25th ANNUAL CONVENTION
TORONTO \(\ldots\) JANUARY 21, 22
At this writing, 1974 is drawing to a close and it seems appropriate at this time to reflect upon the past year while thinking ahead to 1975. In spite of our economic and other problems nationally, which in some way have affected everyone of us, VTC has made significant progress towards the goals set earlier in the year. Thanks to the perseverance of your Adcom and continuing support from the membership, we expect 1975 to be even better. Here are some of the accomplishments for 1974:

1) We sponsored a session at the ICC in St. Paul.
2) We sponsored the Automotive Electronic Committee at the SAE held in Detroit in February and again at Convention 1974 in October in Troy, Michigan. The latter meeting drew over 600 attendees.
3) We sponsored the Mobile - Microwave Symposium in Boulder last September.
4) We established a full nominations committee who, under Bob Eison, generated 16 candidates for ADCOM office. Five were elected, three are new to ADCOM.
5) We established an educational committee headed up by Art Breen. This committee will generate a scholarship fund under the banner of VTC.
6) We reorganized our editorial staff for more efficiency and better timing for our transactions and newsletter. You are already seeing the results of the newsletter editor, Olin Giles, and Carl Brooka has assured me that the transactions will be on schedule as of the November issue.
7) Our membership continues to hold its own in the face of the economic recession.
8) The ADCOM meetings are well attended but could stand some improvement.
9) The President or Vice President are attending all of the Technical Activities Board meetings to establish a better rapport with headquarters and assure that our autonomy is not in jeopardy.

The above represents many hours of work for your ADCOM and committee members. For 1975 even more work is on the horizon:

1) We must make an early decision regarding VTC involvement in Transportation Systems. A decision to take on this important area will require a highly motivated and dedicated transportation committee.
2) We must clearly identify the needs of you, the members. If you are asked to participate in a membership survey, please cooperate by answering all the questions promptly.
3) We must provide local chapters and regional conferences in the interest of better communications and better dissemination of information.
4) We must be unequivocal in our support of various committees. If we expect to share in the proceeds of money-making conferences, we must participate in the conferences.
5) We must find ways to shorten the interval for review for both Transactions and Conference records in the interest of shortening publication schedules.

On behalf of your Administrative and Committee members, I hope this report finds you in good health, and I sincerely hope that 1975 has the best in store for you.

Olin Giles, Jr.
General Electric Company
Mountain View Road
Lynchburg, Virginia 24502
(804) 846-7311 Ext. 2346

This is the last issue of the IEEE/VTC newsletter before the 25th annual convention in Toronto. I trust that it reaches you before the January 21 convention date. IEEE Headquarters assured me that they would pull all the stops to see that this happens. Now I would like to call your attention to several highlights in this issue.

First, you will find a complete listing of the technical program at the convention, including abstracts of all the papers. A tour of the Metropolitan Toronto Police communications program and an entree you won’t want to miss. George King has written an interesting communication system that you communication types will find interesting.

Secondly, on the automotive side of the house, Bill Flammang, Automotive Electronics Editor, has an excellent bylined story on the recently completed CONFERENCE 74 automotive electronics conference. The event was highly successful and is certainly a solid indicator that the future of electronics is bright in Detroit.

Another item that I want to call to your attention is the story on IEEE Standards. The Standards Committee needs your feedback and help in directing their future efforts. What do you need in the way of IEEE standards? Neal Shephard would like to hear from you. We will try to print several letters representative of the divergent viewpoints on this subject in a future issue of the newsletter.

And, of course, I cannot close without thanking everyone who contributed to this issue.

Happy New Year!!
THE WASHINGTON SCENE
BY ERIC SCHIMMEL

FCC BECOMES AESTHETE

Webster defines Aesthete as one having sensitivity to the beautiful. It’s true that the FCC has some nice heads on their premises, but that’s not what this article is about.

By the time this article is in print, the Federal Communications Commission is expected to have issued an extensive rule-making in the area of environmental quality. Contingent upon final clearance by the General Accounting Office, the new regulations will become effective January 1, 1975.

What in the world, you may ask, does FCC have to do with controlling the environment? Well it began in August 1972, when the Commission issued proposed rules in docket 19556 for implementation of the National Environmental Policy Act of 1969 (NEPA). The thrust of that proposal was to give the Federal Government control over the placement and erection of antenna towers and structures. It is unlikely that the Commission would have voluntarily ventured into this arena, but since it had the muscle to control radio installations via its licensing authority, it has become a patsy of the Environmental Protection Agency. Unlike most EPA actions which focus on the toxicity of our water and atmosphere, this proceeding is almost exclusively devoted to the aesthetic considerations of antenna structures.

As a result of comments filed by interested parties in 1972, the original proposal has been refined in several aspects. The main points to which the FCC has acceded are: (1) that the Commission should make a greater effort to identify those of its actions which are "major" within the meaning of NEPA, and should require the submission of environmental data only for such actions; and (2) that the Commission should assume responsibility for conclusions regarding the environmental effect of its actions and not ask the applicant to do so.

The classes of facilities which the rulemaking defines as "major," and which may be of interest to VHF types, are:

A. Private and common carrier microwave relay antenna towers or supporting structures exceeding 100 feet in height, excluding pole mounted microwave antennas. (This category does not include the mounting of a microwave antenna on an existing tower or building.)

B. Other antenna towers or supporting structures including pole mounted microwave antennas, which exceed 100 feet in height and are not located in areas devoted to heavy industry or to agriculture. (This category does not include the mounting of small antennas on an existing tower or building.)

