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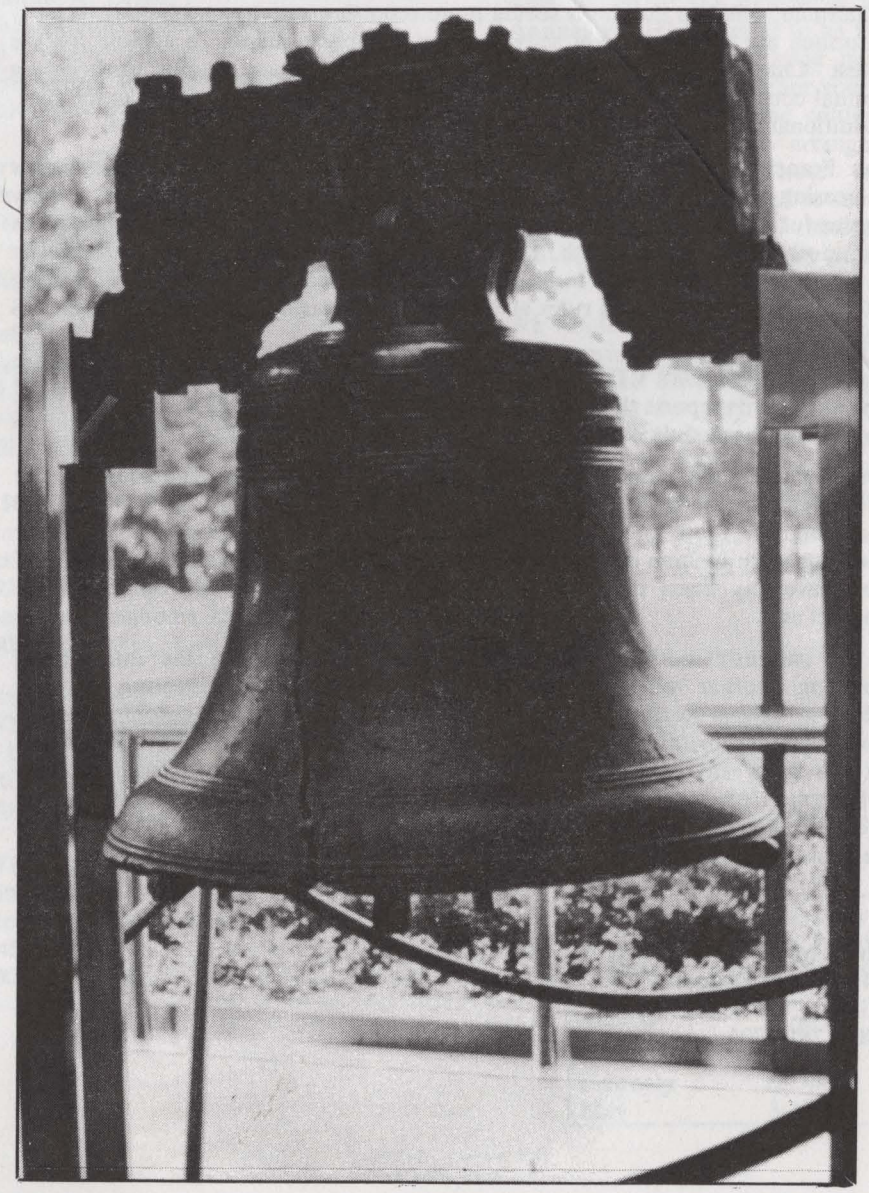
IEEE

VEHICULAR TECHNOLOGY SOCIETY NEWSLETTER

Vol. 35, No. 2, May 1988 ISSN 0161-7887 Editor: A. Kent Johnson



Liberty Bell

President's Message

Stuart Meyer
President
IEEE Vehicular Technology Society

I am happy to report that my messages on this page of a number of recent Newsletters is beginning to pay off. Gaspar Messina, our Chapter Activities Chairman, tells me that he is seeing more reporting activity and he has recently informed me that the newly activated San Francisco chapter is eligible for the latest "Chapter of the Year" award. This will be made at our forthcoming annual conference in Philadelphia, June 15-17 at the Holiday Inn_Center City. Additional conference information appears elsewhere in this newsletter.

San Francisco Chapter Chairman, Frank Thatcher is to be congratulated for increasing the activity of this group. Last year this chapter held a very successful Land-Mobile mini-conference, and Frank is moving along with plans for another one on June 28th, 1988. If any of you are interested please do get in touch with him. Yours truly has agreed to appear on the program covering FCC licensing policies and rules at 800 MHz with particular emphasis on SMRS activity.

Speaking of the 1988 VTS Annual Conference, National Conference Chairman Evan Richards reports that plans are moving along and that all indications point to another successful conference this year.

Our Board of Governors had a fine meeting in Detroit on Thursday, March 3rd. Among those attending were newly elected directors, J.R. Cruz and Raymond C. Trott for their first meeting. Your Board of Governors will be meeting again in June during this years annual conference in Philadelphia, so if you have any items that you would like brought before the Board, please contact me.

