

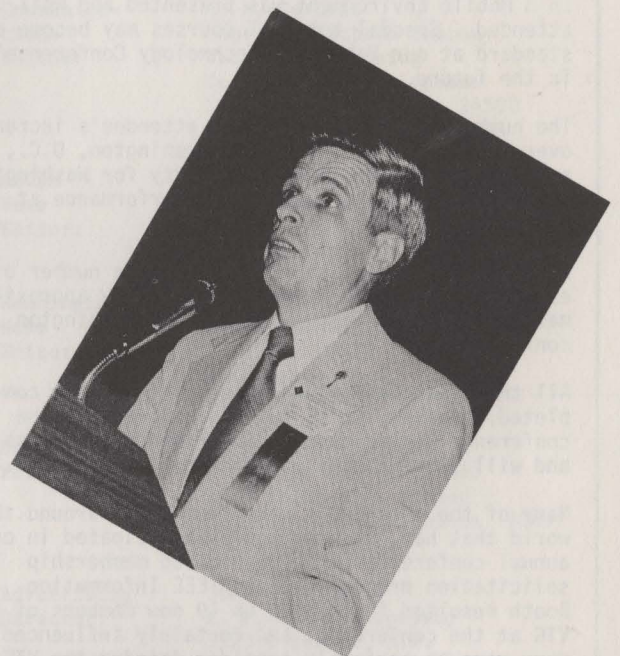
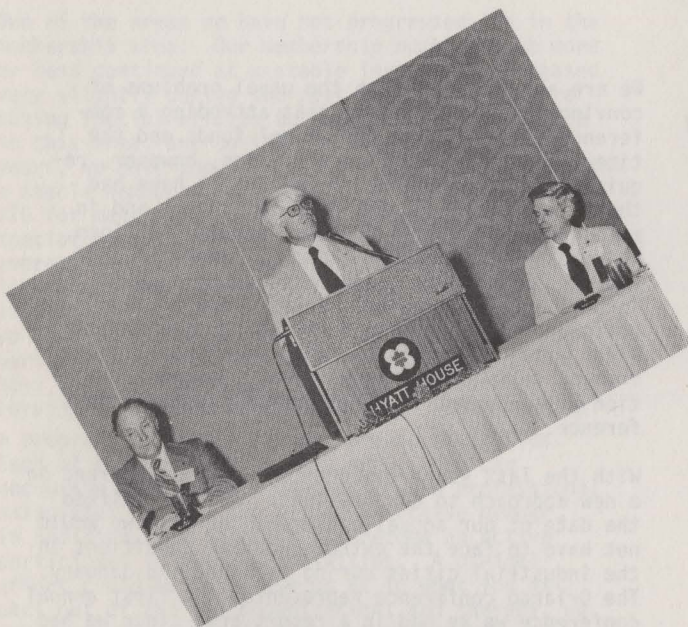


NEWSLETTER

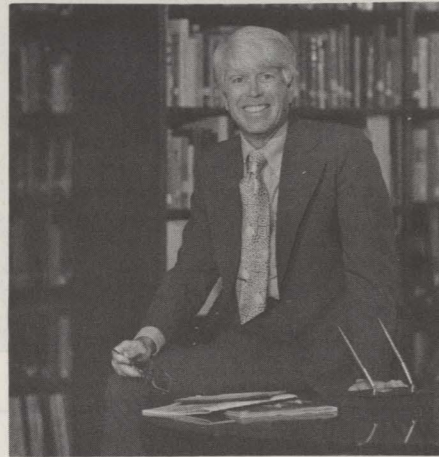
VEHICULAR TECHNOLOGY GROUP

MAY 1977

EDITOR: OLIN S. GILES



THE PRESIDENT'S MESSAGE



The 27th Vehicular Technology Conference is now a matter of record, and by all standards, must be judged as an extremely successful conference for all those attending, and for those participating in the program.

More than 40 technical papers were presented by knowledgeable authors from around the world. A special tutorial course on Data Communications in A Mobile Environment was presented and well attended. Special tutorial courses may become a standard at our Vehicular Technology Conference's in the future.

The number of participants and attendee's increased over last years conference in Washington, D.C., and considering the natural ability for Washington to attract more attendee's, the performance at Orlando was significant.

We are also pleased to report that the number of exhibitors at Orlando were increased by approximately 100% over what we had at the Washington conference.

All the financial figures have not yet been completed, however, it is fair to report that the conference was an outstanding financial success, and will support many of our Adcom activities.

Many of the attendee's were from areas around the world that had not previously participated in our annual conferences. A coordinated membership solicitation program with an IEEE Information Booth resulted in signing up 19 new members of the VTG at the conference, and certainly influenced many more to seriously consider joining the VTG.

The success of the Orlando conference resulted, in no small part, due to the dedicated effort and the efficient management of the entire enterprise by conference Chairman George Mc Clure and his key conference staff members. I can't thank George enough for his extra ordinary efforts this past year, while serving both as Transactions Editor, and Conference Chairman, and doing a spectacular job in both areas.

Previously, the attendance at the Annual VTG Conferences seemed to be reserved for a select group of individuals that were successful in overcoming the many obstacles that the VTG seemed to insert to discourage attendance. Traditionally, the VTG has not been noted for attracting vast numbers of participants. Those of us who have attended previous conferences, obviously felt the quality of the papers presented and the expertise represented by the attendee's was worth the herculean effort of overcoming the many obstacles the VTG seemed to insert to discourage attendance.

We are all familiar with the usual problems of convincing our management that attending a conference is well worth the travel funds and the time expended. The VTG Conferences, however, required more dedication. Normally, we have had these conferences in the dead of winter, and in such exotic locations such as Detroit, Michigan, Columbus, Ohio, and Minneapolis, Minnesota. Of course, a memorable conference, to me, was in Toronto in 1975, during January. During the conference one day I ventured out to get some air. After walking two blocks, ears and fingers were frozen, tears coming to my eyes, I began to question my judgement in participating in that conference.

With the last years conference, the VTG embarked on a new approach to our meetings. We have shifted the date of our annual conference so that we would not have to face the extreme weather conditions in the industrial cities during December and January. The Orlando conference represented the first annual conference we've had in a resort area since we had a conference in Orange County, California in 1962. We still have not established ourselves on a specific week of the month of March for our conferences. Next year we will be in Denver, March 24, however, in the future we are planning to have the annual conference during the first week of March. The selection of a conference date that does not conflict with other activities is almost an impossible task, however, based upon our research, that the first week of March will give us the best possible date for our conferences in the future. We have selected for the 1979 conference, Dallas, Texas, to inaugurate our conference during the first week of March, and I am sure that the Dallas conference will be well attended and establish a pattern for that week of March for years to come.

During our Adcom meeting in Orlando, we found time to review and reflect upon our five year management plan for the VTG. This plan was originally formulated in June of 1974 during an Adcom meeting in Minneapolis, Minnesota. The Adcom developed a series of objectives, numbering sixteen, to be achieved by June of 1979. Some of the key and high priority items are listed below:

1. Maintain autonomy as the Vehicular Technology Group.
2. Improve the quality of our publications and aim for 400 pages in the Transactions per year.
3. Generate a special issue of the Transactions each year.
4. Aim for 500 attendee's at the national conference.

During our next Adcom meeting in June, we will, again, review the five year plan and establish new objectives and goals in accordance with our present position. I am pleased, however, to see a record of achievement in our original goals and objectives. We certainly are a viable organization today. The 1977 issues of Transactions will have a total of 392 pages. We had a special issue in 1976, four special issues in 1977, and have many more planned. The number of attendee's at the Orlando conference was not quite 500, however, we are looking forward to exceeding that goal next year in Denver.

One of the areas we have not progressed, is in the membership area. Our membership numbers have more or less continued at a stable level, and increased very slightly during the past ten years. We are making special efforts to analyze our performance in this area, and to improve upon it. For many years, we have thought that our membership has been a stable number of members, continuing with the VTG for many years. We have recently, through a special questionnaire, have determined that the average membership life of our members is not as long as we had previously thought, and we have been attracting many new members each year, however, we have had a corresponding loss of existing members by their not renewing their membership. We have assigned Tom McKee the important task of serving as our Membership Chairman, and to set up a program to improve our membership statistics. Each of you can help in this area. You can encourage many of your colleagues and professional associates to join the VTG as an active member. In addition, you yourself can become an active participant in the VTG activities. A minimal effort could be to advise us as to what you expect out of the VTG organization, and thereby, we can improve our services to our membership and in turn, enhance our ability to continue on a growth pattern. The VTG operations are supported financially by the membership in the form of dues, and the proceeds from our conferences and special meetings. The VTG does not have any paid staff, and is managed by elected and appointed individuals who donate their time and are given support by their supporting agencies. If you want a more effective organization, it will require a broader support by the entire membership. I would encourage you to contact me regarding your thoughts on improving our organization, and we would be happy to establish new goals and objectives for our organization in the future. Please send me your suggestions prior to our next Adcom meeting in June. We will be working on programs to improve the entire operation according to your suggestions.

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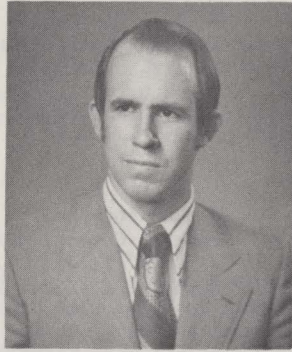
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VTG NEWSLETTER DEADLINE

Month of Issue	Final Copy To Be Rec'd. By Editor*	Target Mailing Date
August	6-27-77	7-29-77
November	10-3-77	11-4-77
February	1-9-78	2-11-78
May	4-3-78	5-5-78

*Inputs for newsletter staff editors should be received 1-2 weeks before these dates.

EDITOR'S NOTES



The feature story in this issue of the Newsletter is the recently completed annual conference in Orlando, Florida. Without a doubt, this conference lived up to its advance billing and was the largest and best attended VTG conference in recent memory. Conference Chairman George McClure and his staff did a superbly professional job. On the inside, you will find the complete story along with numerous photos of the conference. Also, you will find the complete text of the luncheon addresses by NABER's Val Williams and the FCC's Charles Higginbotham.

Because of the realignment of several ADCOM assignments, this issue also marks two changes on the Newsletter staff. Responsibility for chapter activities has been shifted from John Dettra to Sam McConoughey. In addition, the ADCOM secretary's job is being re-assigned from Tom McKee to George Mitchell. Accordingly, the respective Newsletter staff responsibilities for chapter activities and ADCOM Highlights are being realigned to match these ADCOM changes. I would like to express my appreciation to John Dettra and Tom McKee for the fine support they have both given to the Newsletter during the last couple years.

Please note the deadline for the July issue.

OLIN GILES

ADVERTISING

In this NEWSLETTER will commence with the next issue. Deadline for "Ready For Camera" artwork is June 27, 1977. For complete details and rate chart, contact;

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LAST CALL FOR ADCOM COMMITTEE NOMINEES

Part 2, Section 2 of the Vehicular Technology Group By-Laws requires the solicitation of candidates for the VTG ADCOM. Five newly elected members of the VTG will take their seats on the ADCOM for a period of 3 years beginning January 1, 1978. However, they will be expected to participate in the fall meeting of the ADCOM following their election in 1977.