C. Communications facilities to be located in the following areas: (1) Facilities which are to be located in an officially designated wilderness area or in an area whose designation as a wilderness area is pending consideration; (2) Facilities which are to be located in an officially designated wildlife preserve or in an area whose designation as a wildlife preserve is pending consideration; (3) Facilities which will affect districts, sites, buildings, structures or objects, significant in American history, architecture, archeology or culture, which are listed in the National Register of Historic Places or are eligible for listing; (4) Facilities to be located in areas which are recognized nationally or locally for their special scenic or recreational value.

While acknowledging that communications is a "clean industry" and that the primary concern of the agency with the visual appearance of communications facilities, the Commission included a footnote which requires licensees and applicants also to observe electromagnetic radiation exposure standards when evaluating the environmental effects of those facilities.
Procedurally, a form will become available for filling information on proposed "major" facilities. This information should provide a descriptive narrative of the area surrounding the proposed construction, from an environmental impact point of view, including considerations given to the selection of the site and a discussion of any unavoidable adverse effects. The pertinent Commission staff will then use this information to evaluate whether a formal environmental impact statement should be prepared and notice published in the Federal Register. In instances calling for formal publication, interested parties may file comments within 45 days and reply comments within 21 days. It has been estimated that these administrative procedures normally processing times to be extended by 4 months or more.

A tempering factor lies in the Commission's treatment of land uses which urged that Federal regulations should be applicable in certain local zoning ordinances. In its report and order, the Federal Register has not been intended to pre-empt state or local land use policies. It is our position that we see this as mean document approval of the proposed facility from an environmental standpoint, by a local jurisdiction, will go a long way toward receiving local Federal concurrence.

At this writing, it seems likely that some petitions to change or delay the implementation of this proceeding will be filed once the official Report and Order is released. Whether the January 31 date will stand, will depend on the Commission's disposition of those petitions. Watch your trade press for the latest development.

**AN OPPORTUNITY?**

Someone is going to sell millions of specialized VHF receivers in the next few years. That's what was projected at a recent meeting which we attended at the U.S. Department of Commerce, called to brief telephone common carriers and representatives of industry on the National Oceanic and Atmospheric Administration's (NOAA) plans for a national weather warning system. Officials of the National Weather Service and the Department of Commerce's Bureau of Domestic Commerce described a network of 800 transmitters and indicated that a White House announcement could be expected before the end of 1973.

The concept is not really new, and builds on an existing network of 77 transmitters, located primarily in major cities and coastal areas. The present expansion schedule calls for 280 new transmitters to be operational within 18 months. The thrust of the program is to provide complete reporting 36 hours a day to essentially the entire nation. A key feature of the system is the ability to trigger receivers with a tone code and generate a siren sound to alert the occupants on the premises to listen for an emergency message. Such alerts will usually pertain to imminent threats such as floods, crop damaging frosts, heavy ice or snow conditions, and any of a variety of severe storms.

In both normal operation and during emergency periods, the new alert system will be on specific local needs, e.g., agricultural areas will stress information of importance to farmers, and stations near waterways will include marine reports. Regional reports on road conditions will also be included for the benefit of travelers. Normal transmissions will have a duration of 4 to 6 minutes and are revised every 2 to 3 hours, or as frequently as changing conditions require.

It was stressed that the NOAA system is not intended to compete with commercial broadcast services or with telephone dial-up weather reporting services. Rather, people are encouraged to use the NOAA reports for reference, but are also advised by BA to regard telephone weather reports, it was noted that the Federal Register had stated that calling increased after the introduction of the new system.

Future refinements of the system would include the addition of additional frequencies to provide greater geographical and language coverage. These would be caused by overlapping signals. The present operating frequencies are 562 kHz and 162.40 MHz. It is also expected that arrangements will be made with the nation's common carriers to operate and maintain the physical transmitters.

The success of the program, of course, lies in the willingness of the public to purchase receivers. At least one supplier offers a unit, complete with temperature and humidity gauge, for $29.50. A portable model is expected to be available in the $25 price range in the near future. These units are claimed to have good visibility, quality sensitivity (0.5 UV) and high (80 db) interference rejection. It is estimated that there is a mass market of over 100 million units. When you consider that many persons will want a set in the cars and boats, in addition to their homes, the number may indeed be conservative. This is not to mention the probability that most commercial, industrial, and hospital facilities will be equipped to receive alerts.

Perhaps you won't wish to rely on it go after a piece of the action. If so, you may obtain additional information from Mr. Harold Scott, Chief, Public Weather Information, 301-277-7458, or Mr. John Corson, Director of Telecommunications, Bureau of Domestic Commerce, 202-897-4291. If not, we hope that you will have found this information of some personal value.

**AUTOMOTIVE ELECTRONICS**

**DATELINE: DETROIT**

**BY BILL FLEMING**

**CONVERGENCE '74**

Major news out of Detroit concerns proceedings at Convergence '74, the first International Colloquium on Automotive Electronic Technology. Participation in the conference was far greater than anticipated -- more than 300 people and more than 100 U.S. and foreign companies showed up for the event. Convergence '74 was held in Troy, Michigan, at the General Electric Conference Center and our S.E. Michigan Chapter of VGT. Plans are already under way for Convergence '75.

Twenty-five prominent executives from both the electronics and automotive industries participated in the two and one-half day conference. Published articles on the conference proceedings can be found in the following places:

4. Detailed information can be obtained by ordering a copy of the Convergence '74 Proceedings ($30.00/copy, Society of Automotive Engineers, Inc., 18122 E. Eight Mile Road, East Detroit, Michigan 48021).