I am currently working on recommending and preparing the information covering another milestone in Land-Mobile Electrical Engineering History. This one relates to the first Land-Mobile repeater which was accomplished at low band (approximately 35 MHz) in Contra Costa County, California. If any of you know anything about this event or have any leads towards additional information on this pre World War II activity, please get in touch with me. Retired Captain George Burton of that area has been providing me with some very good material including a copy of the first license.

Stuart Meyer
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Cover: The Liberty Bell photograph was furnished courtesy of Philadelphia Convention and Visitors Bureau, 1515 Market Street, Philadelphia, PA 19102, (215) 636-3300.

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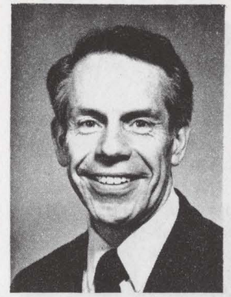

A. Kent Johnson
Newsletter Editor

This edition of the newsletter features the upcoming Annual VTS Conference to be held at the Holiday Inn Center City in Philadelphia from June 15-17, 1988. Elsewhere in the newsletter you will find the complete advanced program of the conference and as you will see, the committee has arranged for an outstanding technical program. Those interested in cellular technology will be pleased to see the number of papers in their area of interest this year. It should be an exciting conference and we hope you will be able to make it to Philadelphia.

We would also like to call your attention to copies of our previous and our revised constitution. Roger Madden and his committee have worked hard on this revision and we hope you will take the time to study their work. You will be receiving the opportunity (by mail) to vote on this revised constitution so please do study it and make an intelligent vote.

Month of Issue	Final Copy to be Rec'd By VTS Editor	Target Mailing Date
August	6-09-88	7-13-88
November	9-13-88	10-15-88
February	12-30-88	1-27-89
May	3-10-89	4-14-89

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AN OPEN LETTER TO VTS MEMBERS

Each year, this Society elects 5 persons to its 15 member Board of Governors. This involves finding up to 10 of our members who are willing to stand for election. These members must have the support of their employers to serve for the 3 year term, be prepared to attend all meetings of the Board, and to make significant contributions to its activities. The search for such people is not easy, and that is why I request your assistance.

If you know someone, whom you believe would make a good candidate for the Society Board of Directors, please write to me at the address below, or give me a call. All I need is the persons name, address and telephone number. I will contact them to see if they will serve, if elected. If so, I will see that they appear on next fall's ballot. The rest will be up to the membership. But don't stop there, if your man gets on the ballot, campaign for him!

Our Society has three main areas of interest: Mobile Communications, Vehicular Electronics, and Land Transportation Systems, and we should have a good representation from each. Since our membership is predominantly communications oriented, it is only natural that our Board is similarly oriented. However, to assure that our other two areas will play an important role in Society affairs, they must be represented. We are especially anxious for those of you with either Vehicular Electronics or Land Transportation interests to nominate your candidates.

Experience has shown that our Membership rarely elects an unknown. So if your man has not been active in the Society, and yet you believe he would make a good candidate, then encourage him to volunteer for a Committee assignment. Many of our present Directors have followed this path to successful election.

Every effort will be made to have at least two candidates for each Board seat. If we are successful, then there will be five who fail to be elected. But if you have picked a person who is of Board caliber, then he should be willing to serve in an appointed committee capacity and then run again for election.

I hope to hear from you.

Bob Fenton, Chairman
Nominations Committee
Department of Electrical Engineering
The Ohio State University
2015 Neil Avenue
Columbus, Ohio 43210
(614) 292-4310

Chapter News

Gaspar Messina
Chapter News Editor

Meetings

San Francisco Bay Area VTS

Design Concepts - Bay Area Cellular One
by Mr. Mike NcNally, Director of Engineering and Operations
577 Airport Blvd; Burlingame, CA 94010
Held March 8, 1988, with 17 attending, including 6 guests.

Orlando, Florida (Com/VT)

Trends in Personal Communications
by Mr. George McClure
1730 Shi Loh Lane, Winter Park, Florida 32789
Held May 20, 1987 with 38 attending, including 10 guests.

The Status of MAGLEV Research, Development, and Implementation
by Dr. Tony Eastham
Department of Electrical Engineering,
Queen's University, Kingston, Ontario,
Canada K7L3N6
Held June 1, 1987, with 31 attending, including 15 guests.

Gaspar Messina
Editor and Chapter Activities Chairman
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Bethesda, Maryland 20817

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Professional Activities

Frank E. Lord
Professional Activities Editor

ENGINEER SUPPLY AND DEMAND

One of the longest running discussions I have encountered during my engineering career is that one which involves the supply and demand of engineers or, put another way, the surplus or shortage of engineers. One would think that this would be a subject that could be readily quantified by some government department or agency like the Labor Department, but that has not been the case. In this column, I will discuss some possible reasons why we do not have better measurements than we do as well as describe some of the indicators that are available.