Any member of the IEEE is eligible for election to the ADCOM and may submit his name, or have his name submitted, providing the following criteria are met:

1. He must have been a member of the VTG for at least one year prior to his nomination to the ADCOM.
2. He shall be interested and actively engaged in one of the fields of interest covered in the "Scope" of the VTG.
3. He must be able to attend all scheduled meetings of the ADCOM for each of the 3 years in office.
4. He must be willing to actively participate in one of several ADCOM sub-committee activities.
5. He shall submit to the Chairman of the Nominating Committee a 150 to 200 word summary of his professional and IEEE activities. Standard forms for this resume are available from the Nominating Committee Chairman or any VTG officer.

The name, including home and preferred mailing address, business affiliation(s) and telephone number of any candidate to be considered for nomination must be submitted to the Chairman of the Nominating Committee to be received no later than May 13, 1977.

Names of candidates will be accepted by telephone if you are not able to process the paperwork in time. You may call me collect up to and including May 27, 1977.

The slate of at least 10 nominee-members will be prepared by the Nominating Committee and presented to the ADCOM for consideration and acceptance at their June 1977 ADCOM meeting.

NOMINATING COMMITTEE CHAIRMAN

Nicholas Alimpich
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CHAPTER NEWS



Sam McConoughey CHAPTER NEWS EDITOR

MEETINGS

CHICAGO

"Radio Propagation Models"

by Phillip Rice of the F.C.C. Policy and Planning Division, Washington, D. C.
Held on February 10, 1977, at Heur's Resturant in Rosemont, Illinois.

Mr. Rice discussed the results of his work in the area of radio propagation spanning a period of over 30 years.

"The Chicago Fire Department Emergency Medical System"

by Messrs. Charles Green, Area Systems Engineer, and Jim Murphy, District Sales Manager, Motorola Inc. Schaumberg, Illinois
Held on January 13, 1977

The Speakers provided an overview of one of the largest Emergency Medical Systems (EMS) in the world, encompassing 40 Medical Intensive Care Units (MICU's), and over 40 hospitals. A discussion of a conceptual and realistic definition for a coordinated EMS communications system was given, with emphasis on the "systems approach" in the planning process.

"Antique Electronics"

by Dr. Ralph Muchow, D.D.S. Practicing dentist, collector of antique radios and related memorabilia.

Held on December 9, 1976. Dr. Muchow showed slides of his antique museum located in Elgin, Illinois and Don Clark, Chapter Chairman demonstrated two operating Atwater-Kent receivers of 1924-26 vintage.

"New Developments in Citizen Band Radio Design."

by Mr. Richard Bell

Staff Engineer
Motorola, Inc.
Schaumberg, Illinois

Held on November 10, 1976. Mr. Bell explained some of the features of the new 40 channel generation of C. B. radios with emphasis on frequency synthesizers and the new F.C.C. requirements for radiation suppression as it affected the design of the Motorola product line.

COLUMBUS

"Common Sense Safety"

by George Adams of the Columbus and Southern Ohio Electric Co.

Columbus, Ohio. Held on February 16, 1977

"Time Share Computers"

by Messrs. Carl Fiorenza and Jenne Aniton
General Electric Co.

Information Services Business Division
Columbus, Ohio.

Held on January 12, 1977

FLORIDA, W. C.

"Computer Aided Design"

by Roland Maltison
(Joint with Computer Group)
Held on March 16, 1977 at
Clearwater, Florida.

"Bell HCMTS at 900 MHz"

by W. Rae Young, BTL
(Joint with Com. Soc.)
Held on January 19, 1977
at Tampa, Fla.

"Ferrite Switching"
by Dr. John Pippin
Held on November 10, 1976 at
Clearwater, Florida

"Technical Writing"
by R. O. Austin
Held on October 20, 1976.

NEW YORK

"Communication Facilities for the Mars Probe"
by Dr. Joseph Hogan
Professor of Atmospheric Sciences
Laboratory for Planetary Atmospheres Research
State University of New York
Stoney Brook, N. Y.
Held on September 22, 1976
Dr. Hogan, previously a senior staff scientist at NASA discussed his research findings and the possibilities of life on Mars and other planets.

ORLANDO

"Bell System Design for High Capacity Mobile Telephone System (HCMTS)"
by Mr. W. Rae Young of the Bell Telephone Laboratories (BTL)
Holmdel, N. J.
Held on Jan 20, 1977
At a joint meeting of the VTG and Com. Soc. Mr. Young, a Fellow of the IEEE, described systems planning by the BTL for the HCMTS to provide mobile telephone and radio dispatch service in the 900 MHz band. He discussed both the Chicago test system which is planned to prove the design concepts and the Newark, N. J. tests which are being conducted in preparation for later full scale development.

PITTSBURGH

"Receiver Voting"
by Donald Harbert
Radio Corporation of America
Held on March 9, 1977
Thirty-five people heard Mr. Harbert present a paper describing techniques of receiver voting and then toured the Thick Film Hybrid Development Laboratories of RCA.

"Bell's New HCMTS at 900 MHz employing Cellular Techniques."
by W. Rae Young
Held on January 26, 1977
Thirty-five people heard Mr. Young describe Bell's developmental High Capacity Mobile Telephone System employing cellular techniques.

"A Computerized Television Broadcast Facility."
by Andrew Jackson, Director of Engineering WIIC-TV
Held on December 1976
Thirty persons attended a talk and tour of WIIC's computerized facilities

SACRAMENTO
(Joint with
Com. Soc.)

The Sacramento Chapter held five joint meetings during 1976 covering subjects such as:

"New Innovations in Test Instruments"
"Data Communications, Past, Present, and Future."
"Filled Core Telephone Cable"
"Data Acquisition, Processing and Transmission"
"Computerized Traffic Control"

and tutorial on transmission lines is scheduled for April according to Mr. Maynard Wright, Chairman.

WASHINGTON

"Regulation-One Leg of the Triangle"
by Messrs. Frank L. Rose and Ronald Stone of the
Federal Communications Commission Washington, D. C.
Held on February 11, 1977

AWARDS

"Chapter of the Year" was awarded to the Washington, D. C. Vehicular Technology Group for the 1975-1976 season. A presentation was made to Mr. Stuart Meyer, then Chairman, during the 27th Annual VTG Conference in Orlando, Florida on March 18.

NEW CHAPTER OFFICERS

CHICAGO Dan Clark, Chairman
John Zinkus, Vice-Chairman
Richard Schendorf, Sec'y-Treasurer

ORLANDO Herbert J. Zwarra, Chairman
John R. Endicott, Vice Chairman
* Walter C. Simciak, Sec'y-Treasurer
* Resigned, left Orlando area, replacement not yet named.

FLORIDA, W. C. Mr. H. B. Orr, Jr. as Chairman
replacing Mr. R. R. Scheznutt who was transferred out of the area.

SPECIAL MEETINGS

Chapter Chairman's Breakfast
was held in Orlando, Florida on March 17, 1977 during the 27th Annual VTG Conference with six chapters represented. More on this later.



DENVER...The Mile High City...Site of 1978 VTG Annual Conference...March 22-24

ORLANDO CONFERENCE SETS RECORDS

The 1977 Vehicular Technology Conference in Orlando set several records. It attracted a record number of both conference attendees and spouses, presented a record number of papers, included a successful tutorial course (the first ever) organized by Chuck Lynk, which attracted over 90 registrants and included its own printed course notes.

In the exhibit area, 31 booths were used by 27 exhibitors showing the newest in mobile communications and test equipment and publications. Forty technical papers presented covered the full range of vehicular technology—communications, transportation systems, and automotive electronics. The very popular Wednesday morning session on law enforcement communications attracted a standing-room-only audience.

Speaker at the Wednesday luncheon was Val Williams, President, National Association of Business and Educational Radio, Inc. (NABER) discussing land mobile radio — the struggle for survival.

For the banquet following the joint IEEE/Radio Club of America reception, Fred Link arranged a showing of the IBM-sponsored film on the gathering of the Tall Ships in New York harbor on July 4, then conducted drawings for door prizes of pictures of the tall ships and a CB radio.

Speaker at the Friday luncheon was Charles Higginbotham, Chief, Safety and Special Services Bureau, FCC. His topic was land mobile radio 30 years ago and 30 years from now. Awards were also presented at the Friday luncheon. Edward Weller received his certificate and pin as a IEEE Fellow. Stuart Meyer received the Best-Chapter award, as past chairman of the Washington, D.C. VT chapter. Awards for Best-Papers-of-the-Year were also presented.

The 266-page conference record is available after the conference from IEEE at \$15.00 per copy, less 25% member discount on single copies. The order number is 77CH1176-7VT. Orders should be mailed to IEEE Single Copy Sales, 445 Hoes Lane, Piscataway, NJ 08854.

THIRTY YEARS AGO AND THIRTY YEARS FROM NOW

CHARLES A. HIGGINBOTHAM
CHIEF, SAFETY AND SPECIAL RADIO SERVICES BUREAU
FEDERAL COMMUNICATIONS COMMISSION

Thirty years ago, to be exact on January 20, 1947, the Commission issued what I will call a "Progress Report" on the development of what it called the "Mobile Radio-telephone Service". The document is interesting in that it sets forth what were obviously thought to be significant advances in the authorization of Land Mobile Communication Systems.

Quoting from it, the Commission in speaking of the taxicab industry said:

"There have been more than 200 ... grants involving nearly 8,000 taxicabs in cities from Boston, Mass., to San Diego, Calif."

And, as to motor carriers:

"... The trucking industry is interested in radio as an aid for dispatching and controlling the movement of vehicles ... and there have been ... three experimental grants to date ... one involving the use of 100 units."

Adding that in the "recognized services":

"Such as police, fire, special emergency ... railroad and public utility, there were already over 27,000 licensees operating numerous mobile units."

Now, I'm not going to give you a lot of statistics, but I do think a few key ones will serve to illustrate our growth experience in the Land Mobile Service from the date in 1947 to the present, 1977.

Today, in the Taxicab Radio Service, we have over 4,000 stations licensed and these serve nearly 150,000 mobile units. I contrast this to the 200 stations and 8,000 mobiles in 1947.

In Motor Carrier, we have about 15,000 base stations serving about 150,000 mobiles, and in 1947 this was a new service with "three experimental grants", one involving the use of "100 mobiles".

In the Fire and Police Radio Services and the others I mentioned, in 1947 there were "over 27,000" licenses; but now in the Land Mobile Services, we have in the order of 500,000 transmitters licensed for base station and associated control facilities, with mobile units at the 9,000,000 mark.

I might add that this does not include Aviation and Marine; nor have I included the Personal Radio Services, where we are now at the 8,000,000 level and growing.

What I have said relates to the growth of the industry in terms of numbers of units -- transmitters and receivers and related fixed systems used in Land Mobile Operations -- but what I wish to imply, and I think this is clear to you, is that during this 30-year period from 1947 to 1977 there has been a corresponding



Stu Meyer receives Outstanding Chapter Award as Chairman of the Washington, DC Chapter during 1976.



Edward Weller receives award as Fellow at Friday Luncheon.

growth in demand for your talents and your services as electrical and electronic engineers in solving the myriad of technical problems that developed as the need for mobile radio communications increased.