Our S.E. Michigan Chapter of VGT had a membership table at Convergence '74; the table was manned by Ken Nien, Charlie Boyd, and myself. There was also considerable interest in the automotive electronics activity of VGT. I estimated that approximately twenty confidential attendees explicitly stated their intention of either joining IEEE or renewing expired membership in IEEE because of automotive electronics activities in VGT.

Trevor Jones of General Motors was the prime mover who made Convergence '74 a success. He arranged to have GM's newly elected president, Elliot Estes, give the keynote address, and to have Simon Rama of TRW, and C. Lester Hogan of Fairchild give separate dinner presentations.

I thought it would be of interest to quote some comments made by speakers at Convergence '74 which I found noteworthy. They were as follows:

Simon Rama, Chairman of the Executive Committee of TRW, urged automotive and electronics industries to share both in the development and in the production of future automotive electronic products. He warned that if the automotive industry does not work in a cooperative spirit with the electronics industry, the "miracle of the marriage of the two technologies will suffer. The marriage will fail, and the resulting offspring will be growth stunted." Rama believed the wedding of electronics with the automobile is coming due to a great coincidence of timing.

"Electronics technology has now advanced to a point where, fortunately, it can fulfill the stringent performance requirements currently thrust on the automobile."

**Dr. Simon Rama**

**ELLIOTT M. ESTES**
Robert Joyce, President of Intel Corp., told how the rapid development of the electronics industry has made the following statement true. "To a first approximation, if data can be obtained from sensors, computing power is essentially free." He also pointed out that if automotive industries had made the same cost and speed improvements in cars as electronics industries made in microprocessors, a car would today only cost $1 and would reach a speed of six million mph. In his address, Jones of General Motors said that maybe what Joyce was really trying to point out was that for years ago electronics were way overpriced, whereas cars were. Joyce, in turn, begged off by saying that he never meant to infer that the electronics industries or the auto- motive industries have ever made unreasonably high profits.

One speaker, who best go un-named, raised the question of reliability of electronic products on vehicles by citing the record of the seat belt interlock circuit. He said that this circuit contained 14 failures in 295,000 units for a 99.995% reliability rate. It was pointed out that he did not mention that there were only 132 in failures, whereas the actual number of failures may never be known.

Bernard Warren, President of American Micro- systems, gave a list of advice for minimizing risk in joint development programs between electronics and automotive companies. His list included the following advice for automotive companies:

1. Don't expect the electronics company to define a system specifically for your requirements.
2. Don't withhold desired performance specifications, and don't be afraid to expose advance products plans.
3. Don't prejudice economics of electronics.
4. Don't rush development of the system.
5. Allow system flexibility; e.g., take advantage of ROM circuits.

Seek the advice of electronics companies and be open to exploring potential features.

Work out a comprehensive contract in prefer- ence to a purchase order, and maintain conti- nued close contact.

Warren concluded that "just as MOS/LSI technology in America helped us to regulate the computer calculator market, it can be used by the automotive industry to show world leadership in automobile performance.

T. Jones of General Motors first reviewed the spectacular advances in electronics technology. He then pointed out that the electronic subsystems now onboard production vehicles have a total count of approximately 2500 electronic components. "If an LSI circuit could be made to accommodate all 2500 components, its total cost would only be about $2.00." Jones then gave a list of 60 additional electronic systems which are candidates for tomorrow's automobile. Explaining why these systems are not yet available, he said an evaluation revealed a breakdown into the following major problem areas:

He predicted that once federal emissions legis- lation starts to be enacted by 1979, MOS and ROM large-scale integrated digital circuits will be used, wherein extra control functions will be added at essentially no extra cost. By the same time, as Bendix works on their experience curve, the cost of electronic fuel controls will eventually become less than the cost of carburetors.

Takio Kitano, Executive Vice President of Nippondenso Co., described some experiences which he called the "contradiction in the appli- cation of electronics." He said that an electronic idle control system included a buzzer and/or lamp to warn the driver of wheel lock-up. They found that drivers of this car are rapidly learning from this warning signal how to achieve excellent control of skid without further need for the electronic control system. A similar learning experience was had by drivers who used vehicles equipped with mile-per-gallon meters. He said one might conclude that these systems are not effective at all. While discussing the trade-offs in automotive electronics between cost and precision, Kitano made the following memorable quote, "Automotive electronics have to be as strong as seeds on a roadside, meaning that currently available electronics, which are like greenhouse plants, or a well protected daughter, will never stand up to the cruel treatment of automotive use."

In summary, there was a prevailing technical these, re-asserted by many of the speakers at Convergence '74. Time and again, they said things like, "What turns a microprocessor on is data, but the data wouldn't come until cost-effective transducers are made." While transducers, speakers pointed out that automotive electronic systems require a quantitative measure of mechanical systems never before have needed. Donn William, President of Rockwell International said, "We are on the threshold of a new way of thinking, together of electronic and mechanical disciplines will create the sparks of creativity necessary to make automotive electronics most fruitful.

AUTOMOTIVE ELECTRONICS: SPECIAL EVENT

Special sessions on automotive electronics will be included in the upcoming Society of Automotive Engineers Congress to be held in Detroit, Michigan, February 26-28, 1975. More than 20 papers will be given during five sessions organized on this Conference and are of generally advanced content.