First of all, we can not expect that information will be available if very few parties are interested in that information. Consider that other than IEEE, the National Society of Professional Engineers (NSPE) and the American Chemical Society (ASC), technical professional societies or at least their leaderships have exhibited very little interest in the non-technical aspects of the careers of their membership. Thus there is not a great deal of strength that can be mustered to apply to the government to encourage the gathering and publishing of engineering employment information. We engineers think that we have a serious problem when our unemployment rate gets up to three percent and that is understandable given the preparation that is necessary to enter the profession and the further effort required to maintain competence. However, government officials and politicians who compare our unemployment rate with that of the general population see us as being in good shape and are not interested in applying any resources in our area.

The consequence is that there is no single "official" index of demand for engineers in the United States. Various organizations publish indicators of current demand as well as projections of probable future demand for engineers and scientists that are referred to as reasonably reliable sources of information on this subject.

Indices of Current Demand

Probably the best known and widely respected source of information on current demand for engineers and

scientists is published monthly by Deutsch, Shea & Evans, the advertising subsidiary of Foote, Cone & Belding Communications, Inc. *The Deutsch, Shea & Evans High Technology Recruitment Index* is a national indicator of technical demand for degreed engineers and scientists based on a monthly count of recruitment ads appearing in 39 major newspapers and technical journals that are distributed in major job markets throughout the United States.

A superficial look at the D&S index plotted versus time gives a favorable long term indication until one is reminded that the 100 level is not the break even level, but just the level that existed the year the index was started. The level at which entrants into engineering positions balance voluntary exits is somewhere in the 130 to 140 level based on work performed and published by IEEE Fellow Bob Rivers in the early 1970s. Bob also determined that above the break even level there are opportunities for 7000 entrants for every point rise in the index and that for every point below the break even level 7000 engineers must leave the profession. Whether those leaving will all come back or will be accepted back later is not known, but it is safe to assume that many will return since we generally all know someone who has.

The *National Science Foundation* also periodically surveys major employers of scientific, engineering and technical personnel in U.S. industry in an effort to monitor the adequacy of supply of such personnel.

Projections of Future Demand

There are three major sources of information on the probable future demand for scientists and engineers. These sources include the Bureau of Labor Statistics at the U.S. Department of Labor, the Division of Science Resource Studies at the National Science Foundation, and for electrical engineers, surveys that have been conducted by the American Electronics Association.

The *Bureau of Labor Statistics* projects the probable future growth of the whole economy and of component industries. Then it calculates how many engineers will be needed to achieve this growth rate based on historical patterns of engineering employment and anticipated future changes in these patterns. The Bureau is currently working on projections to 1995.

The *National Science Foundation* used a similar methodology to estimate changes in the need for scientific, engineering and technical personnel between 1982 and 1987. Its model considered the effects of projected changes in defense spending to a greater extent that the BLS model does.

In 1981 and again in 1983 the *American Electronics Association* asked its member firms to project future personnel needs, particularly for electrical and electronics engineers, through 1987.

Based on these surveys, the AEA's estimates of future demand turned out to be three times higher than those of either the BLS or the NSF. The AEA methodology has been roundly criticized on the grounds that most employers of engineers do not make firm projections of manpower requirements more than 18 months into the future. In addition, respondents to this kind of survey frequently tend to be overly optimistic about the relative market share that their companies are likely to achieve and are therefore more bullish about future personnel requirements than events generally turn out to warrant.

Supply

If you think the demand side of the equation is unclear, you will find the supply side even more so. Some readers may recall a column published here several years ago titled *Who is an Engineer?* which pointed out the many definitions of engineer and the many ways that one might end up being called an engineer. If one only compares the supply of BSXE graduates with the demonstrated needs of industry, academia and government, it would always appear that a great and growing shortage exists. This view is not a valid one because of all the other paths that exist for entering engineering. Science and math graduates always exceed the need in those fields and many of these discover that they can make a living in the engineering world and end up bing counted in our ranks. Some journalism students become technical writers and get counted as engineers in positions that are described as requiring an engineer. Technicians who learn well on the job and take appropriate courses to enhance their theoretical backgrounds often are promoted to engineer by their organizations. If we can not ascertain the supply accurately, how can any meaningful projections as to supply/demand balances be made? Perhaps it is not yet possible or practical but recent history allows us to make some observations.

Based on our collective experience during the 1970s and 1980s, our member electrical and electronics engineers are very skeptical about predictions of impending shortages and attendant calls for governmental intervention in order to increase the supply of scientists and engineers. In the late 1970s for example, industry managed to avert predicted shortages or petroleum engineers by increasing salaries. And, to the best of our knowledge, there has never been any shortage or qualified responses to requests for proposals for engineering work.