Touching on another aspect of this growth for a moment, you will recall, I believe, that in the early 1940's there was relatively heavy reliance on the use of equipment in the 25-50 MHz band in mobile systems. There followed greater demand for radio communication capabilities (particularly at the end of World War II), and equipment to operate in the land mobile bands at 150 MHz had to be perfected. Then, when the VHF channels became congested, as they did, the new frontiers were at 450 MHz and in the use of the shared UHF-TV band at 470-512 MHz. Now, these bands are becoming saturated (in some areas the available channels have been exhausted or nearly so), and the move is to 900 MHz. We are in fact crossing the 900 MHz horizon at this time; and with experience as my teacher, I believe, even now, that we should look beyond.

During this time, particularly in the mid-1960's, as some of you may recall, there was continuing pressure to find new techniques to make possible more effective and efficient use of the spectrum the Commission had made available to the Land Mobile Services. The Advisory Committee for the Land Mobile Radio Services was formed; and, your organization, as a member, contributed to the effort -- and it was an exhaustive one -- to come up with solutions to the congestion problem.

But the challenge is still there. It has not disappeared with the allocation of the new band at 900 MHz; and you are being called upon daily, I know, to meet this challenge; and you are responding in a way that lends credit to you, as individuals, and to the IEEE.

Further, this challenge now goes well beyond basic vehicular technology that you had to deal with in 1947 and in the years following. Now, there are satellite systems, with their potential for greater coverage and spectrum conservation. There are new design requirements for automatic transmitter identification purposes and for automatic vehicle location systems; for radio fault alarm and performance monitoring; and for the new digital techniques we are currently trying to weave into the fabric of the private

land mobile radio services to promote "secure" transmission capabilities.

This is but a fractional part of what you are being asked to look at, and I have said nothing about the important matter of developing a proper data base to give us a greater understanding of the propagation characteristics of radio waves in the 900 MHz region. This will be needed in perfecting system configuration and in the design of equipment that will meet the requirements of individual users in the radio services in which they operate. Nor does it cover what I feel we should anticipate will be the case -- the need to move even beyond 900 MHz to higher ranges to meet the ever-growing requirements for radio communications that will evolve, I am certain, as our society pushes out of the 20th and into the 21st century. That is really not far away. Just about 30 years. Just about the time span from January 20, 1947 to March 1977. You have seen the evidence for this yourself. You have been a witness to it and a participant, too; and I think some of you will agree with me on this.

Vehicular technology requirements have not, I would stress, developed arithmetically, rather geometrically, and I see this as a factor to strengthen my conviction that we must prepare for the future as, perhaps, we did not prepare for the past. Therefore, the challenge for the next 30 years will be no less than that for the last 30; and we must be aware of this, at least as a possibility.

In closing I would like to mention that the part I play in the regulatory processes of the Commission is one which brings our paths together often, mine at the administrative, regulatory level, and yours on technical matters that so profoundly affect the industry. It is my hope that when they do cross, we can work together in harmony with one another. I dedicate myself to this proposition, so that new techniques can be found and implemented with a view toward bringing the public more efficient means of communication in meeting their important public interest requirements. I will devote myself and my office to this objective; and, if I may borrow a phrase, "You can count on that".

Thank you again for this opportunity of sharing experiences with you and in bridging the gap that sometimes exists between the government of the people and the people, themselves.



Your ADCOM at work in Orlando



Charles Higginbotham of the FCC speaks at Friday Luncheon.



1977 VT Conference Committee and wives: (left to right) Mel & Sue Kelch (Vice Chairman), Herb & Lucille Zwarra (Exhibits Chairman), George & Glenda McClure (Chairman), Sam & Ann Leslie (Registration Chairman), George & Janice Dewire (Arrangements Chairman), Marion & Helen Cunningham (Membership & Hospitality Chairman), Dick & Carol Endicott (Finance Chairman), and Martin & Barbara Barton (Technical Program & Papers Chairman).

LAND MOBILE RADIO—THE STRUGGLE FOR SURVIVAL

Val Williams, President
National Association of Business
and Educational Radio (NABER)

Thank you. I appreciate this opportunity to participate in the IEEE Vehicular Technology Conference. Seeing Marty Cooper sitting in the high-back chair back there reminds me of the time I gave a talk to a group of investment analysts at the Harvard Club in New York, where I spoke mostly to the backs of tall chairs. It was a very interesting experience. As I came into this room today and tried to envision what this audience would look like when seated, I couldn't help but remember the time in New York.

I am here, frankly, to talk to you people in a little different vein from the topics you normally deal with. I am a political animal and I am the first to admit it. You are technical. You are the brains. We are the guys who run around smiling and shaking hands, trying to keep enough of a facility available so you can do your thing which is to create and invent and come up with whole new concepts, etc.

When I look at a group like this, I am reminded of the story of the little commuter airline that was running from a backwoods type place like Orlando, Florida, to a place like Washington, D.C. This little commuter airline had capacity for 3 passengers and the pilot. They were flying along on this particular day, 3 passengers and the pilot, and the pilot all of a sudden came back in panic and said, "Gentlemen, I am sorry, I am having serious mechanical trouble. There is no way in the world that we can land this plane but I want you to know that I can save at least 3 of us. I have 3 parachutes." Then he said, "For the fourth I am sorry. Frankly, it is obvious, me being the head of this airline, the pilot, I get one parachute." With that he jumped out the door. There was an electronics engineer as one of the passengers and he said, "Well, obviously I must be saved for humanity, for mankind. I am brilliant, I have ideas—I create things, I must have a parachute." And with that he grabs a bag and jumps out the door. A Catholic priest and a hippie were left. The priest looked at the hippie and said, "Son, I am a man of the Cloth, a man of God, I was sent on Earth to save my fellow man, and I will be last to leave this plane. You may have the remaining parachute." The hippie said, "Father, don't sweat it. That guy that just went out the door, that brilliant man from IEEE, took my knapsack." So I may not be the brilliant man you are but I probably, like the hippie, would sit there and not worry too much. As long as you create things we will try to keep sufficient spectrum, vehicles for you to create your products for. George said that I was going to speak about Land Mobile Radio-The Struggle for Survival, and that's exactly the topic I am going to deal with.

We have spent many years in this activity. It has been a political struggle, from the years when mobile radio was first created, back in 1948 when the Federal Communications Commission made the first division of spectrum for the various activities and various technologies that they saw evolving. The struggle became really serious in 1958 when the business radio service was first created. This was the first time that people other than those with very restricted definitions and very strict eligibilities could use mobile communications. The real battle started in earnest in 1965 when it became obvious that the use of mobile communications in industry was expanding out of all proportion to any concept or any provisions that the Federal Government had made for its growth. It was in 1965 that NABER was

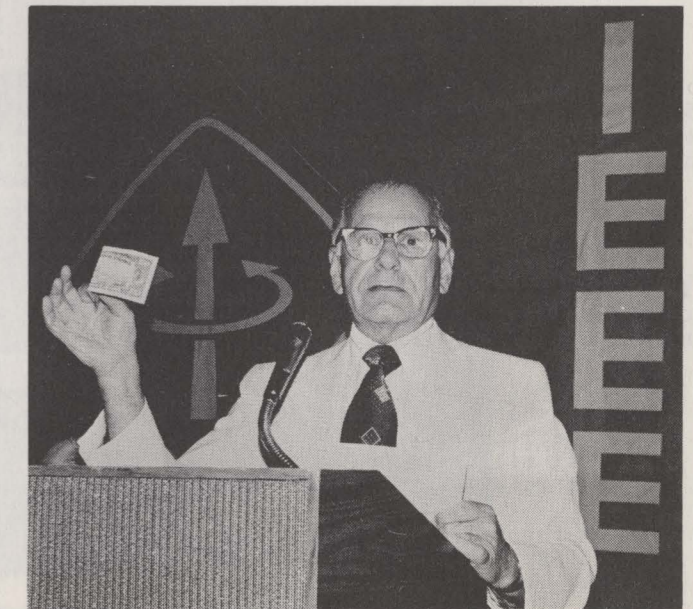
created and its primary goal was to go to Congress and convince Congress that the Federal Communications Commission had erred in its allocations of spectrum in 1948 and that a reallocation process was a thing that had to be done immediately. As many of you may know, by 1967 and 1968 the Federal Communications Commission had issued two landmark decisions, two landmark directions; one was the sharing of a certain portion of the UHF TV spectrum in the area of Channels 14 through 20. The second was the outright reallocation of Channels 70 through 83 to the land mobile or to the general mobile type communications capability. We have been in that struggle for a long time now. We have used a great portion of the amount of space that was provided for in the UHF TV sharing docket in the 13 major metropolitan cities where it was made available. That amount of space is now virtually gone. We are in a situation now in New York, Los Angeles, San Francisco, even down in this part of the world, in South Florida, where we just don't have any place else to put people. We had hoped by this time, of course, and so had everyone else, that we would be able to be using the 800 MHz spectrum which was made possible or provided for, in the reallocation of Channels 70 through 83 but we ran into many, many snags, and many, many roadblocks in trying to get that part of the spectrum developed and underway, as you know, not the least of which was the original approach by the Commission under the pressures from AT&T to make the great part of that spectrum available only for cell-type development, cell-type communications. The original proposal was, as many of you know, to assign 75 MHz out of the 115 MHz available to that kind of development. This is why I call the struggle for private communications a struggle for survival because had that kind of allotment been allowed to stand, the chances of developing private systems as we have known them, and private systems as are needed, by the literally hundreds of thousands of businesses in the United States, would never really have gotten off the ground because you would have had to put your technological brainpower to work on the development of all of the cell equipment and auxiliaries, and everything else that goes with it. The preponderance of attention would have been focused on that part of the development. However, after many more years beyond the 1970 date when the decision was first made by the Commission, we finally got the reallocation of that part of the spectrum redefined to the point where the cell system now has an outright allocation of 12.5 MHz to work with, the rest is designed to stay in reserve until such time as technology decides which ways we are going to go. Now, these are political struggles, these are things that go on everyday in our world, but they touch on your world and it seems to me when I was invited to come down here that I should not try to talk to you on anything other than political terms because it seems to me it's important that you understand and appreciate the kind of thing that we have to go through to try to keep the things that you do alive.