A selection of topics to be discussed include the following:

- Electronic Equipment Earning its Place on European Vehicles
- Electronic Equipment Design on Japanese Vehicles
- Electronic Display Systems in the Automobile
- Drive Circuits for Electronic Displays
- Adaptive Control of Automotive Engine Functions
- Closed-Loop Control of Air-Fuel Ratio Using a Carburetor on Engine
- Engine Control by On-Board Computer

Design Philosophies for Use of On-Board Computer

Fundamentals of Automotive Electronics and Power Distribution and Information Transfer

A Subnanosecond Sensor for Pre-Collision Sensing and Braking Systems

A Random Noise Radar Sensor for Automotive Applications

VGA Members Elect New Fellows in the VGA Club of America

The Radio Club of America recently announced that a total of twenty-six new Fellows have been elected. Of these new Fellows, several are IEEE/VGA members. They are:

Sue Lane
Dan DeMott
Jack Neubauer
Al Reiner

The photo shown was taken at the 55th Banquet, November 12, 1974. The Club club elevates a small number of its roughly 600 active members to the status of Fellow each year.

The current president of the Radio Club of America is Fred M. Link. Fred is also a newly elected member of the VGA ASCOM.
October Meeting
The October VIT Adcom meeting was held on 10/31 at the Somerset Inn in Troy, Michigan.

The following persons were in attendance:
- Nick Alikopoulus
- Bob Elmer
- Arnold Brenner
- Carl Brooks
- John Deitra
- Bill Elder
- Dick Emerson
- Robert Keogler
- Chuck Mansfield
- John de Laage
- Jack Newburger
- Ted Schaller

The following elected Adcom members were unable to attend the meeting:
- John Cessidy
- Harry Cooper
- Jack Germain
- Sam Less
- Roger Madden
- Dick Moore
- Stu Meyer
- Jack Roman
- Neal Shepherd

** The Treasurer reported that VIT's financial picture continues bright. Expenses are expected to increase slightly during the last quarter, but this will not allow VIT to do more for its members. Co-sponsorship, with SAs, of events in the automotive electronics field are an example currently under discussion.

** John Detra, the Chapter Activities Chairman, reported that VIT currently has 23 authorized chapters, and that an additional 10 chapters are expected to be authorized during the past year. These 10 chapters have held 46 regular meetings during the current period of time. So far, 50 of the 10 reporting chapters meet solely as VIT chapters, while the others meet jointly with other groups.

** The Membership Committee Chairman, Andy Misenda, reported that the membership rosters have been pre-sorted at the finish of the APO Convention and at the Government - 74. Automotive Electronics Colloquium.

** Likely prospects for VIT membership will soon be sent a copy of the VIT Transactions and membership advertising.

** Bob Bloor reported that the 1974Bountee Committee has completed its work, and has submitted a list of 16 Adcom candidates to the membership. Ballots will be counted on the November 15. Voting deadline. The five candidates receiving the most votes will be elected to the Adcom for a 3-year term.

With the Toronto Conference almost upon us, the Adcom looked beyond 1975, to future national conferences. The Washington, D.C. Chapter is targeting on late March for the '76 conference and this time period was proposed as a suitable time for the '77 and later conferences also.

** In the Automotive Electronics world, Ted Schaller was happy to report that Convergence - 74 was a great success. He suggested that VIT sponsor the next "Convergence".

In February, 1975, VIT will again co-sponsor five automotive electronics sessions at the SAE International Conference. Nineteen interesting papers will be presented. A new automobile electronic book will result from these papers. Overall, Ted reported that VIT and the SAE were cooperating very well in the automotive electronics field.

** There was considerable discussion on VIT's and IEEE's role in the vehicular communications standards area. EIA (Electronics Industries Assn.) and I.E.C. (International Electrotechnical Commission) are very active in this area, and there are questions concerning the amount of use of IEEE standards versus EIA or I.E.C. Several methods were suggested for determining the relative usefulness of IEEE vehicular communications related standards.

** In the publications area, Carl Brooks reported that the Transactions are being pulled back on schedule, with the November issue scheduled for late November. Several special issues of the Transactions are being worked on. Publicity for the Automotive Electronics book was discussed. Ted Schaller indicated that the Southeastern Michigan Chapter would be offering the book sale at its local chapter meetings.

** Also deferred to the small number of reviews, I will not spend my time panting a book. If I believe a book is poor, it will not be noticed here. Many books have promising titles and fail to deliver. Because of my personal prejudices, I will concentrate on books which I believe have something to offer the practicing design or system of a current rather than theoretical nature. I personally enjoy well done theoretical works, but unless they touch reality somewhere, I won't mention them in this column.

** Book Reviewed: Approximation Methods for Electronic Filter Design

** Author: Richard W. Daniels, Bell Telephone Labs

** Publisher: McGraw-Hill, $19.50

** The selected book carries the subtitle "with applications to acoustical and image processing." Generally speaking, the book begins with a brief introduction to filters and filter design. Then we are introduced to the modern "classical" filter: Butterworth, Tchebicheff, inverse Tchebicheff and Elliptic, separate chapters

Prizing of 500 extra copies of the November Newsletter, to be used in recruiting new members, was decided upon. These will be available at the Toronto Conference.

** There was a lengthy discussion of the work of the Awards Committee. Jack Newburger indicated that he needs advocates to do the spade work necessary to submit worthy VIT members for consideration as fellows. Jack also indicated that while the Adcom has been submitting a list of candidates for VIT Honorary Members, this can also be done by petition. The signatures of 50 VIT members, as well as the technical background and IEEE/VIT service performed by the candidate are essential. This award is usually bestowed only on those with long years of IEEE/VIT service.

** VIT's future role in the IEEE Oceangraphic Coordinating Committee got a thorough airing as a result of a letter from the OCG chairman requesting that VIT either either incooperate in the work of the OCG or withdraw from the Committee. VIT's past involvement with the OCG has been mainly auxiliary via support given several years ago when the OCG was just getting established. OCG's development has not included as much of common interest with VIT as had originally been expected. Several Adcom members questioned our continued involvement with OCG. It was made to withdraw from OCG unless a way can be found for VIT to become more active. Resolution of this question will be via mail ballot of the Adcom members.