In a 1985 report to Congress, the Office of Technology Assessment concluded that there appears to be no convincing cause for concern that demographic trends will lead to shortages of scientists and engineers. This is because the labor market for technical personnel has a variety of mechanisms for coping with potential supply-demand imbalances that seem to work reasonably well without the need for government intervention to increase the supply of trained manpower. If our members perception that engineers are underutilized is correct, then there is additional capacity within the system for significant increases in engineering output.

Transportation Systems

Bob McKnight
Transportation Systems Editor

FCC authorizes railroads to use six 900 MHz frequencies for ATCS

In an order released January 29, 1988, the Federal Communications Commission has authorized the Association of American Railroads to use six frequency pairs in the 900 MHz range for its Advanced Train Control System Project.

According to the FCC order "This system would be the largest and most complex land mobile communications system in the world. It would automate rail operations nationwide, enabling railroads to operate more safely, efficiently, and economically. Upon review of the record, we have decided to waive five sections of the Commission's Rules to permit construction and operation of this system.

Vast data handling. The frequencies would be used to transfer large volumes of data between locomotives, work crews and computerized control centers. The information would be analyzed by computer and necessary action would be taken to improve operations or to prevent potential problems. For example, the system mightslow or stop a locomotive, move a switch, or re-routea work crew. Many aspects of the system would be automated, thereby reducing the chance for human error. While the system would have voice capability, it would be used primarily for digital data transfer, so stated the FCC order.

"On a busy line the system might work as follows: At the beginning of a work day the engineer would proceed to the lead locomotive and use a plastic identity card to 'book on' to the system. A computer on the locomotive would display route information such as the location of track work, areas in which the train should reduce speed, railroad cars to be picked up enroute, and the route profile. Before departure, a safety computer at the control center would compare the train's proposed movements to movements approved for other trains throughout the system. The computer at the control center also would check track integrity and switch settings. If no conflicts were found, the control center would authorize the train's movement and download this information by radio to the computer on the locomotive. If necessary, the control center would update or modify this information during the train's route."

Train location too."At frequent intervals during the route, the train's onboard computer would radio the train's location to the control center. The train's computer would also calculate the speed necessary to meet schedules and to ensure safety. If the train were to exceed its desire speed by more than a small margin the engineer would be warned immediately. If the engineer did not apply the brakes, they would be applied automatically. Aside from the apparent safety benefit of this feature of the system, it also would have a major economic benefit. Since power would be cutto trains that were ahead of schedule, the railroad industry estimates that it would save approximately $100 million in fuel costs per year. The communications system would also enable work crews, using portable terminals, to monitor train locations. This would protect them from oncoming trains and allow them to work safely on the tracks."

Large system. AAR has filed 756 license applications for 2,059 land mobile base stations and 30,000 mobile units. Also, AAR intends to file for another 941 base locations.

FCC has waived its rules to permit AAR to use six frequency pairs instead of the five allowed in the rules. ATCS will be permitted to operate the following six frequency pairs in the conventional mode:

(a) 896.8875/935.8875 MHz; (b) 896.9375/935.9375 MHz; (c) 896.9875/935.9875 MHz; (d) 897.8875/936.8875 MHz; (e) 897.9375/936.9375 MHz; and (f) 897.9875/936.9875 MHz.

FCC's Private Radio Bureau will license AAR to use these frequencies.

Also FCC will grant a waiver to permit AAR ten years from the release date of this Order to complete construction of the ATCS and to put the system into full operation.

As for reporting, FCC will permit AAR to file annual reports on construction progress.

Also, FCC will afford AAR an 80 mile zone of protection (rahter than present rule requirement of 70 miles) around each base station location proposed. After the construction period a normal zone of protection shall apply to those base stations that meet the loading requirements. No zone of protection shall be given automatically to those base stations that do not meet loading requirements at the end of the construction period but specific requests will be considered at that time.

The six frequency pairs identified above shall be made available to other compatible users, subject to the conditions discussed in this order.

AAR's implementation schedule indicates that the cumulative number of base stations to be completed by the end of the each year are: 138 in 1988; 290 in 1989; 515 in 1990; 790 in 1991; 1,140 in 1992; 1,540 in 1993; 1,990 in 1994; 2,380 in 1995; 2,740 in 1996; and 3,000 in 1997.

Proceedings available on rail systems technology and operations symposium

Proceedings are now available on the Sept. 14-16, 1987 Mellon Institute symposium on Rail Systems Technology and Operations. The symposium focused on microprocessors in rail transit and was jointly sponsored by the Rail Systems Center, Carnegie-Mellor University and the Office of Technical Assistance of the Urban Mass Transportation Administration.

The symposium addressed a broad range of subjects of vital concern to both transit authorities and their suppliers. Much emphasis was placed on the perceived economic benefits of the technology and the assumed liability which the technology introduces.

For copies of the Proceedings, send $50 check or money order to Mellon Institute, Rail Systems Center, 4400 Fifth Ave., Pittsburgh, PA 15213, attenditon of Pamela Sellitti, Administrative Assistant.