Now, after we got the allocation determined and settled as far as the Bell System was concerned, we then ran into another snag and one that has plagued us and has become very very troublesome to deal with. That is the intervention and the intercedence of the Radio Common Carrier in trying to tie up the whole 900 MHz decision and trying to force a redefinition and a reallocation of what the Commission has already finalized. This thing has gotten so hot that as you know we had, NABER and others, but basically NABER, and the Federal Communications Commission had to go through the courts up to the Supreme Court to get an approval and a confirmation of the decision that the Commission had made. But unfortunately, in that whole court process where the decision was finally to support the

direction that the Commission had taken, in that process, the Courts kept interjecting little innuendos that all of a sudden have now opened the flood gates again for a reattempt by the Radio Common Carriers to open up this whole issue. What this means, simply, is that as of today while the Commission will accept applications for private systems in the 800 MHz portion of that new spectrum, there is a great reluctance to do a whole lot about it by equipment developers and you people in the design and creative engineering area simply because we are not real sure where all of this thing stands and we are not real certain just what will finally come out of all of this and there have been some confusing moves by the Commission staff that has made this even a little more complicated. You can't really fault them because it really is a complicated problem. There are times when people say to me when they read some of the stuff I write, "You are mad, obviously," and I will tell you very frankly I am damn mad. It is unfortunate that we are dealing in an area where industry, the very industry that provides the economic growth, the economic capability, economic backbone, of a growing nation has to struggle so hard and desperately to find space for the mobile communications tool that has proven so valuable and an almost invaluable asset to business. Of course, in all of this we have had other little side problems not the least of which, of course, has been the problem of the Canadian border clearance and the fact that, because our sister nation is not real sure whether we are even going to eat up the spectrum totally before they get the chance to develop, makes it difficult for us to use the full impact of this type of new space in a way far away from the border-type operation to the point where we begin to have a little channel down through the center of the country we can operate in. That I think will be resolved and has been resolved to a certain degree but is still something that we have to live with. Of course, the other item that we have to look at in terms of the private system capability is the constant growth of other parts of communications. God help us, we need them all. CB of course is first all over the scene even to the point where you people attending this particular conference, with a personal communications theme, and other conferences, PC76, PC77, and I suppose on to PC2000. It is certainly taking a great part of the attention of this industry, and rightly so, but each of these growths and developments, takes away the political interest that is necessary for us to maintain private systems. It takes away the Commission's time and so we have to fight and struggle and work harder to try to get the attention we need to get our problems solved. For this reason you will hear, if you do listen to this part of the world, about a new project that we are working on at the moment which is the organization of all of the independent suppliers, service station organizations, and manufacturers' distribution organizations. This is an attempt to get greater strength and greater impact on this whole business of trying to preserve the private sector capability for communication. I would say the type of use that is made of the private communications by Murphy, the plumber, Joe the cleaner, and all the major corporations, is something that is vital to the growth of your industry and the growth of the nation at large. We have one real big item coming up that has got to be important to all of you and that is the proposed rewriting of the Communications Act of 1934. Congress made some efforts in this regard last year. We know now that it is definitely going to be done this year and whether it is done good or bad or whether it is done for our benefit or not, depends upon how close we stay to that situation. I was very interested last evening when I came in here around 11 o'clock and met with a couple of the guys from Washington, one of whom is with OTP.

He mentioned that he had been sitting in conference yesterday with the new White House Staff, these peanut farmers from South Georgia, and he tells me that he is alarmed at the cavalier way in which these people are treating this whole area of communications. They are saying, in effect, "Throw out everything that has been done and start over." That's what reorganization means, that's what pulling government back to the people means, throw out everything you have ever seen and start over. Now obviously that is not going to happen, but anything that even smacks of that kind of approach is throwing the impact on you and me to the point where we had better be ready to take a very positive stand and a very forceful stand in this whole rewrite of the Communications Act. I urge you to listen and read carefully all of the developments that go on and when someone asks you to write your Congressman you be well prepared to just do that because we are going to need your help.

I certainly appreciate the opportunity to come here and spout off a little about the whole problem of trying to maintain the visibility and viability of the whole private land mobile sector and when I talk about the private land mobile sector I am not talking alone about the business radio service but I am talking about all the other industrial services, public safety services, all down the line, because if we do not maintain the proper interest of you and in development, developing technology; if we don't maintain the proper interest of the Federal Communications Commission in making possible the spectrum that is needed, now and 20 years from now, and if we don't keep Congress's attention to the point where it is willing to step in and force action, then we are derelict in our duties as members of this great industry. I assure you that those of us who are dealing on the political side will try every way we can to make your side more productive. Thank you.



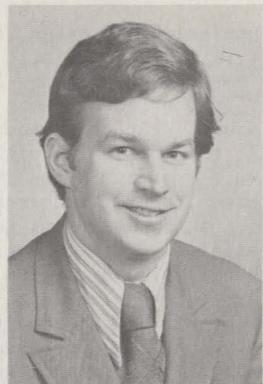
Fred Link "buys" the attention of the Banquet audience.

AUTOMOTIVE ELECTRONICS

DATELINE: DETROIT

By BILL FLEMING

AUTOMOTIVE ELECTRONICS EDITOR



SAE INTERNATIONAL CONGRESS

The biggest news on the subject of automotive electronics came out of the Detroit area during the week of February 28 through March 4, 1977. The Society of Automotive Engineers (SAE) conducted their annual International Congress, at which 438 technical papers were presented, and the total Meeting and Exposition attendance approached 30,000 engineers.

At this meeting, 14 separate sessions were arranged, and some 60 technical papers were presented, especially on the subject of automotive electronics. A breakdown of the papers, by subject, is as follows:

Automotive Electronics Papers at SAE

SUBJECT AREA	NO. OF PAPERS
Engine Electronic Controls	20
Electric Cars and Battery Technology	13
Electronic Displays and Microprocessor Interface Circuitry	11
Electronic Sensors	8
Automotive Radar Systems	5
CB Radio Technology	3
Total Papers	60

Some highlights, taken from these SAE papers on automotive electronics, are described here.

Engine Electronic Controls

Three automotive companies released details of their research and development of new engine electronic control systems.

- General Motors. Engineers at the GM Research Laboratories presented three papers which dealt with the problem of squeezing more car mileage from a tank of gasoline without raising exhaust emission levels.

In the paper, "Computerized Five Parameter Engine Mapping," Ms. Lakshmi Vora measured how the fuel consumption and emission levels of a V-8 engine responded to changes of engine spark timing, air-fuel ratio, and degree of exhaust gas recirculation. Using a computerized engine/dynamometer test cell, an engine-map data base of over 20 million

numbers for 48 different variables, measured under 200 experimental test schedules, was obtained. Regression analyses were then applied to reduce the data to a set of mathematical equations. The resulting mathematical models can be used to investigate the interaction of multiple control variables so that more efficient engine control strategies can be developed.

In a second paper, "A Computerized On-Line Approach to Calculating Optimum Engine Calibrations," John Cassidy outlined a mathematical method which solves the problem of how to balance fuel consumption and emission levels over a Federal Test cycle. The solutions are used to set upper limits of engine performance obtainable solely from the incorporation of electronic controls.

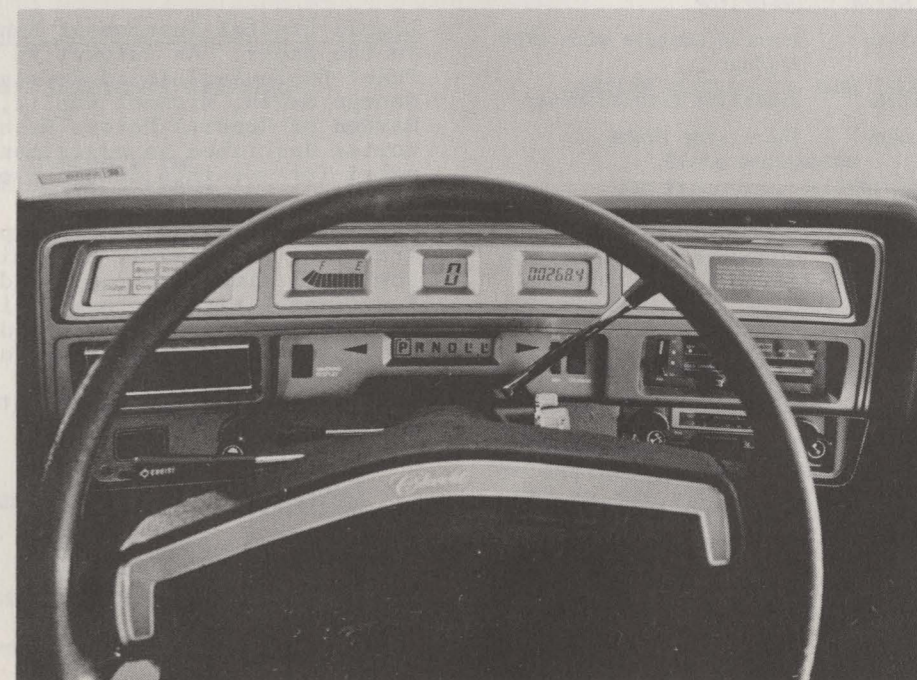
In a third paper, "A Microprocessor-Based Vehicular Engine Control System Testbed," Allan Kotwicki, John Farrell, Norman Laursen, and James Stevens described what in essence was a computerized, mobile, engine test cell. Two onboard microprocessors provide a high degree of test flexibility by allowing one to investigate engine control strategies "on the road". The investigator uses a video-keyboard terminal to enter software commands directly into the operating vehicle. Once programmed, a vehicle road test can be immediately conducted, test results can then be displayed, and the engineer can interactively modify control parameters and calibrations to seek out in real time the optimal vehicle performance.

Volvo/Bosch "Three-Way" Control. In the papers, "Development of the Volvo Lambda Sond System," and "Y₂O₃--Stabilized ZrO₂-Sensor for Application in Automotive Emission Control Systems," Stephen Wallman of Volvo (Sweden) and Eckehardt Hamann of Robert Bosch (West Germany) described a newly released "three-way" emissions cleanup system. The lambda-sond system is the culmination of nearly five years' work at Volvo. (Note: "lambda-sond" is translated into English as follows: "air-fuel equivalence ratio sensor").

The three-way system relies on a Bosch oxygen sensor mounted inside the exhaust pipe to determine whether the air-fuel ratio is rich or lean of the chemically correct stoichiometric ratio. An electronic control unit continually adjusts engine fuel



Unique vehicular testbed which permits on-the-road investigation of engine control strategies--the computerized vehicle was developed at GM Research Labs.



Experimental liquid crystal display instrument panel, developed by GM Research Labs., is a possibility for future automotive use.

injectors to maintain the stoichiometric ratio. At this condition, a "three-way" catalytic converter in the exhaust pipe can simultaneously clean up HC, CO, and NOx gases by converting a large fraction of these gases into H₂O, CO₂, and N₂.

Volvo has introduced this three-way system on its 240 Series 1977 cars in California. The U.S. Environmental Protection Agency has acclaimed these cars because they yield good gas mileage of approximately 18 mpg (city) and 25 mpg (highway) and at the same time also surpass the most stringent statutory emission limits. The system, however, is expensive because it utilizes electronic fuel injection and requires a converter which has a high loading (amount) of platinum and rhodium noble-metal catalysts.

- Ford Motor. In the paper, "The Ford Electronic Engine Control System," Robert Oswald described the first of three new electronic engine control systems (EEC systems) to be introduced over the 1978 model year by Ford Motor Company.

A system, called EEC-1, will simultaneously control both spark timing and exhaust gas recirculation flow rate. Seven transducers are used in the EEC-1 system -- they are as follows.

Transducers to be Used in 1978 Ford EEC-1 System

Transducer Function	Operating Principle
1. Crankshaft Angular Position and Speed	Variable Reluctance Pulse Generator
2. Manifold Absolute Pressure	Aneroid Capsule with LVDT Readout
3. Throttle Position	Resistive Potentiometer
4. Intake Air Temperature	Thermistor Probe
5. Engine Coolant Temperature	Thermistor Probe
6. Barometric Pressure	Diaphragm with Capacitive Readout
7. Exhaust Gas Recirculation Flow Valve	Sonic-Flow, Variable Orifice with Pintle, Position Feedback Provided by Magnet-in-Coil Sensor

The EEC-1 system will use a digital micro-processor to provide supervisory control of engine spark timing and exhaust gas recirculation. With this system, Ford Motor intends to offer improved gas mileage and vehicle driveability in 1978 while maintaining low emission levels.