** Ways of increasing VIT's involvement in the transportation systems area were discussed. While, due to Bob Feinberg's efforts, the Group has been able to attract good transportation-oriented papers for the Transactions, we have been less successful in attracting members interested in the field. It was felt that there is interest in the field within IEEE, but that those interested were scattered throughout the groups and societies. Bob Feinberg agreed to write a 2 or 3 page report documenting the discussion and his feelings. The report will contain recommendations which can be acted upon at the January Adcom meeting.
CONTINUOUS TONE-CONTROLLED SQUELCH SYSTEM (CTCSS) (RS-229, $3.50)

This Standard describes a Continuous Tone Control System along with performance standards for environmental tests of operation for both the transmitter and receiver. The Standard provides for a choice of any one of thirty-three different audio tones which can be used for designing a communication system in which the receiver squelch will only open when the transmitter is modulated by one of the low frequency audio tones. The system is designed for operation in the 25-470 MHz range and in either the Narrow or Wide Band deviation mode.

MINIMUM STANDARDS FOR LAND MOBILE COMMUNICATION SYSTEMS USING FM OR PM IN THE 25-470 MHz FREQUENCY RANGE (RS-237, $4.10)

This Standard details overall minimum performance requirements for land mobile communications systems such as (1) a radio transmitter including an associated transmission line and antenna, and (2) a radio receiver with an associated transmission line and antenna. Definitions of pertinent system parameters are given and methods of measurement under controlled test conditions are included to determine whether minimum standards are met.

MINIMUM STANDARDS FOR PORTABLE/PERSOINAL LAND-MOBILE COMMUNICATIONS FM OR PM EQUIPMENT 25-470 MHz (RS-314, $4.40)

This Standard details the minimum performance requirements for radio transmitters, receivers or combinations of both which can be hand-carried or worn on the person, and which are operated from their own portable power source and antenna.

MINIMUM STANDARDS FOR LAND MOBILE COMMUNICATION ANTENNA PART I—BASE OR FIXED STATION ANTENNAS (RS-329, $3.00)

This Standard details the minimum performance requirements for base or fixed station antennas. Test conditions and methods for measuring the characteristics of these antennas are given for establishing conformity to these requirements.

MINIMUM STANDARDS FOR LAND MOBILE COMMUNICATION ANTENNA PART II—VEHICULAR ANTENNAS (RS-329-1, $2.20)

This Standard supplements RS-329 by covering vehicular antennas in the 130-1000 MHz frequency range.

LAND MOBILE SELECTIVE SIGNALING STANDARD (RS-314, $4.20)

This Standard presents the definitions, minimum performance standards and methods of test common to all selective service systems.

MINIMUM STANDARDS FOR TEST CONDITIONS COMMON TO FM OR PM LAND MOBILE COMMUNICATIONS FOR EQUIPMENT 25-470 MHz (RS-388, $2.70)

This Standard describes common test conditions under which performance parameters of Frequency Modulated or Phase Modulated Land-Mobile communication transmitters, receivers, base trans and selective signaling units, power supplies, station combinations, personal/portable, or other assemblies of equipment, including complete operating packages, shall be measured.

The International Electrotechnical Commission (IEC) is preparing recommended methods of measurement for equipment and systems used in the mobile services. The publication plan includes 7 parts which will be covered in a future issue.

In turn, we in the VPC standards committee wish to complement these objectives, in a meaningful way, without conflicting redundancy. We also need to recognize how you, the design, systems or applications engineer, can best apply the procedures thus defined. We believe the VPC type of standard can become the basic criteria of all test and evaluation programs.

Should you have any helpful comments or suggestions, please address them to the chairman of the VTC Standards Committee.

Mr. Neal Shepherd
General Electric Company
Mountain View Road
Lynchburg, Virginia 24502

The returns from the VTC ADCOM election have been counted and the following members have been elected for a three year term beginning January 1, 1975:

Carl R. Brooks
San Luke
Fred H. Link
S. F. McConnell
Thomas A. McKee

Congratulations to them on their election to the ADCOM.

The present ADCOM members and their respective terms are outlined below:

Term Ending 12/31/74

A. Brenner
Motorola, Inc.
Chicago, Illinois

J. Cassidy
General Motors
Warren, Michigan

S. Meyer
EGC
Washington, D.C.

J. Neuhauer
Urban Science, Inc.
Philadelphia, Pennsylvania

M. Cooper
Motorola, Inc.
Chicago, Illinois

S. Robb
Federal Communications Commission
Chicago, Illinois

E. Moore
City of San Jose, California
San Jose, California

R. Penner
Advance Technology Systems
Washington, D.C.

Term Ending 12/31/77

H. Alsimpich
Michigan Bell Telephone Company
Detroit, Michigan

M. Cooper
Motorola, Inc.
Schaumburg, Illinois

H. Robb
Federal Communications Commission
Los Angeles, California

S. Robinson
Private Consultant
Pittstown, New Jersey

R. Moore
City of San Jose, California
San Jose, California

H. Robb
Federal Communications Commission
Washington, D.C.

Thomas A. McKee
General Electric Company
Lynchburg, Virginia
AWARDS
BY: JACK NEUBAUER

The VTO Awards Committee is in need of your help in identifying eligible candidates for nomination as recipients of the VTO Institute Field and Group/Society Awards as well as those qualified for the rank of Fellow of the Institute. Our VTO By-Laws also provide for the election of Honorary Members in the Group, in recognition of significant technical contributions and the performance of outstanding service to the profession and to the VTO. Other Awards include the Prize Awards made to contributors of outstanding papers.