CP and CN rails in Canada may operate cabooseless trains.

In an order dated December 14, 1987, the Railway Transport Committee of the Canadian Transport Commission are permitted to operate trains without cabooses. There are several conditions under which CN and CP must operate these trains.

The order states (abstracted): "A train may be operated without a caboose and with the rear crew located in the cabs of the lead locomotive consist provided the train is equipped with a Digitair II end-of-trin-information system with rear train emergency braking feature and a red flashing marker light operated by an automatic light sensitive cell (switch), and with a distance measuring device where no other distance measuring device is installed on that train, or an equivalent end-of-train information system approved by the Railway Transport Committee, that train hereinafter referred to as a cabooseless train.

"A conductor on a cabooseless train shall be stationed in the operating cab of the lead locomotive.

"No cabooseless train shall be operated for a distance in excess of 60 miles without having passed an operational hot box and dragging equipment detector or without having been inspected on each side of the train by employees referred to in this order* or without having been stopped and inspected."

*Employees referred to include the following: section gang, extra gang, signal gang, welding gang, roadmaster, assistant roadmaster, operator, track patrol employee and other employees or groups of employees, where assigned duties along the right-of-way where a cabooseless train may be moving and where that passing train can be observed, shall be provided with or have immediate access to an operational portable two-way radio capable of communicating with the crew of that passing train.

"Prior to the operation of any cabooseless train all gateway [near yards] hot box and dragging equipment detectors shall be equipped with hot wheel detectors."

Making up train consist. There are requirements concerning the make up of trains. The two provisions have a major exception, namley "Subject to marshalling rules that may be in effect, cars containing dangerous commodities may be marshalled in any location on a cabooseless train if located behind cars that are all equipped with roller bearings."

Subject to rules in effect and the above requirement, "a cabooseless train handling cars containing dangerous commodities shall not have such cars marshalled within 2,000 ft. of the rear of that train where that train ix more than 4,000 ft. in length."

Also "a cabooseless train that is less than 4,000 ft. in length shall be marshalled so that cars containing dangerous commodities are located only wihin 2,000 ft. of the lead locomotive.

"All dimensional loads that would normally be marshalled so that they could be seen by the train crew, cars with loads that are prone to shifting and special loads that should be observed while en route, shall be marshalled as close as possible to the lead locomotive, but shall not be marshalled more than 2,000 ft. from the lead locomotive.

"Each trainman and conductor on a cabooseless train shall be provided with an operational portable two-way radio before leaving a crew change off point. . . . .

"A cabooseless train shall not be permitted to leave a crew change point unless all components of the end-of-train system are properly functioning.

"Where any component of function of an end-of-train-information system fails en route, the cabooseless train shall proceed to the next crew change point at a speed not exceeding 25 mph. . . . .

"For the purposes of conducting a No. 2 and a No. 3 air brake test on a cabooseless train, . . . the end-of-train-information system shall be used to verify that brake pipe continuity exists throughout the train and to determine that the air brake system is responding properly to the application and release of air brakes on the last car of the train.

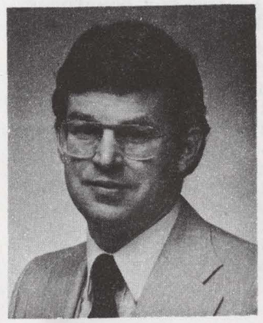
"An indication on the display unit of the end-of-train-information system in the locomotive cab of 60 psi or more brake pipe pressure sensed at the rear car shall be considered to be an indication that the brake system on a cabooseless train is sufficiently charged for conducting a No. 2 or No. 3 air brake test, if all other requirements for those air brak tests are met.

"During a No. 2 or No. 3 air brake test on a cabooseless train and following a full service brake application and release, respective indications on the display unit in the locomotive cab that the brake pipe pressure has decreased and increased at the rear car shall be considered to be a verification that the air brake system has initiated an application and a release of brakes and shall be considered to confirm that the brakes on the rear car have applied and released."

Train length. "The locomotive engineer or the conductor of a cabooseless train shall be provided with a train consist printout for that train which shall indicate the

continued on page 11

Vehicular Electronics



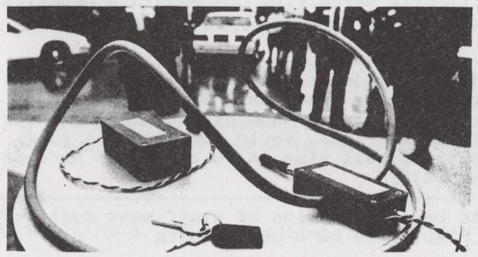
Bill Fleming
Vehicular Electronics Editor

GENERAL MOTORS PRESENTS CONCEPT ELECTRONICS

General Motors announced three new promising electronics concepts [1]. First, car owners may some day soon carry a key fob that includes a microwave transmitter. As the owner approaches the car, the car will receive a radio signal from the key fob and then prepare to welcome them aboard. Doors and/or the trunk will be unlocked, seats and mirrors will be adjusted to the driver's preference, the radio and/or compact disk player will be started, the engine will be started, and the climate control -- cooling, heating, and/or defogging -- will be set and started [1].