Other Papers of Interest

There were other papers which also caught the attention of this author.

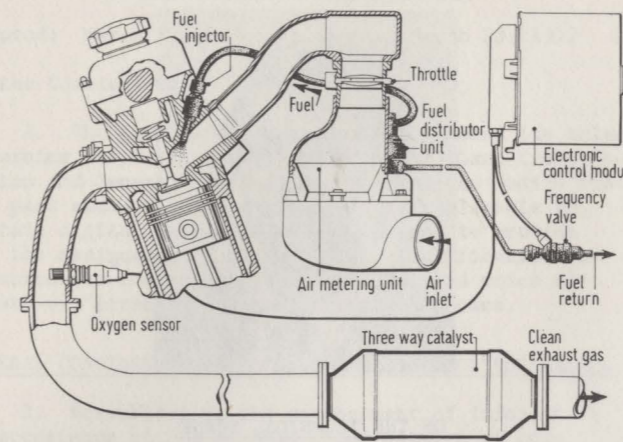
- Zirconia Oxygen Sensor. In the paper, "Device Model of the Zirconia Oxygen Sensor," William Fleming of General Motors Research Laboratories presented results of analytical and experimental investigations of this sensor. Since the sensor is a critical component in the aforementioned "three-way" control system, this work was of particular interest.

Three cases of experimental importance were examined: (1) shift of the sensor voltage transition step towards air-fuel ratios rich of the desired stoichiometric point with increase of exhaust temperature, (2) obtainment of a sharper voltage transition step with the addition of a porous over-coating onto the sensor exhaust-exposed electrode, and (3) occurrence of a hysteretic voltage characteristic due to direction change of air-fuel ratio. By use of an analytical procedure which was based on an original device model of the sensor, the above experimental behaviors were each traced to specific physical parameters of the oxygen sensor.

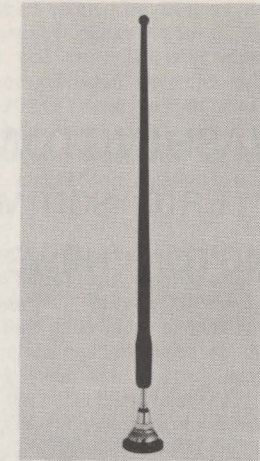
- CB Radio Antenna. Allgon Antenn of Sweden displayed an interesting CB radio antenna, called "Hi-Flex". It is a 65-cm whip antenna which is made from a flexible conductive rubber, rather than metal. The antenna can be literally tied into a knot, and has no sharp points or edges, thereby preventing possible injuries.

- Liquid Crystal Instrument Panel Display. In the paper, "An Automotive Instrument Panel Employing Liquid Crystal Displays," George Smith, Michael Kaplit, and Daniel Hayden of General Motors Research Laboratories described an experimental display panel for possible future use in automobiles.

Panel readouts showed: car speed, distance traveled, fuel level, transmission gear position, time, and various driver warning functions. With the use of integral electric heaters, the liquid crystal display was made to operate at ambient temperatures below -20°C. In addition, the use of colored polarizing films provided both one- and two-color display capabilities.



Schematic diagram of the Volvo-Bosch "three-way" emissions control system



CB radio antenna which can be literally tied into a knot because it is made of Conductive Rubber. Made by Antenn of Sweden.

MEETINGS

ELECTRONIC COMPONENTS CONFERENCE

Stouffer's Inn
Arlington, Virginia

May 16-18, 1977

* * *

WESTERN ELECTRONICS SHOW (WESCON)

Civic Auditorium
San Francisco, California

September 20-23, 1977

* * *

INTERNATIONAL CONFERENCE ON COMMUNICATIONS

O'Hare Inn
Chicago, Illinois

June 12-15, 1977

* * *

OCEANS '77

Bonaventure Hotel
Los Angeles, California

October 17-19, 1977

* * *

THE WASHINGTON SCENE

By ERIC SCHIMMEL

WASHINGTON NEWS EDITOR



ON THE POLITICAL SCENE

No major changes have yet been made by the Carter administration in any of the telecommunications related agencies. Chairman Wiley is being permitted to complete his full term which expires at the end of this June, so short of speculation, no new names will be available until a new chairman is appointed. A plus for the technical community was the appointment of Dr. Bill Thayler as Acting Director OTP, following the resignation of Tom Hauser.

I can, however, give you a run-down of the new congressional communications subcommittees. As you may have noticed, the IEEE is becoming more active in pursuing the professional interests of its members directly with members of congress. If you are personally acquainted with any of the following or their staffs, it could be useful to the organization in the future. I would be happy to compile a reference list if you will advise me of your relationships. Please send these to me at P.O. Box 19232, Washington, DC 20036.

SENATE

Ernest Hollings (D, S.C.), Chairman
Warren Magnuson (D, Wash.)
Howard Cannon (D, Nev.)
Daniel Inouye (D, Hawaii)
Wendell Ford (D, Ky.)
John Durkin (D, H.N.)
Edward Zorinsky (D, Neb.)
Donald Reigle (D, Mich.)
Robert Griffin (R, Mich.)
Ted Stevens (R, Alaska)
Harrison Schmitt (R, N.M.)
Robert Packwood (R, Ore.)
John Danforth (R, Mo.)

HOUSE

Lionel Van Deerlin (D, Cal.), Chairman
John Murphy (D, N.Y.)
Charles Carney (D, Ohio)
Henry Waxman (D, Cal.)
Timothy Wirth (D, Colo.)
Martin Russo (D, Ill.)
Edward Markey (D, Mass.)
Thomas Luken (D, Ohio)
Albert Gore, Jr. (D, Tenn.)
Barbara Mikulski (D, Md.)
Louis Frey (R, Fla.)
Carlos Moorhead (R, Cal.)
W. Henson Moore (R, La.)
Marc Marks (R, Pa.)
Harley Staggers (D, W.Va.) Ex-Officio
Samuel Devine (R, Ohio) Ex-Officio

ON THE TECHNICAL SCENE

Two new rulemaking proposals of interest to the Land Mobile community, have been issued by the FCC. Docket 21142 is innovative in proposing to permit digital voice modulation to be authorized, initially, in the Police Service. Some time ago in this column, I suggested that there was a strong demand, and commensurate product opportunities, for a good speech scrambler. Docket 21142 would seem to be a major step in accommodating those objectives.

The other proceeding is less innovative, and in my opinion, regressive. Docket 21137 revisits the subject of automatic non-voice station identification, by proposing to permit this function to be satisfied with audible (750 Hz) 25 word per minute Morse Code. Without further editorializing, I'll go on record as predicting that this proposal won't fly, and that if it does somehow receive the Commission's blessing, the product won't sell.

These two dockets are reproduced below for your own evaluation, and hopefully some commentary to the FCC.

★★★

FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of)
)
)
Amendment of Parts 89, 91, 93 and 95)
(General Mobile Radio Service) of)
the Commission's Rules and Regulations)
to provide for the use of F3Y emission)
(digital voice modulation) in secure)
communications systems and to elimi-)
nate the low pass audio filtering)
requirements in digital voice, auto-)
matic vehicle monitoring (AVM) and)
other high bit rate digital applica-)
tions.)
)

Docket No.
21142

NOTICE OF PROPOSED RULE MAKING

Adopted: March 9, 1977; Released: March 23, 1977

By the Commission:

1. The Commission is proposing to amend its rules governing the Public Safety, Industrial, Land Transportation and General Mobile Radio Services to modify the low pass audio filtering requirements applicable to certain digital transmission systems and to provide for the assignment of the emission classification F3Y to authorize the transmission of digitized voice for secure or "scrambled" communications purposes.

GENERAL CONSIDERATIONS REGARDING THE USE OF SCRAMBLERS

2. Scrambling is the arrangement of information in accordance with a predetermined pattern or code known only to the sender and the receiver. Its purpose is to prevent unauthorized interception of messages where communications security is important. The use of scrambled transmission techniques by licensees in the private land mobile radio services has been permitted by the Commission as a matter of policy for some time. Until recently, however, the scrambling techniques utilized in these services consisted of some form of "analog scrambling" such as frequency inversion, masking, or band splitting, the product of which was still recognizable and classifiable as an audio waveform. Such emissions fall within the scope of voice emissions F3 and A3, commonly authorized in the private land mobile radio services, and their use has been authorized on the same basis as voice communications, except that the required transmission of the station call sign has had to be in clear voice.

3. The transmission of "digitized" voice is another, more recently developed method of scrambling messages in the private land mobile radio services. The use of digital techniques, we understand, enables the attainment of a much higher degree of security than has hitherto been obtainable using analog methods. In digital voice scrambling, the audio signal is "sampled" at a "clocking rate" equal to the transmitted "bit rate". The particular sequence of "bits" varies in accordance with the particular modulation scheme selected to represent the inputted audio signal. The radio transmitter is then directly modulated (usually by frequency shift keying) with the resultant "bit stream" (i.e., a continuing series of "bits" which may or may not be further encoded or scrambled, used to characterize the voice signal).

4. There are two significant points to note here. First, the digital signal generally does not vary in terms of amplitude (as does a voice signal) and continues even when no modulation is present. (It would, of course, cease when the transmitter was unkeyed.) Second, because of the high "sampling rate" necessary for accurate characterization of the voice signal, and because of wave shaping considerations (ideally the "bits" would be transmitted as rectangularly shaped pulses), the digital voice signal contains a much greater percentage of high frequency components than its analog equivalent. As a result, it tends to sound more like noise and is not recognizable as an audio waveform when received on a conventional receiver. These considerations preclude digital voice from falling within the standard F3 emission classification. Nevertheless, it should be emphasized that although the format is digital, it is not "data" transmission in the sense that we usually think of that term. The channel occupancy (in terms of time) and the message

lengths associated with the use of digital voice are identical to that of clear voice. For these reasons, we believe that the emission F3Y should be assigned to describe coded or uncoded digital voice transmissions. (See Section 2.201(d) and (e) of the Commission's Rules.) This is a special class of a voice emission and, as such, the restrictions imposed by the rules in Parts 89, 91 and 93 on non-voice communications will not apply.

5. The use of digital voice, however, presents potential operational and technical problems which should be addressed. First, there is a serious question as to whether a system transmitting digital voice is compatible in an environment or a radio service where the frequencies are shared extensively. The main problem stems from the inherent difficulty in recognizing as communications ongoing transmission of co-channel digital voice signals. Whereas analog scramblers sound (to receivers not properly equipped to recombine the signal) like highly distorted conventional audio, the "sound" of a digital voice signal resembles (depending on the bit rate and modulation scheme used) anything from a slightly noisy "dead" carrier to an increasingly loud "white noise" much like that heard on an unswitched receiver under no signal conditions. Consequently, we are concerned that a licensee sharing a channel with a digital voice user may not recognize such transmissions as being co-channel communications. Thinking that the channel is clear, such a licensee's attempt at communication would very likely result in mutual interference.

6. This compatibility aspect of digital voice scramblers with regular clear voice systems is a serious matter, and we tend to think that authorizing this technique in the private land mobile services, where many channels must be shared extensively, may not be desirable unless there are countervailing public interest considerations. While the need for secure radio communications in law enforcement is clear and well recognized, we are not aware of any such need in other areas. For this and for other reasons discussed below, we propose to allow the use of the F3Y emission classification only in the Police Radio Service. However, we solicit comments on this matter, and information concerning the requirements for secure communications in the other services, as well as information on the extent to which existing (analog) scrambling techniques are used.