A brief description of the various awards follows to assist you in identifying qualified nominees.

FIELD AWARDS
See the IEEE Field Awards table on the following page.

FELLOW GRADE
The grade of Fellow is one of unusual professional distinction and shall be conferred only by invitation of the Board of Directors upon a person of outstanding and extraordinary qualifications and experience in the fields of electrical engineering, electronics, radio, allied branches of engineering or the related arts and sciences, who has made important individual contributions to one or more of these fields. The candidate shall meet the requirements for Senior Member as stated in the Bylaws and shall have been a member in any grade for a period of seven years or more preceding the year of nomination, except that the seven-year provision in any individual case may be waived for cause by the Board of Directors.

Senior Member is the highest professional grade for which application may be made and shall require evidence of attainment reflecting professional standing. For admission or transfer to the grade of Senior Member, a candidate shall be an engineer, scientist, educator, technical executive or originator in the fields of electrical or electronics engineering and science, radio, allied branches of engineering or related sciences and arts.

He shall have been in the active practice of his profession for at least ten years and shall have attained distinction as measured by performance over a period of at least five of these years, such performance including one or more of the following:

- Publication of important original engineering or scientific papers, books or inventions, or
- Technical direction with evidence of accomplishment of important scientific or engineering work, or
- Creative contributions to the welfare of the scientific or engineering profession, or
- Establishment or furtherance of important scientific or engineering courses in a "school of recognized standing", or
- Contributions equivalent to those of above in such areas as technical editing, patent prosecution or patent law, provided these contributions serve to advance progress substantially in the fields of electrical engineering, electronics, radio, allied branches of engineering or the related arts and sciences.

**** *

We believe many of our members are qualified to receive at least one of these awards. It is up to you, our membership, to identify them. Will you help us? Address your recommendations:

J. K. Neubauer
Awards Committee Chairman
Urban Sciences, Inc.
30th King Avenue
Pensauken, N. J. 08108

IEEE FIELD AWARDS
NAME OF AWARD

Harry Diamond Memorial Award
Outstanding technical contributions in the field of government service in any country, as evidenced by publication in professional society journals.

William M. Rohrer Award
Outstanding contribution in the field of transmission and distribution of electric power, to an individual or group.

IEEE Award in International Communication in honor of Berend and Soethenes Bohn
Outstanding contribution in the field of international communication, to an individual or group.

Hervin J. Kelly Award
Outstanding contribution in the field of telecommunication to an individual or group.

Norris K. Lewis Award
Outstanding contribution in the field of electrical measurement, to an individual or group. Special consideration given to value of contribution made before candidate reached 36th birthday.

Norris M. Liebmann Memorial Award
Important contribution to emerging technologies recognized during preceding three calendar years.

Frederick Phillips Award
Outstanding accomplishments in the management of research and development, resulting in effective innovation in the electrical and electronics industry, to an individual or group.

David Sarnoff Award
Outstanding contribution in the field of electronics, to an individual or group.

Vladimir K. Zworykin Prize Award
Outstanding technical contribution in the field of electronic television.

DISTINCTIVE FEATURE

One annually. Certificate and $1000. Date established: 1946


One annually. Plaque, Certificate and $1000. Sponsored by International Telephone and Telegraph Corporation. Date established: 1966

One annually. Bronze Medal, Certificate and $1000. Sponsored by Leede & Northrup Foundation. Date established: 1959

One annually. Illuminated Certificate and $1000. Sponsored by Leede & Northrup Foundation. Date established: 1958

One annually. Certificate and $1000. Date established: 1919

One annually. Gold Medal, Certificate and $1000. Sponsored by R.C. Phillips' Glascampsfabriken. Date established: 1971

One annually. Gold Medal, Certificate and $1000. Sponsored by RCA Corporation. Date established: 1959

One annually until 25 awards have been made. Certificate and $1000. Date established: 1952

*To be awarded at an IEEE meeting of wide scope and interest upon the recommendation of the Awards Board.

Nominations are due at IEEE Headquarters not later than April 1.
The Metropolitan Toronto Police Department has what is believed to be the most advanced police communications system in the world. It is a computer-aided dispatch system that links over 700 police vehicles with a communications center by means of a 12 channel duplex radio network with 12 dispatchers and six base station locations and capable of handling both digital message traffic and voice communications. The system is expandable to 1000 units and 15 dispatcher positions. Base station capacity can also be increased. The area covered is Metropolitan Toronto which is 260 square miles with a population of 2,2 million people.

The original concept was initiated by George H. Long, of MTP. However, the system evolved to its present configuration by extensive consultation with the consultants and the supplier.

Some of the prime functional features are:
- Automatic routing of message traffic
- Automatic frequency assignment
- Push-button initiated generation of messages
- Error rejection
- Versatile dispatcher display system

Voice communications is by standard 1600 P.Y. modulation. Digital communications is by dedicated use of the same RF channel using M-phase modulation at a data rate of 2400 bits/second where each message consists of 32 bits repeated 16 times.

Interconnection between the control center and the base stations is by telephone lines. The data rate over the telephone lines is 300 bits/second.

The system specification error rate for data at 12 db E/No is 1 in 3 million. To date, no wrong digital messages have ever been received.

The logic unit in each mobile has its own address which is sent automatically at the beginning of each transmission. In addition to responding to a discrete address, each unit can respond to group addresses. Other logic functions are the transmission and reception of standard messages.