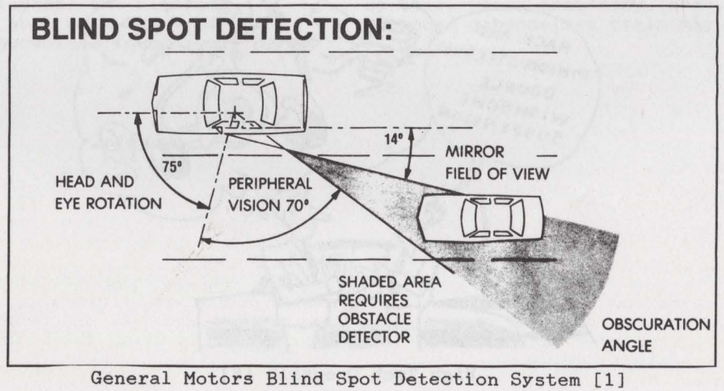
A rearview proximity warning system is a second concept. An audio signal and a dash panel light warn the driver of obstacles such as tricycles, small children, dogs, and hidden vehicles (when driving and approaching a lane change maneuver). A low-strength, low-frequency radar is said to be used to detect the obstacles. GM Hughes Electronics is developing a gallium arsinide microchip specifically for this application [1].

Heads-up displays are also under development [1]. Indeed, the Cutlass Supreme Indy Pace Car that will be introduced in May, 1988, will feature the first U.S. market introduction of a production heads-up display. The display will show vehicle speed and turn signal indicator operation, and the driver can adjust the brightness and the display's vertical position [2].



Electronic Key System Prepares Car To Welcome Driver [1]

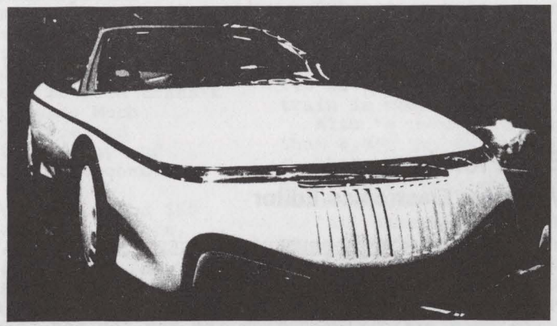
Heads-Up Display To Be Featured On Indy Pace Car [2]



General Motors Blind Spot Detection System [1]

LINCOLN CONCEPT CAR

At the January 16, 1988, Detroit Auto Show; Ford Motor debuted its Lincoln Machete concept vehicle [3]. The car features deployable aero-aids, front and rear, that extend for downforce at highway speeds, and change to drag configuration under braking. The vehicle canopy glass tint changes, due to liquid-crystal technology, according to sunlight brightness. And finally, new "minicube" headlights are used to create unique styling appearance, and provide improved roadway illumination [3].



Lincoln Machete Concept Car [3]

HIGH TECH OVERKILL

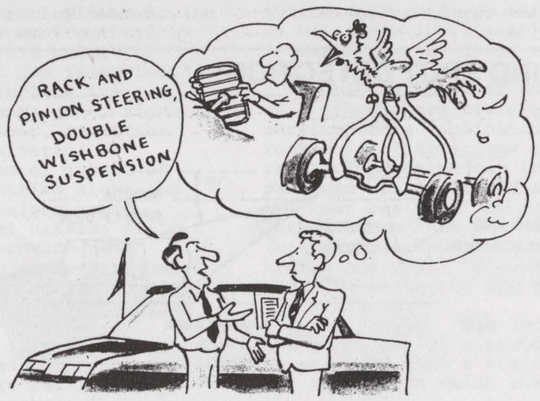
Do you really appreciate all the high tech electronics? Is this what you really want? For example, the emphasis in Japan now is on kansei, i.e., the fusion of man and machine. Japan believes that if they can "humanize" the car, this technological achievement will allow them to leapfrog past the traditional European carmaker powers, such as BMW and Mercedes, and put Japan Inc. at the top [4].

However, there's great risk involved. Consider the new Mitsubishi "Active Four" Galant, recently introduced in Japan [5]. The car features totally integrated: four-wheel-drive, four-wheel-steer, four-wheel self-aligning suspension, and four-wheel anti-lock braking. But the approximate cost of this option package is $4500 at present exchange rates [5].

Another drawback is that consumers sometimes have difficulty perceiving commensurate benefits for these expensive technologies [4]. Still another problem is complexity in terms of maintaining and repairing high-tech systems.