7. Also, the security of communications achieved through the use of scrambling equipment, whether digital or analog, restricts our ability to monitor communications for content, and could seriously hamper our ability to enforce the rules relating to permissible communications and the use of private land mobile systems. Further, radio systems transmitting scrambled messages would be more difficult to identify (in the resolution of interference problems, for example), particularly if the station identification was to be given in scrambled form. To minimize this problem, we propose to require all such stations, whether digital or analog, to transmit the station identification in clear voice. Finally, we wish to mention that while our experience indicates that the use of scramblers (again, both digital and analog), due to the comparatively poor audio quality and the concomitant annoyance factor, would be self-limiting, we nevertheless expect that scrambling techniques would only be used in situations where the licensee feels they are absolutely necessary. On balance, we feel that the need for security in radio communications in certain types of applications would outweigh the disadvantages we have discussed. Accordingly, we propose to allow the use of scrambling techniques

only in the Police Radio Service, or in those radio services or situations where the comments persuade us that we should do so.

8. A technical problem raised by digital voice scramblers revolves around our low pass audio filtering requirement and its consequences when applied to high speed digital transmissions. Because this issue is broader in scope and impacts more than just digital voice, it is discussed in a general context below.

AUDIO FILTERING REQUIREMENTS

9. Existing rules require that each transmitter in the private services be equipped with a low pass audio filter, the purpose of which is to insure that widely varying speech waveforms will not result in the production of excessive sideband emissions. Lower bit rate digital signals can be passed through this filter without significant distortion, but this will not be the case with several digital voice modulation systems operating at a 12 kilobit rate now in the final stages of development. At least one AVM system (operating at 9.6 kilobits/sec.) has been designed to operate through the presently-required low pass audio filter, but with considerable difficulty and with some degradation in overall system performance. In general, it appears that state-of-the-art digital operation (the use of up to 12 kilobits/second in narrow band FM applications) is dependent upon the bypass of the presently-required low pass audio filter.

10. In proposing to eliminate the low pass filtering requirements for digital voice and other high speed digital transmission systems, the question is raised as to whether or not we need to prescribe specific filtering requirements even for analog operations. It appears to us that instead of specifying filter characteristics, the better course may be to rely on emission limitation standards and to prescribe a measurement procedure whereby we determine compliance with those standards. In other words, it may be sufficient to rely on the emission limitations set out in our rules (e.g., Sections 89.107, 91.104, 93.104 and 95.617) rather than to prescribe specific equipment features. This approach would give more flexibility to equipment manufacturers in the way they achieve compliance with our rules and, at the same time, it will give us the assurances we feel we need that our technical requirements are being met in a satisfactory manner. However, there may be a question as to whether the present emission limitation standards are adequate to prevent any increase in adjacent channel interference without the added assurances the present filtering requirements provide. For example, while in most digital equipment about which we have information the distribution and amplitude of the higher frequency components are virtually static and predictable, there may be cases in which the interference resulting from the presence of out-of-band components may be substantial even though the present emission limitation standards are satisfied. We have limited information about the adjacent channel interference potential of both analog and digital systems.

11. Therefore, we are raising the question as to whether or not the low pass filter requirements should be deleted from Section 89.109(d), (h) and (i), and in the comparable sections in Parts 91, 93 and 95. We also raise the question as to whether or not the pre-

sent emission limitation standards in Section 89.107(c) are adequate to prevent any increase in adjacent channel interference if the presently specified low pass filtering requirement is deleted. In the latter case, we invite comments concerning the advisability of specifying a formula to compute the necessary bandwidth for digital modulation systems in a manner similar to those specified for microwave digital modulation [see Section 2.201(g)] and for computing the sideband emission envelope.

12. Further, concerning adjacent channel protection, Sachs/Freeman Associates, Inc. indicates that the present emission limitations provide sufficient protection in the 30-50, 450-512 and 806-866 MHz bands where the channel separation is 20-25 kHz, but that an additional 8 dB reduction in signal strength (this assumes a base station of "average" power and antenna height) appears necessary to insure non-interference to adjacent channel operations in the 150 MHz band where the channel separation is 15 kHz. This is due to the fact that the modified sideband power distribution curve of a high bit rate digital system is viewed by an adjacent channel receiver as having an effective 8 dB increase in signal strength. We therefore believe that digital communications systems requiring bypass of the standard low pass audio filter should be precluded on frequencies in this band. Recognizing, however, that this conclusion and the data upon which it rests may be incomplete or open to question, we solicit comments, including all necessary technical showings, pertaining to the adjacent channel compatibility of various types of high bit rate digital equipment with normal two-way voice communications in the 150 MHz band.

13. With respect to digital equipment operation in the remaining frequency (i.e., 30-50, 450-512 and 806-866 MHz) we propose to require that a showing be made, during the transmitter type acceptance process, that the radiated emission of any digital transmitter not equipped with the low pass audio filter specified in the rules, complies with the existing emission limitations.

14. Because of the complexity of the technical issues raised in this Notice of Proposed Rule Making, we have concluded that our consideration of requests for waiver of the rules to allow for the use of available digital voice equipment should be suspended, and that no additional digital voice systems should be authorized pending the outcome of this proceeding.

15. Authority for the proposed amendments is contained in Sections 4(i) and 303 of the Communications Act of 1934, as amended. Pursuant to applicable procedures set forth in Section 1.415 of the Commission's Rules, interested parties may file comments on or before May 24, 1977 and reply comments on or before June 23, 1977. Relevant and timely comments and reply comments will be considered by the Commission before taking final action in this proceeding. In reaching its decision, the Commission may take into account other relevant information before it, in addition to the specific comments invited by this Notice.

16. In accordance with the provisions of Section 1.419 of the Commission's Rules, an original and five copies of all statements, briefs, or comments filed shall be furnished the Commission. Responses will be available for public inspection during regular business hours in the Commission's Public Reference Room at its headquarters in Washington, D.C.

FEDERAL COMMUNICATIONS COMMISSION Washington, D.C. 20554

In the Matter of)
)
Amendment of Parts 89, 91, 93,)
and 95 of the Commission's) Docket No. 21137
Rules and Regulations to per-)
mit the use of automatic Morse)
Code identification equipment.)

NOTICE OF PROPOSED RULE MAKING

Adopted: March 4, 1977 Released: March 9, 1977

By the Commission:

1. Over the past several years the Commission has received numerous inquiries regarding the permissibility of the use of automatic Morse Code identification equipment in the various private land mobile radio services, including the CB Service. Proponents point out that the use of such a device would insure that the station identification requirements specified in the Rules are satisfied, and, particularly in highly active communications systems, relieve the control operator of the burden of either "watching the clock" to make sure the required time interval does not pass, or else transmitting the station's call sign much more often than is necessary. Automatic Morse Code identifiers would also be preferred from the cost-advantage standpoint, since, in general, their cost is about one fourth of that of an automatic voice identifier. In the CB Service, such devices could result in station identification by licensees who now identify infrequently, or not at all.

2. Except for a special provision allowing the use of automatic Morse Code identification in trunked systems operating in the 806-866 MHz band, the use of this technique has been prohibited because it would require the use of an emission (A2 or F2) not authorized to licensees solely engaged in voice communications and would require the supervision of a licensed radiotelegraph operator. In fact, even in the case of non-voice operations involving the use of A2 or F2 emission, the rules presently require that station identification be given by voice.

3. In addition to the restraints imposed by the rules, our policy against widespread use of automatic Morse Code identification resulted, in part, from several uncertainties associated with the technical operation of these devices. For example, in a number of demonstrations of automatic Morse Code identification equipment, the identification was transmitted simultaneously with ongoing voice communications and was of insufficient amplitude to be readable by even the most expert observers. This problem could be overcome by our requiring that the identification be transmitted either independently (interrupting voice communications) or subsequent to voice communications. Under these circumstances the modulation level is not critical. We recognize, however, that such an approach is not satisfactory because of the potential of interrup-

tion of vital communications. Accordingly, we are proposing simultaneous transmission of Morse Code identification with voice, provided that the level of Morse code modulation is 40%, $\pm 10\%$, with the modulating tone to be at the frequency 750 Hz ± 10 Hz. We solicit specific comments on the feasibility of attaching a filter to the receiver which could reduce or eliminate the tone.

4. Another issue requiring consideration is the anticipated impact of Morse Code identification on licensees unfamiliar with it and, especially in the CB Service, their ability to identify co-channel users causing them interference. It is our belief that while Morse Code identification may not be immediately decipherable by the untrained, it should be possible for such persons either to tape the signal or to transcribe the dots and dashes into the proper grouping for delayed interpretation. Accordingly, we propose a Morse Code fixed transmission rate of 25 words per minute. We also have under consideration the necessity for frequent transmission of a station's call sign during a series of brief transmissions and the impact this could have in a service utilizing congested channels, such as the CB Service. We have proposed to amend Part 95 to relax somewhat the present ID interval requirements.

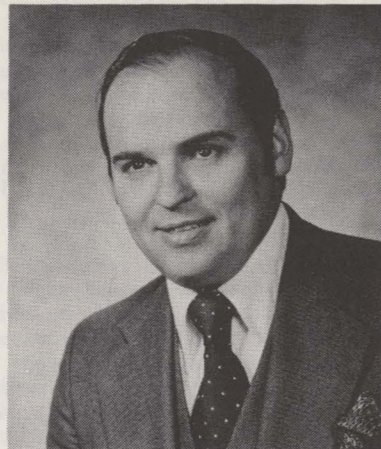
5. It is noted that the Commission presently has under consideration Docket 20351, which concerns the implementation of an Automatic Transmitter Identification System (ATIS) for stations in the private land mobile radio services. While ATIS is regarded as the ideal long-term solution to the various station identification problems, the implementation of such a system has raised a number of complicated questions which are still in the process of being resolved. This automatic Morse Code proposal is set forth as an interim measure affording licensees a convenient means of resolving their station identification problems until an acceptable form of ATIS can be developed.

6. In view of the above-mentioned considerations, we propose to amend Parts 89, 91, 93, and 95 of the Commission's Rules to permit the use of automatic Morse Code identification equipment in the services governed by those parts. Authority for the proposed amendments is contained in Sections 4(i) and 303 of the Communications Act of 1934, as amended. Pursuant to applicable procedures set forth in Section 1.415 of the Commission's Rules, interested parties may file comments on or before May 17, 1977 and reply comments on or before June 16, 1977. Relevant comments and reply comments will be considered by the Commission before taking final action in this proceeding. In reaching its decision, the Commission may also take into account other relevant information before it, in addition to the specific comments invited by this Notice.

7. In accordance with the provisions of Section 1.419 of the Commission's Rules, an original and five copies of all statements, briefs or comments shall be furnished the Commission. Responses will be available for public inspection during regular business hours in the Commission's Public Reference Room at its headquarters in Washington, D.C.

ADCOM HIGHLIGHTS

By George Mitchell



MARCH MEETING

The spring meeting of the VTG Adcom was held on March 15 at the Orlando Hyatt House, Kissimmee, Florida.

