1971) 370 pages.

This is the seventh in a series of books published by the Golem Press in Electromagnetics. This book deals mainly with the following problem: If the statistical characteristics of the field over the aperture or the length of an antenna are assumed to be known, what are the statistical characteristics of its radiation pattern, gain, beamwidth, etc., such as mean value, fluctuations, and correlations. The treatment goes much beyond the usual antenna tolerance theory, which normally deals only with small errors in excitation and small correlation distance.

Part I is devoted to a systematic development of the general theory of the mean antenna characteristics, fluctuations and correlation matrix of the antenna field including asymptotic formulas for small and large errors, and small and large correlation distances. It also considers the effects of the errors in multireflector antennas and branched feeders.

The results obtained in Part I are applied in Part II to more general cases of arrays, rectangular apertures and traveling wave antennas.

Part III considers the statistics of the diffraction image of a focusing system when a wave with random amplitude and phase is incident. It includes a generalization of the results obtained by L. A. Chernov, the analysis of the effects observed in tropospheric propagation, the medium-to-antenna coupling loss, etc. The effects of atmospheric inhomogeneity on the directive gain, randomly spaced arrays, and the effect of fluctuation of the signal parameter on its ambiguity function are also discussed.

In the past antenna tolerance, phase errors, randomly spaced arrays, etc., have been studied in the U.S. and abroad, but this is the first and the only book to present a coherent and unified theory of statistical antennas. The author is a well-known expert in this field and the book is well written, with many examples and illustrations. This is not, however, an elementary introductory book. The reader is expected to have a reasonable background in antenna and probability theory. I believe, however, that most antenna engineers with a few years experience should have no trouble understanding it. This book may also be used as a text for a special graduate course. Part III on focusing system should be of great interest to people in millimeter wave and optical communications through the atmosphere.

The presentation of this rather difficult subject matter is clear, but condensed. It is advisable to read the book with pencil and paper on hand and to work out intermediate steps which have been omitted in the derivations. The monograph is an interesting contribution to the literature on surface waves, and it will be useful to the designer of electromagnetic and acoustic surface wave devices.

Reviewed by: Georg Goubau
U. S. Army Electronics Command
Fort Monmouth, N. J.

Continuous Transitions in Open Waveguides, by V. V. Shevchenko, translation by Peter Beckmann, 176 pp., 43 Figs., The Golem Press, 1971. Price: $12.00.

This monograph is devoted to the investigation of surface wave propagation along guides with inhomogeneous sections; where the guide parameters vary gradually in the direction of propagation. Practical cases of continuous transitions are, for instance, the launching of surface waves on a single wire line, and surface wave antennas. The material presented in this monograph is in essence based on work by the author and his associates which was published in Russia during the years 1960 to 1965.

Gradual transitions in open waveguides may be treated in the same way as gradual transitions in closed waveguides where the field in every cross section can be expanded in a complete set of orthogonal mode functions. The author shows that such a set of mode functions also exists for open guides. However, in contrast to closed guides, this set has only a finite number of discrete modes, while the other modes form a continuous spectrum. The discrete modes are the actual surface waves. The other modes, which the author calls "pseudo modes," represent the radiation field. These pseudo modes do not satisfy Sommerfeld's radiation condition individually; but they are bounded at infinity. The discrete modes are orthogonal (in the usual sense) to each other and to every pseudo mode. The mutual orthogonality of the latter is formulated by a Dirac delta function of the spectrum parameter.

The treatment of the guide transitions follows the method developed by B. Z. Katsenelenbaum ["The Theory of Irregular Waveguides with Slowly Varying Parameters," (in Russian), AN SSSR Moscow, 1961] for closed guides. This method, in short, is as follows: The function ψ which describes the field in the cross-sectional planes of the guide, and the derivative of ψ in the direction of propagation, i.e. $\partial\psi/\partial z$, are expanded into the mode functions associated with the considered cross section. The coefficients of these expansions are functions of z. By inserting the mode expansions of ψ and $\partial\psi/\partial z$ into the wave equation, and utilizing the orthogonality relation between the modes, one obtains a system of integro-differential equations. Although there is no general analytic solution of this system, in some special cases the solution is relatively easy.

Three types of guiding structures are considered: plane conductive and reactive surfaces; plane stratified dielectric media, including dielectric slabs; and single wire transmission lines. For each of these structures, various kinds of gradual transitions are treated and the associated radiation pattern discussed. In the chapter on plane guiding surfaces, the author shows that his method of treating gradual transitions can also be applied to directional changes of the guide.