Based on market feedback [6], the average car buyer doesn't understand the high tech features, may be intimidated by high tech talk, or simply dismisses it as "gadgets." For example, all-wheel steer would most benefit the guy in a Chevrolet Caprice -- and he'd be the last guy to want it, maybe because its scary to him [4]. Put it another way. Would you trade in your Rolex on the highest-tech Seiko ever made, even if it could tell time in 16 cities at once and give instantaneous stock quotes 200 meters under water [4]?

If kansei doesn't work out, and high-tech turns out to be a collection of stuff most customers don't want, then another more familiar Japanese word might take on a new meaning -- "kamikaze," instead of "kansei" [4].



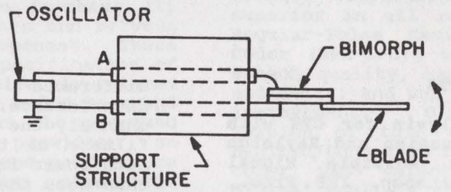
High Tech Overkill [6]

NEW SENSOR CONCEPTS

Bob Hetrick of Ford Motor's Research Staff presented an interesting SAE paper on new types of sensor concepts [7]. Small, piezoelectrically driven, vibrating cantilever blades are used.

A magnetic field sensor was realized by depositing a multi-turn planar coil of aluminum onto the insulating blade's surface. When the blade was driven at a cantilever resonance frequency (at 1-to-3 kHz), in the presence of a magnetic field, an ac voltage proportional to the field strength was induced in the coil. Its operation is analogous to an ac generator (i.e., it operates like a vibrating magnetometer).

In a gas-sensitive sensor configuration, an air gap is established by placing the blade of the cantilever a few millimeters from a high-displacment vibrating piezoelectric generator. When the generator is driven at the resonance frequency of the detection blade, acoustic coupling of the gap gas determines the resultant amplitude of the blade. The induced vibration of the blade is "read out" via a piezoelectric detector element attached to the base of the blade. Gas composition is sensed by monitoring amplitude of the blade [7].



Essential Elements of New Sensor Concepts [7]

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1. R. Rowand, "GM Plans Wonders for Future," Automotive News, February 29, 1988, p.16.

2. "Heads-Up: Oldsmobile Plots a World Coup," Autoweek, February 29, 1988, p.5.

3. K. Wilson, "Daydreaming In Detroit," Autoweek, February 1, 1988, pp. 26-27.

4. B. Lovell and G. Levy, "Japan's Changing Target," Autoweek, January 4, 1988, pp. 20-24.

5. R. Schreffler, "Going Active Four Image," Automotive Industries, February 1988, pp. 50-51.

6. G. Witcher, "Car Ads Turn To High-Tech Talk -- But Does Anybody Understand It?," The Wall Street Journal, March 7, 1988, Section 2, p. 21.

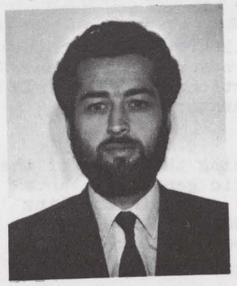
7. R. Hetrick, "New Sensor Concepts Using Vibrating Cantilevers," SAE Paper 880556, presented at the International Congress, Detroit, MI, February 29, 1988, SAE Publication SP-737, pp. 83-87.

TRANSPORTATION SYSTEMS -- continued from page 8

total length of that train in feet with slack fully extended.

"A means to calibrate the distance measuring device, such as a measured distance, on a cabooseless train shall be provided at each crew change off point where a cabooseless train may be operated so that, where necessary, that device on an outbound cabooseless train may be calibrated."

Communications



J. R. Cruz
Communications Editor

ABSTRACTS

"Error Probability Analysis for CPM with Linear Detection on Gaussian and Rayleigh Fading Channels with Multiple Signal Interference," A. Svensson, IEE Proc., Vol. 134, Pt. F, No. 7, December 1987.

Binary continuous phase modulations with constant amplitude (CPM) with modulation index 1/2 have been shown to provide both good spectral and error probability properties. These modulations can also be detected with a very simple linear detector, which can be implemented simply at high speeds. This can be done with only a minor degradation in error performance. The linear detector can be implemented both as a serial and as a parallel detector, and these have slightly different sensitivity to errors in bit timing and phase synchronization. In the paper we study the effects of multiple interfering signals on both these linear detectors for CMP. Coherent detection is assumed, and both Gaussian and slow Rayleigh fading channels are considered. Analytical formulas are derived on both channels, where only a single integral has to be calculated numerically. This formula can also easily be used for detector filters with impulse response of long time duration. It is shown that the difference in performance due to the number of interferers is small, when the total interference power is kept constant. Further, it is shown that the performance is improved by several decibels for the longer asymptotically optimum filters in adjacent channel interference. As one would expect, the smoothed phase modulations have significantly larger tolerances against adjacent channel interference, while the difference is small in cochannel interference. On the Rayleigh fading channel, the longer asymptotically optimum filters on the Gaussian channel lead to much lower irreducible error probabilities than does the MSK filter; a decrease by a factor of as much as 10 has been found.