* * *

The following persons were present:

Nick Alimpich
Jim Bender
Arnold Brenner
Bill Chriss
Olin Giles
Wendel R. Harris
Sam Lane
Fred Link
Roger Madden
Stuart Meyers
George McClure
Sam McConoughey
George Mitchell
Jack Neubauer
John Tary

Membership Chairman reports the VTG membership as of 1/31/77 to be 2628. Students comprised approximately 10% of this total.

* * *

Dale M. Grimes resigned from VTG/Adcom effective 3/14/77.

* * *

The Treasurer's report indicates a firm financial position, thanks to the success of Convergence '76.

* * *

Bill Chriss has issued a "call for papers" for a special issue of the IEEE Transactions on Vehicular Technology "Emergency 900 MHz Technology". This issue is planned for mid-1978. Paper topics will include, but are not limited to, the following:

- .. New Hardware & Systems Developments
- .. Cellular Systems
- .. Trunked Systems
- .. Customer Needs
- .. EMC & RFI in the Vehicular Environment
- .. Propagation
- .. Spectrum Requirements
- .. Spread Spectrum Techniques
- .. Digital Communications

Please send abstracts or ideas for proposed papers by October 1, 1977, to:

W.H. Chriss
Bell Laboratories
Room 3G-638
Holmdel, NJ 07733

* * *

Transactions Editor, George F. McClure reports a continuing growth in the number of papers published and Adcom has increased its page budget for Transactions.

* * *

Conference Chairman's report for the annual IEEE Vehicular Technology group indicates a RECORD year

* * *

Starting in 1979, and continuing on, IEEE/VTG has standardized on this annual conference time. It will be held the 1st full week of March. This will allow everyone to plan their schedules in advance.

The following persons were unable to attend the meeting:

Carl Brooks
John Cassidy
Robert Cassis, Jr.
D.S. Howarth
T.O. Jones
Tom McKee

* * *

John Tary of the Denver Boulder Chapter reported on the fine efforts of his 1978 Annual Conference committee. Orlando was great, but the '78 committee is planning some fine things at the March 22 thru 24, 1978 IEEE/VTG meeting in Denver, CO.

* * *

The 1979 IEEE/VTG meeting will be held in Dallas, Texas, during the first full week of March. Exact dates will be established later.

* * *

for papers submitted and presented. A broad spectrum of interesting subjects were covered.

These papers have been published in the Conference Review. A new idea introduced in Kissimmee was a tutorial course on mobile data communications. Our thanks to Chuck Lynk and all who contributed to this highly successful and innovative session.

* * *

Fred Link reports from his personal attendance at the Denver Committee meeting that 1978 conference is rapidly shaping up with a well established committee now in place under Herman Wills, Conference Chairman.

* * *

Programs and Paper Coordinator, John F. Slater (303 449-1000 ext. 3185) has issued an advance call for papers for the 1978 Denver meeting.

* * *

George J. Mitchell has been assigned the additional responsibility of Chairman of the Publicity Committee.

CALL FOR PAPERS

A special edition of the Transactions of Vehicular Technology is scheduled for publication in the third quarter, 1978. This issue will concern itself with data transmission in a mobile environment. Suggested topics are listed below but all subjects of a similar nature are encouraged.

Modulation Techniques

Error Performance

Coding Techniques

Transmission Characteristics

Data Hardware

Data Systems

Spectrum Requirements

Circuit Design Techniques

Please send abstracts in for review by August, 1977 to:

W. J. Little

General Electric Company

Mobile Radio Products Department

Mountain View Road

Lynchburg, Virginia 24502

GEORGE J. MITCHELL NAMED ADCOM SECRETARY

PROFILE . . .

George Mitchell has been involved in the mobile communications industry for 14 years. He recently was appointed Secretary for the VTG Adcom.

The bulk of George's career has been at RCA. George is presently Manager of Mobile Product Operations. Before coming to RCA, he was a system engineer for 2 1/2 years at Motorola. Although his career has spanned engineering, product management, marketing administration, project management, and inventory control, product and marketing management have been his first love.

After receiving his BSEE from the University of Pittsburgh in 1962, he began his career as a Systems Engineer in the Communications Division of Motorola, Inc. He then accepted a position with RCA in 1965 as a Systems Engineer with the Mobile Communications Division at Meadow Lands, Pa. In 1967 he was assigned to the position of Manager, Mobile Proposal Administration and was transferred to the Camden (NJ) plant. While at Camden he was promoted to Product Planning Manager. In 1971 he returned to Meadow Lands and progressed through several promotional changes to his current position as Manager of Mobile Product Operations.

In his current position he has four discrete functional groups reporting to him. George is responsible for the management and direction of finished goods inventories to maintain appropriate market mix and inventory cost ratios using production

sales inventory (PSI) computers and systems. He is also responsible for the management and direction of Products Management, Product Design Engineering, Systems Engineering and Major Contracts Administration.

During George's tenure as Manager of Mobile Product Operations, he introduced several important product lines which emphasized advanced technology. The first of these was the TACTEC(R) portable 2-way radio. This product is an advanced microelectronics design utilizing custom beam leaded integrated circuits and thick film hybrids. It was one of the first on the commercial market to use gold beam lead ultrasonic bonding. The second product he introduced was the VEETAC mobile 2-way radio line. This product was designed to reduce costs by employing modern manufacturing techniques, such as automatic component insertion and computerized module and system testing, while producing a unit that provides outstanding performance to meet the needs of quality conscious customers.

George has always been interested in furthering his education. He has completed several company sponsored technical and management courses. He has also engaged in Post Graduate Studies, including evening courses in an MBA curricula. George, his wife Nina, and their 3 children currently reside in Bethel Park, Pa.

PROFILES OF RECENTLY ELECTED ADCOM MEMBERS



PROFILE . . . ARNIE BRENNER

Arnie has been involved in the land mobile industry for seventeen years and active in I.E.E.E./VTG activities for most of that time. He has been on the Administrative Committee since 1973 and before that, served as a member of Chicago Section and as Chairman, Arrangements Committee.

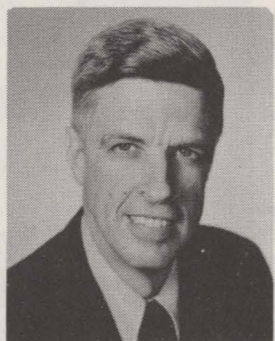
Virtually all of Arnie's professional career has been with Motorola. Currently Vice President and Director of Mobile Operations, Communications Products Division, he began as a development engineer in 1959 and held positions of Engineering Group Leader, Section Manager, and Manager of Engineering in Motorola's engineering laboratories. His engineering experience was broadly based, having had assignments in portable, fixed station, and mobile products. Prior to his current assignment, Arnie also held positions of Product Manager, Group Product Manager and Operations Manager with responsibilities for marketing and manufacturing as well as engineering.

He was a key contributor in the design of many of the mobile radios which have been adapted by communications users all over the world. Motrac, Mocom 70 and Micor are a few of the mobile radio product names to which he made significant contributions in improving performance, reliability and enhancing the value of two-way radio. He also started and managed the mobile data communications group which signaled the beginning of a new era of mobile communications beyond voice. Computer-aided dispatch systems, two-way data signalling, vehicular data terminals and teleprinters, and fixed-route transit vehicle location systems were some of the new products introduced in this period.

He was also actively engaged in the land-mobile industry effort regarding the re-allocation of the 800 MHz frequency band; made several contributions to the technical proposals necessary for the FCC to orderly allocate the frequencies within the band, and served as Chairman of the Ad-hoc Committee of the Land Mobile Section of the E.I.A. on establishing technical standards for land mobile equipment in the 800 MHz band.

He enjoys participating in the Washington scene, and has been very active on Committees both in E.I.A. and I.E.E.E. with respect to formulating and publishing standards and participating in the rulemaking process by the FCC.

Arnie received his BSEE from Illinois Institute of Technology in 1958 and MSEE from the University of Illinois in 1959. He took three years of further post-graduate work evenings at Northwestern University. He also has taken several seminars in marketing, finance and management as well as attending the Motorola Executive Institute in 1971.



PROFILE . . . GEORGE McCLURE

George has been involved with mobile communication systems engineering for the past fifteen years, with applications to both commercial and military activities including mobile telephone, emergency medical services communications, and military tactical communications. Prior to joining Martin Marietta in 1962, he was engaged in development of high-speed printers and other display products for Radiation, Inc., now part of Harris Corp.

A member of the Vehicular Technology Group since 1963, he organized the Orlando VT Chapter in 1974 and served as its first chairman. He was appointed Editor of the IEEE Transactions on Vehicular Technology in 1975 and was selected as Engineer-of-the-Year by the Orlando Chapters of VT and Communications Society the same year. He is chairman of the 1977 Vehicular Technology Conference

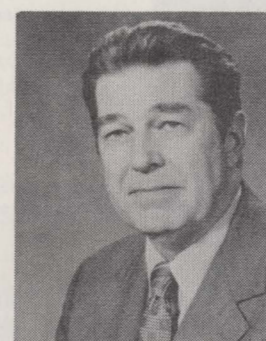
With an interest in ocean engineering also, as a result of five years' service in the Navy as a Communications Officer and a total of twenty years in the Naval Reserve, mostly engaged in communications for antisubmarine warfare, George is serving as a VT representative to the IEEE Council on Oceanic Engineering in addition to his other activities. He first joined IRE/IEEE in 1957, while serving as an instructor in the Department of Electrical Engineering at the U. S. Naval Academy.

George received the Bachelor of Electrical Engineering degree from the University of Florida in 1954, and the Master of Science in Engineering there in 1961.

A Florida native, George lives in Winter Park with his wife, Glenda, and their two children, where, as time permits, he pursues leisure activities including sailing, swimming, reading, and woodworking. Among other activities, he is a member of the Audio Engineering Society and of the Communications Committee of the Orange County Emergency Medical Services Council.

Arnie enjoys fishing, which he only discovered two years ago, as well as snorkeling, tennis, racketball and an occasional round of golf but finds that business and family don't leave enough time to really fully participate in recreation.

He currently lives in Glenview, Illinois with his wife Anita, two sons, Ira and Glenn, and daughter Karen. He is presently commuting between offices in Fort Worth, Texas and Schaumburg and plans to relocate to Motorola's new Fort Worth, Texas facility during the year.



PROFILE . . . STUART MEYER

Stu has been associated with mobile radio most of his adult life. After graduating from Curtis High School (on Staten Island, New York) he was employed as an electronic service technician which included the fields of HF marine radio telephones and the primitive forms of one-way and two-way AM Public Safety communications.

Shortly before going on active duty with the Naval Reserve he completed an Electronics course with DeForests Institute in Chicago. During his five years in the Navy, he received additional electronic training at Naval Air Technical Training Command Schools at Annapolis, Maryland and Corpus Christi, Texas. In October 1945 he completed his tour of active military duty as an Aviation Chief Radio Technician and immediately joined Fred Link's organization as a design engineer of FM Land Mobile equipment. During his tenure at Link Radio he rose to the position of Chief Engineer.

After leaving Link Radio he held a number of engineering and management positions with the Allen B. Dumont Laboratories, Hammarlund Manufacturing Company, Aerotron, Inc. and RCA. He is now Manager of Government and Industry Relations for the E.F. Johnson Company and is based in Washington, D.C.