Additional logic functions are built in to provide great system flexibility. For example, it is possible on a selective basis to erase or maintain messages stored in the unit's memory.

Each dispatcher can control up to 136 mobile units. Operational support is handled by computers, queuing, priorities, assignments status, information storage and retrieval. Base station locations and frequencies actually in use are automatic, with all pertinent information displayed on video screens. Except for priority calls, the dispatcher can "accept" a call on a first-in-line basis by pushing a single button.

A supervisory console has complete over-riding control. For example, the supervisor can take over the operation of any console and distribute individual vehicles or groups of vehicles to any dispatcher position.

The system has enough capacity to serve Metropolitan Toronto for the next 10 years.
Is There A Bee In Your Bonnet????

The aim of this session is maximum involvement from the floor. The members of the panel, drawn from the FCC, DOC, suppliers, and users, are there to trigger discussion, not to preach.

The theme is "The Future in ....", but no one should feel constrained by the title. If you have something to say which is of interest or of concern to FCC members, feel free to ask questions, answer questions, make statements, or comment on those of other conference.

SESSION III

MOBILE RADIO SYSTEM ENGINEERING

Chairmen: W.B. Young
Bell Telephone Labs
Holmdel, New Jersey

Design Considerations for Data Services in the Mobile Environment

Robert Beckman
Motorola
 Schaumburg, Illinois

Abstract: In recent years the rapid growth of municipal and state public safety data bases has given rise to the need for computer access from the vehicle. Mobile alphanumeric terminals, which consist of a keyboard, display, and printer are presently being considered and used by police departments throughout the United States. The purpose of this paper is to call attention to the environmental, human engineering, and safety problems peculiar to such computer access devices when exposed to mobile operation.

New York City Police Department Command and Control System

H. Bloomberg
New York City Police Department
New York, N.Y.

Abstract: The design of a command and control system for radio dispatching with built in flexibility, so that add-ons, and deletions in channel capacity are easily made, was the prime consideration. The command and control system interfaces with the "system" computer and the common carrier telephone system, so that remote locations can be on line with radio control.

To ensure operation under all conditions, the system operates on a system of dispatcher and supervisor priorities. The system can generate: tone keying, tone frequency shift coded keying to control the base stations in a prescribed mode of operation.

To facilitate add-ons, deletions, and changes in channel capacity, all control consoles are terminated in a common matrix, where selective matrix control, crosspoint, and input/output modules process control and the dispatching.

AVM - Optimized for Multi-Deck Economics

George V. Grover
Information Laboratories, Inc.
Fort Worth, Texas

Abstract: The different operational methodologies and economic constraints of a variety of potential users of automatic vehicle monitoring (AVM) are discussed. An RF property analysis of a system which has been designed and tested to meet multiple-user requirements is described.

Unique features of this system include (1) variable location accuracy to meet different user's requirements, (2) different reporting modes for different users, (3) use of existing mobile radios, (4) no user or city site growth restrictions and (5) low cost.

Systems Considerations in the Designation of a Low Capacity Tone Paging System Through Voice Sharing with High Capacity Signaling

David P. Millard
Ronald F. Sharp
Motorola, Inc.
Fort Lauderdale, Florida

Abstract: Many existing two-tone (possibly 3 tone "hallo") paging systems in our large metropolitan areas have reached system capacity. By allocating a small percentage of air time for a higher signaling rate and larger number of keyers, channel capacity can be increased several times. The low capacity paging systems can then be converted to all allocated management systems, such as highway patrol, in which the number of channels is large and several generalized digital techniques are used.

Design for System Reliability in Personal Radio Signaling

George P. Schiecher
Illimole Bell Telephone Company
Chicago, Illinois

Abstract: Innovative techniques and attention to frequency ignored factors have been combined in a new personal radio signaling system. Access to a personal radio signaling system. Access is by means of "tong" tone keying, and frequency shift coded keying to control the base stations in the prescribed modes of operation.

To facilitate add-ons, deletions, and changes in channel capacity, all control consoles are terminated in a common matrix, where selective matrix control, crosspoint, and input/output modules process control and the dispatching.

An Ultrashort Pulse Radar System for Pre-Collision Vehicular Sensors

Louise L. Hagg
Electronics Department
General Motors Research Laboratories
Warren, Michigan

Abstract: An ultrashort pulse radar system was designed, developed, and fabricated for an automotive hazardous evaluation program. Tests verified that this unique system, which had a pulse duration of approximately one nanosecond, did meet its design goals. Reflectivity characteristics of several real road surfaces and across sections of selected highway objects were measured. Experiments verified the capability of the system to identify one object from another, even for a multiple object environment. An analytical model was developed that describes the forward region scattering characteristics of simple objects.

A Comparison of Two Efficient Digital Modulation Systems

R. E. DeBuda
Communications and Systems Services Department
Canadian General Electric Company
Toronto, Canada

Abstract: The 4-phase FSK and the 6-phase are two different digital modulation systems. They both perform well when it is required to conserve power as well as bandwidth. This report discusses some of the subtle differences between their signal structures, their spectral occupancy, and between the circuitry which "self-synchronizes," i.e., regenerate carrier phase and clock references at their receivers.
We gave you a review of the how and why of intermodulation interference in the August issue of this magazine. Then we went into spurious outputs and spurious responses, and finally the November issue dealt with electronic calculator people. We showed how a calculator can be used to find what may happen and to explain what has already come to pass. In this issue, we continue along the calculation kick, but revert to intermod. This time, we take the emphasis off "why?" and put it upon "where?" Here are some practical shortcuts which will allow you to predict where the IM products may fall. They will also help you understand these products which suddenly appear, disturbing the tranquility of all concerned. Pinpointing the mechanism is a necessary prelude to working out a solution.