When a translator is himself an expert in the field, the value of the book is particularly enhanced because of some added touches which are impossible to obtain otherwise. Silverman's translations of Tatarski and Chernov are examples of this. Professor Beckmann has added much useful information and expert comments in the form of footnotes to this book.

All in all, this is an authoritative work in a new emerging field and is recommended for serious engineers, professors and graduate students interested in antennas.

Reviewed by: Akira Ishimaru
Department of Electrical Engineering
University of Seattle
Seattle, Washington

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CHAPTER NEWS

Chicago
May 15, 1973 "A Picture's Worth 1000 Words" Picturephone principles and demonstration by Illinois Bell Staff Members.

Columbus
Feb. 21, 1973 "Design of Satellite to Aircraft Antenna Systems" by William F. Croswell NASA/Langley, Hampton, Va.

April 26, 1973 "Digital Microwave Transmission Systems" by Dr. Frederick E. Glave, Bell Northern Research, Ottawa, Ontario.

May 16, 1973 "Some New Results on the Excitation and Loading of Cylindrical Antennas" by Dr. Branko Popovic, University of Belgrade, Yugoslavia.

Phoenix
April 10, 1973 "Solid State Phased Arrays" by Dr. John L. Allen, NRL; GMTT National Lecturer.

May 8, 1973 "An Introduction to Adaptive Arrays" by Dr. William F. Gabrial, NRL.

San Francisco
April 12, 1973 "On the LP's of LP Antennas" by Dr. Ray Duhamel, Consulting Engineer, Los Altos Hills, Ca.

May 16, 1973 Northern California Symposium on Antennas and Propagation organized by the S.F. Chapter featuring papers as follows:
(1) "How Design to Price Affects the Antenna Engineer" M. Wahl, Applied Technology.
(2) "A Limited-Scan Phased Array for Use with a Clutter Mapping Radar System" R. I. Presnell, SRI.
(3) "Gain Paradox in Array Antennas" A. E. Smoll, Philco-Ford, WDL.
(4) "Application of Toeplitz Matrix to the Problem of a Dipole in a Warm Plasma" R. J. Lytle and D. L. Lager, Lawrence Livermore Laboratory (LLL).
(5) "Observation Concerning the Relative Surface Wave Efficiency of Sources in Proximity to Ground" R. J. Lytle, E. K. Miller, E. J. Deadrick and D. J. Lager, LLL.
(6) "Problems Associated with Spiral Antennas Operating at a Close Distance Over a Ground Plane and Possible Solution" G. N. Voronoff, Dalmo Victor.
(7) "Don't Believe that Slow-Wave Technique Extend the Low Frequency Cut-off of Spiral Antennas; Proper Termination Does" G. N. Voronoff, Dalmo Victor.
(8) "A Broad Band Sector Qualification Antenna" S. Kuo, GTE Sylvania, Inc.
(9) "Numerical Results of Transient Analysis of Antennas" (A Computer Movie), J. A. Landt, E. K. Miller and F. J. Deadrick, LLL.

Southeastern Michigan
April 25, 1973 "High Power GaAs Field-Effect Transisters at Microwave Frequencies" by Louis S. Napoli, Research Staff Member, RCA Laboratories.

TO ALL CHAPTER CHAIRMEN

The Newsletter has added the new feature -- G-AP Names in The News. Would you please send us information about G-AP members in your chapter that would be of interest for this column? The Editor (address on page 2) Remember, however, that regular Chapter News is handled by Associate Editor, Professor K. K. Mei.

NEW CHAPTER CHAIRMEN

Houston	Mr. Auguste B. El Kareh
Dallas	Mr. Robert O. Meeks
Chicago	Mr. Robert N. Hargis
Los Angeles Council	Mr. William A. Imbriale
San Francisco	Mr. Kenneth K. Mei
Columbus	Mr. Gary A. Thiele
Washington	Mr. Anthony Dambrisi
Boston	Mr. Ronald L. Fante
Baltimore	Mr. Lester K. Staley
St. Louis	Mr. John A. Ziegler
Philadelphia	Mr. John Mulholland

POSITIONS
WANTED and AVAILABLE

Engineer - Recent graduate preferably with Masters degree and University background in areas of electromagnetic theory or related subjects. Candidate must be willing to enter antenna and microwave profession with emphasis on antenna design. Graduates with zero to three years experience will be considered for this position.

Principal Engineer - Five to ten years experience in antenna design and microwave devices with emphasis on antenna design. Hardware experience essential along with ability to communicate internally and with customers in both written and verbal interchanges. Candidate must have technical and management capability to run programs, supervise a small number of people, and innovate new antenna concepts. Some proposal effort also required.

Name of Company: RADIATION SYSTEMS, INC.