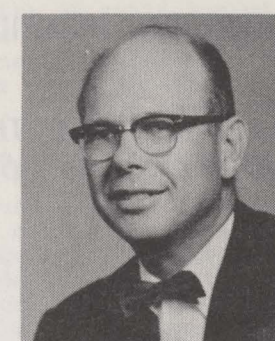
He is directly responsible for a number of 150-170 MHz (High Band) equipment designs which saw wide spread use shortly after World War II in the Taxicab and other then newly FCC authorized radio services. A few years later he directed equipment and system design programs in the UHF (then 450-460 MHz) in the two-way radio industry.

Stu has a 25-year association with IEEE and has participated in a number of VTG activities. He has gone through the chairs of the local VTG chapter and during his term as Chairman, the Washington, D.C. Chapter was the Chapter-of-the-Year award winner. He was General Chairman of the Twenty Sixth Annual Vehicular Technology Conference and has just been reelected to his second term on the VTG ADCOM.

He also has a long association with Electronic Industries Association (EIA) activities and one of his present duties is Chairman of the Engineering Panel of the Communications Division.

Stuart Meyer is a fellow in the Radio Club of America in addition to holding the office of Executive Vice President. He has been an active radio amateur (W2GHK) since 1932 and has operated from a number of locations in Europe, Africa and South America. He is a recipient of the "DX Hall of Fame" award.

Stu met his wife Lottie at Link Radio where she was



PROFILE . . . NEAL SHEPHERD

Neal has devoted most of his technical career to the mobile communications business at the General Electric Company. He has been on the Administration Committee of the Vehicular Technology Group since 1965, and has served on Technical Committees 16 and 27.7 since 1956. In 1970, he was elected to fellow grade of the IEEE and cited "For contributions in the field of Vehicular Communication, particularly to effective Spectrum Utilization".

Prior to joining the General Electric Company, Neal served four years as a communications officer in the Army Air Force. Most of his military service time was spent in Southern California, where he was responsible for installation, operation, and maintenance of a radio communication network between radar stations along the California coast and Control Centers in La Jolla and Hollywood Hills.

Neal received his BSEE from Texas A&M University in 1942 and has taken graduate courses at Syracuse University.

In recent years, a considerable portion of his time has been spent on technical committees, FCC advisory committees, Joint Technical Advisory Sub-Committees, and the International Consultative Committee (CCIR). As a delegate to the CCIR Study Group 8, in Geneva, Switzerland, he has been the United States spokesman on documents prepared for the land mobile services. He has been a member of Working Groups of the SC12F of the International Electrotechnical Committee (IEC) since it was formed in 1971. As a member of an IEC Working Group, he was given the major task of developing a method measuring impulsive noise and its effects on receivers. Although this task has not been completed, considerable progress has been made as evidenced by the documents which are in the process of approval.

Neal and his wife, Sue, living in Lynchburg, Virginia, are the parents of three children, two daughters and one son. All three children were actively engaged in the sport of competitive swimming which brought Neal and Sue into many activities of the YMCA and Amateur Athletic Union (AAU). Neal is a Vice President of the AAU and has been a delegate to the last six national conventions of the AAU.

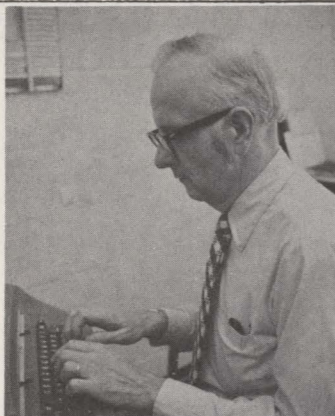
his laboratory technician. They live in Vienna (Virginia) with their daughters Rosemarie and Susanne (also a radio amateur - WB4USX).

Stu's hobbies include carpentry and automotive maintenance in addition to Amateur Radio.

MORE INTERFERENCE SOURCES UNVEILED

By

A. K. "Kenny" GUTHRIE
COMMUNICATIONS EDITOR



Construction of a "frequency difference" table is a systematic way to make a first pass at an interference problem. One was prepared. The injection frequency of each receiver was included, along with the transmitting and receiving frequencies. The frequencies are listed in descending order, and differences calculated for each pair.

	A	B	C	D	E
	164.70	156.00	146.94	146.34	137.64
B	8.7	x	x	x	x
C	17.76	9.06	x	x	x
D	18.36	9.66	0.6	x	x
E	27.06	18.36	9.3	8.7	x

$A - B = D - E = 8.7$ is the desired IF response for the two receivers. We ignore these, of course. However, the difference 18.36 also appears twice in the table, and this is significant. $A - D = 18.36$, and $B - E = 18.36$, so $A - D = B - E$. We can explain the interference to Receiver D thus:

$$D = A + E - B$$

In English, to the frequency of Xmtr A, we add the injection, E, of Rcvr D, and subtract the injection B, of Rcvr A. This yields the frequency of Receiver D and is a good explanation for the phenomena reported.

In the actual case, the problem was not diagnosed before it went away, when Station A was replaced with newer equipment. Since the new gear employed a different IF frequency (and, thus, a different injection) the playhouse was broken up. A less drastic approach might have improved decoupling between the two cabinets. An even easier "cure" could have been obtained by merely "killing" the oscillator of Receiver A during the periods when Transmitter A was keyed.

Let me again emphasize the value of a table of frequency differences. It helps you to avoid overlooking the obvious.

INTERFERENCE CASE HISTORY #1

This one doesn't fit one of the customary classifications. But, since something did happen which was both unwanted and unexpected, we call it "interference" anyway.

Several long distance telephone calls were in progress within a busy office. Then, a paging receiver did its thing, letting out the customary "beep." A number of the long distance calls were unceremoniously dumped, leaving the former "talkers" listening to the dial tone.

The explanation involves the characteristics of "SF" signaling, as used in some telephone facilities. When a conversation is "up," the line is bridged by a tone receiver, responsive to 2600 Hz, which listens for a "disconnect" signal. The bandwidth of the tone receiver can be deduced from information on private line interconnection published by Bell System. We're told that an interface should never deliver energy solely in the band 2450 Hz to 2750 Hz. The output of the "beeper" was within the forbidden range, it was picked up by the telephone transmitters, and the tone receivers did their job. The moral: Avoid the frequencies 2450 Hz to 2750 Hz for audible alarms and thus remove another source of irritation.

INTERFERENCE CASE HISTORY #2

A repeater and a push-to-talk station shared the same tower. The equipment was as follows:

A Xmtr: 164.70	RPT	C Xmtr: 146.94
A Rcvr: 164.70		D Rcvr: 146.34
B Inj : 156.00		E Inj : 137.64

Each time Transmitter A was keyed, Receiver D responded and, in turn, keyed up Transmitter C. Modulation of Transmitter A was recovered at Receiver D and remodulated by Transmitter C without distortion and at normal levels. No modulation, except that from Transmitter A, was apparent. Intermod was discounted as an explanation.

BLACK IS HOT; WHITE IS NOT...

It's amazing how many radiomen have forgotten (or never knew) the conventions for normal 121 VAC branch electrical wiring. To the radioman, black is ground. To the electrician, it's vice-versa. Here are the conventions, taken from the code:

HOT (any color except white, gray or green, usually BLACK)	TERM brass/ copper
GROUNDING CONDUCTOR (bare in wiring, green in cords)	narrow blade
GROUNDING/NEUTRAL (white or gray)	wide blade
	TERM white/ silver

GIVING YOURSELF A "CLEAN BILL"

When there's an in-band "2A - B = C" intermod problem, and you're responsible for Transmitter A, someone trying to use C may accuse you of radiating junk at higher than permissible levels. Since there is a chance that the accusation may be true, you may wish to determine a fact or two before opening your mouth in defense! Assuming you have no fancy instrumentation immediately available, here's a way to make a quick check--accurate enough to reveal any gross conditions.

You need a mobile with receiver which can be switched to Frequencies A and C, a voltmeter with dB scale hooked to its IF circuit, and a calibrated attenuator box between antenna and receiver. The receiver must deliver equal sensitivity at both of the frequencies. In most cases they will be inside the multi-frequency switching range. If not, plan to retune during the test.

Check the Rules. Determine the required attenuation of the spurious output (considering the frequency separation) in dB. Travel away from your station until you can get a usable indication on the meter with the pad box set for a few dB more than the required attenuation. Now, switch to frequency C, restore sensitivity if necessary, and take out sufficient attenuation to restore the meter indication. The difference in pad box settings is degree to which the spurious is suppressed below your own carrier level.

Don't rely on the indication unless you can verify a dB for dB relationship between attenuator setting and meter reading under both conditions. If the meter changes less than a change in attenuator setting, there's a sneak path around the pad box. If the meter changes more than a change in attenuator setting, you're generating an IM product inside your own test receiver!

IT WAS A REAL PLEASURE meeting old friends, new friends and Mickey Mouse at Orlando. Hope to see you again in Denver.

--Kenny Guthrie

CALL FOR PAPERS

A special issue of the IEEE Transactions on Vehicular Technology on EMERGING 900 MHz TECHNOLOGIES is planned for mid-1978. The special issue will focus on the new developments in the 800-900 MHz region. Paper topics will include but are not limited to the following:

- . Spectrum Requirements
- . Spread Spectrum Techniques
- . Digital Communications
- . New Hardware & System Developments
- . Cellular Systems
- . Trunked Systems
- . Customer Needs
- . EMC & RFI in the Vehicular Environment
- . Propagation

Please send abstracts or ideas for proposed papers by October 1, 1977 to:

W. H. Chriss
Bell Laboratories
Room 3G-638
Holmdel, New Jersey 07733

Paper selection based on abstracts will be completed by November 1, 1977. Completed manuscripts will be expected by January 15, 1978.

VTG PUBLICATION ORDER FORM

In addition to back issues of the Transactions, conference records and books on automotive electronics may be ordered. Publications available are listed with both list prices and member prices. Only one copy of each publication may be ordered at member prices. All prices include postage.

TEAR OUT

	<u>LIST</u>	<u>MEMBER PRICE</u>	<u>AMOUNT</u>
1. <u>Automotive Electronics</u> , Pub. No. 74CH0871-4VT (Hardbound)	\$27.95	\$21.50	\$ _____
2. <u>Automotive Electronics</u> , Pub. No. 75CH0976-1VT (Hardbound)	30.00	24.00	_____
3. <u>Proceedings</u> , CONVERGENCE-74, Pub. No. 74CH0928-2VT	20.00	15.00	_____
4. <u>Proceedings</u> , CONVERGENCE-76, Pub. No. 76CH1146-0VT	20.00	15.00	_____
5. 1975 Vehicular Technology Conference Record, 75CH0915-9VT	15.00	11.25	_____
6. 1976 Vehicular Technology Conference Record, 76CH1056-1VT	15.00	11.25	_____
7. 1977 Vehicular Technology Conference Record, 77CH1176-7VT	15.00	11.25	_____
8. <u>IEEE Transactions on Vehicular Technology</u> , special issue on Automatic Vehicle Monitoring, February 1977	10.00	5.00	_____
9. <u>IEEE Transactions on Vehicular Technology</u> , special issue on Emergency Medical Services Communications, November 1976	10.00	5.00	_____
10. Other issues of <u>IEEE Transactions on Vehicular Technology</u> , <div style="display: flex; justify-content: space-around; margin-top: 5px;"> _____ _____ </div> <div style="display: flex; justify-content: space-around; margin-top: 5px;"> Month Year </div>	10.00	5.00	_____

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