The highest level products which fall into the same band as the off-channel signals (and therefore create the most misery) are listed in Figure 1. There are, of course, higher-order products and products which depend on more than three signals. One of them will rise up to bite you, sooner or later. We figure that the ones listed are enough for one sitting. If you can manipulate them, you won't have much trouble with the others.

Intermodulation frequency calculations can go both directions. You may go forward, working from the position of signals, predicting the IM products. You may also go backward (i.e., known output and backing in to the mechanism and the unknown contributors). Either way, you can specify matters up to constructing a table of "Frequency Differences." It is easier to manipulate the intervals (or differences) than to manipulate the frequencies. You'll appreciate this observation more after seeing the commonality between many mechanisms expressed in terms of the frequency differences. See Figure 2.

One must be systematic in playing this game. I assign letters to the frequencies in a surrounding order of frequency. A is the highest frequency, B is the next highest, etc. We adopt this convention for the rest of this article (and it can make a difference as we get a little deeper). In the vertical column A, we show the difference between Frequency A and each other frequency. Lower, B, which is under investigation. Under the vertical column B, you'll find the difference between Frequency B and each frequency lower than B. So it goes, for as many frequencies are of concern.
the differences, A-B, A-C and B-C, shows up many times.

Figure 5 reduces the entire computation for three signals to a "program" for your pocket calculator, and demonstrates the merit of the memory feature. We've shown a sample computation, using frequencies from Figure 2. If you want to expand the program to more than three frequencies, you need only do more of the same. Be my guest!

This article pretty well handles the forward look in intermodulation frequency calculations—it deals with prediction. In a subsequent article, we'll show how to go directly from a frequency difference table to discovery of the mechanism which produces a known IM product.

**THE MOST TROUBLESONE IM PRODUCTS**

2-SIGNAL, 3rd-ORDER PRODUCTS, in the form: 2A - B (A) 2B - A (B)

2-SIGNAL, 5th-ORDER PRODUCTS, in the form: 3A - 2B (C) 3B - 2A (D)

3-SIGNAL, 3rd-ORDER PRODUCTS, in the form: A + B - C (E) B + C - A (F) C + A - B (G)


**Figure 1**

**A FREQUENCY DIFFERENCE TABLE**

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>152.45</td>
<td>152.33</td>
<td>152.27</td>
<td></td>
</tr>
<tr>
<td>A</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>152.45</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>A-B</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>152.33</td>
<td>.12</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>A-C</td>
<td>B-C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>152.27</td>
<td>.18</td>
<td>.06</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>A-D</td>
<td>B-D</td>
<td>C-D</td>
<td>X</td>
</tr>
</tbody>
</table>

Note: Freq A > Freq B > Freq C

**Figure 2**

**CALCULATING 3rd- AND 5th-ORDER 2-SIGNAL PRODUCTS**

1. PUT THE DIFFERENCE (A-B) INTO MEMORY
   .12
2. ENTER FREQUENCY A (THE HIGHER FREQ)
   152.45
3. ADD (A-B) FROM MEMORY AND READ THE UPPER 3rd-ORDER PRODUCT
   152.57
4. ADD (A-B) AGAIN FROM MEMORY AND READ THE UPPER 5th-ORDER PRODUCT
   152.69
5. ENTER FREQUENCY B (THE LOWER FREQ)
   152.33
6. SUBTRACT (A-B) FROM MEMORY AND READ THE LOWER 3rd-ORDER PRODUCT
   152.21
7. SUBTRACT (A-B) FROM MEMORY AGAIN AND READ THE LOWER 5th-ORDER PRODUCT
   152.09

**Figure 3**

**THE MOST TROUBLESONE IM PRODUCTS**

( in terms of frequency difference )

<table>
<thead>
<tr>
<th>Third Order</th>
<th>Fifth Order</th>
</tr>
</thead>
<tbody>
<tr>
<td>2A - B = A + (A-B)</td>
<td>3A - 2B = A + 2 (A-B)</td>
</tr>
<tr>
<td>2B - A = B - (A-B)</td>
<td>3B - 2A = B - 2 (A-B)</td>
</tr>
<tr>
<td>2A - C = A + (A-C)</td>
<td>3A - 2C = A + 2 (A-C)</td>
</tr>
<tr>
<td>2C - A = C - (A-C)</td>
<td>3C - 2A = C - 2 (A-C)</td>
</tr>
<tr>
<td>2B - C = B + (B-C)</td>
<td>3B - 2C = B + 2 (B-C)</td>
</tr>
<tr>
<td>2C - B = C - (B-C)</td>
<td>3C - 2B = C - 2 (B-C)</td>
</tr>
</tbody>
</table>

**Figure 4**
POCKET CALCULATOR "PROGRAM" FOR IM PRODUCT FREQUENCIES

3-SIGNALS

Enter A•B (.12) Into Memory

A (152.45) 2  (A-B) 2A-B (152.57)
B (152.33) (A-B) 3A-2B (152.69)
C (152.27) (A-B) 3B-2A (152.09)

Enter A-C (.18) Into Memory

A (152.45) (A-C) 2A-C (152.63)
C (152.27) (A-C) 3C-2A (152.81)
B (152.33) (A-C) 2B-A* (151.91)

Enter B-C (.06) Into Memory

B (152.33) (B-C) 2B-C (152.39)
C (152.27) (B-C) 3B-2C (152.45)
A (152.45) (B-C) 2A-B (152.21)

* DUPLICATION OF PREVIOUS CALCULATION

FIGURE 5