Address: 1755 Old Meadow Road, McLean, Virginia 22101

Phone No: 703-893-5500

Persons to Contact: Mrs. Dorothy E. Perry or Mrs. Sarah F. Shelley, Personnel Administrators, Personnel Department

Interested persons should mail resumes promptly or call or write Personnel for application form.

MISCELLANEOUS

SOCIETY STATUS FOR G-AP

Our application for Society Status is proceeding on schedule and will be presented to the next meeting of TAB for their consideration and approval. After that, it will be presented to the Board of Directors for their consideration and approval.

Assuming we pass both of those Boards, we will then have approval to proceed as a Society. I estimate that it will be the end of 1973 before we get both of these approvals.

John B. Damonte
Chairman
Committee on Society Status

Index to G-AP Symposia--Status Report II
Ralph E. Hiatt

This is the second and probably the last status report on the cumulative index of papers given at the first ten G-AP Symposia. For background information see pages 18 and 19 of the March '73 and page 24 of the June '73 Newsletter. A few weeks ago, I informed Mr. J. H. W. Unger of Bell Laboratories at Whippany that the estimated number of orders for the cumulative index would be under 25. Based on that information, Mr. Unger has very generously agreed to provide copies for all of those who have now requested them at no cost. He will send me 20 or so copies and I will arrange to distribute them. Checks which accompanied the requests are being returned to the sender, except that the two checks received from abroad are being used to cover mailing expenses. To those who wrote me, I thank you for your interest and for the kind remarks about the Newsletter. To Mr. UNGER, all of us say, WE THANK YOU!

From the TAB -- Office of the Vice Chairman

Following is an excerpt from a letter addressed to our President:

Dear Carl,

I read with interest the June 1973 issue of the G-AP Newsletter and would like to compliment you and Ralph Hiatt for having an unusually interesting group publication. By the way, I cannot recall another case in which I received a Newsletter the month preceding the publication date.

Very truly yours,
Bruce B. Barrow
Director-at-Large

1973 G-AP DIGESTS

Those who were unable to attend the 1973 G-AP Symposium may order copies of the Digest from IEEE Headquarters in New York, 345 East 47th Street, NYC 10017. The price, including mailing costs, is $7.50 for IEEE members and $11.00 for non-members.

SHORT COURSES

The following short courses of possible interest to G-AP members have been announced by

The George Washington University

For further information, contact Continuing Engineering Education Program, The George Washington University, Washington, D. C. 20006 or call (202) 676-6106.

TITLE: Laser Technology-Recent Advances and
DATE: Sept. 24-28, 1973 Applications
CO-SPONSOR: Naval Research Laboratory
Course Coordinator--J. McMahon, Interaction Physics Branch, NRL
FEE: $350, includes lecture notes, supplies and parking
TOPICS: Introduction to Laser Principles, Lasers and Devices, High Average Power, Solid State Laser Design, Optical Damage in Materials High Average Chemical and Electrical Lasers, High Power Gas Lasers, Pulse Gas Lasers and their Applications, Short Pulse Laser Theory, Short Pulse Laser Experiment, Laser Fusion, Solid State Optical Devices, Spectroscopic Applications of Tunable Sources and Integrated Optics.

TITLE: Planning for Metric Conversion
DATE: October 30 to November 1, 1973
CO-SPONSOR National Bureau of Standards
STAFF: Mr. A. G. McNish, Consultant, NBS
FEE: $225, includes lecture notes, supplies and parking.
DESCRIPTION: Problems which have arisen because of the increased use of metric measurement units and the steps which are being taken to solve them. The course is designed to meet the needs of the research and development, design, and manufacturing engineers on whom the greatest burden of problems in metric conversion will fall.

TITLE: Antennas
DATE: November 5 to 9, 1973
STAFF: Mr. Edward H. Braun, Associate Professor of Engineering and Applied Sciences, G. W. U.
FEE: $330
DESCRIPTION: Fundamentals, radiation patterns, different antenna types, phased arrays, networks methods of analysis, interactions, finite and infinite arrays, element efficiency, traveling wave, log-periodic, and synthetic aperture antennas.

RECOGNITION for NEW PHD GRADUATES

University of Michigan

Dr. HAROLD EDWIN FOSTER
Transient Radiation from Resistively Loaded Transmission Line and Thin Biconical Antennas

Dr. YU-PING LIU
Excitation and Propagation of Waves Between Two Planar Interfaces

The Ohio State University

Dr. PRABHAKAR H. PATHAK
TM Surface Wave Diffraction by a Truncated Dielectric Slab Recessed in a Perfectly Conducting Surface

Dr. KENNETH L. REINHARD
Adaptive Antenna Arrays for Coded Communication Systems