"Effects of Correlated Fading on Level Crossing Rates and Average Fade Durations with Predetection Diversity Reception," F. Adachi, M.T. Feeney, and J.D. Parsons, IEE Proc., Vol. 135, Pt. F, No. 1, February 1988.

General expressions for the level crossing rate (LCR) and average fade duration (AFD) are obtained for several diversity combining schemes employing two-branch predetection reception of correlated Rayleigh fading signals. These expressions are obtained from joint and conditional probability density functions (PDFs) of the received signals, and lead to a unified treatment. This simplified method contrasts with the characteristic function approach used in previous investigations. Numerical results are presented for a space-diversity system using horizontally spaced antennas at a mobile station. It is shown that while the angle between the antenna axis and the direction of vehicle motion does not appear in the cumulative distribution function (CDF) of the combined output signal envelopes, it affects the LCR and AFD when the two fading signals are correlated. When the two antennas parallel with the direction of vehicle motion are used, the LCR can be reduced below the value obtainable from signals which fade independently. When the two antennas are perpendicular to the direction of vehicle motion, the AFD is loosely dependent on the antenna spacing and, provided the antenna spacing is not too small, is approximately half that for the no-diversity case.

"ENCAP-4: an OQPSK-type Modulation Technique for Digital Radio," A.M. Gusmao, and N.L. Esteves, IEE Proc., Vol. 135, Pt. F, No. 1, February 1988.

A class of OQPSK-type signals (offset quadrature phase shift keyed) is defined which generalizes several well known modulation formats. These signals are generated by means of a set of encoding rules which introduce a controlled amount of correlation between the in-phase (I) and quadrature (Q) components and between signal elements in each component. These encoding rules imply the specification of four generating functions directly related to the eye diagram of the I and Q baseband signals. It is shown that the proposed signal representation provides an efficient means of design and performance evaluation. Advantageous trade-offs between spectral efficiency and power efficiency can be achieved with some of the proposed signals, making them suitable for digital radio applications.

"CCITT Standards on Digital Speech Processing," M. Decina, and G. Modena, IEEE J. Select. Areas Comm., Vol. 6, No. 2, February 1988.

This paper gives an overview of CCITT activities on speech processing standards for evolving digital communications networks. Such standards apply to worldwide interconnected digital networks and provide for adequate voice and non-voice quality as assessed by the leading laboratories and experts in the world telecommunications community. Current status of standards is briefly discussed and perspectives are given on results to be achieved by the end of the present CCITT Study Period (1984-1988).

"Evaluation of Six Medium Bit-Rate Coders for the Pan-European Digital Mobile Radio Systems," J.E. Natvig, IEEE J. Select. Areas Comm., Vol. 6, No. 2, February 1988.

A digital cellular mobile radio system has been under development in Europe since 1982 under the coordination of the working group CEPT GSM (Groupe Speciale Mobile). In a recent coordinated experiment, listening opinion tests were performed on the speech output of six candidate 16 kbit/s speech coding schemes for this system. The experiment comprised one regular-pulse excited coder, one multipulse excited coder, and four subband coders.

A laboratory session was hosted by CSELT (Italy) and subjective tests were performed in seven different laboratories. For comparison purposes, test conditions from a companded cellular FM system currently in operation were included in this experiment.

The six codecs were compared in terms of subjective quality, transmission delay, and ease of implementation. In this overall comparison, no single codec was superior in all respects. However, the Regular-Pulse Excited Linear Predictive Coder (RPE-LPC), which provided the best speech quality, had acceptable complexity and delay, and was singled out for further improvement. Ultimately, an improved version of this codec, a Regular-Pulse Excited/Long Term Prediction LPC (RPE-LTP) coder was selected for the European digital mobile system.

"Speech and Channel Coding for Digital Land-Mobile Radio," M.J. McLaughlin, and P.D. Rasky, IEEE J. Select Areas Comm., Vol. 6, No. 2, February 1988.

Toward the goal of providing digital radio services, this paper describes the joint development of a medium bit rate speech coder along with an effective channel coding technique to provide a robust, spectrally efficient, high quality mobile communication system. The speech coder employed is a subband coder operating at 12 kbit/s which, in the absence of channel errors, provides speech quality comparable to current analog land-mobile radio systems. In addition, the subband coder design incorporates a unique coding of the side information to facilitate the use of forward error-correction coding without the need to code the entire bit stream. The use of excessive overhead for redundancy is avoided while still mitigating the harsh effects of frequent channel errors. These techniques have been employed in an experimental FDMA digital land-mobile radio system. The combined speech and channel coder operates at 15 kbit/s and provides intelligible speech at fading channel error rates up to 8 percent.

"An Error Protected 16 Kbit/s Voice Transmission for Land Mobile Radio Channel," H. Suda, T. Miki, IEEE J. Select. Areas Comm., Vol. 6, No. 2, February 1988.

In mobile radio channels, decoded speech signals suffer severe degradation from multipath fading. Therefore, introducing a robust speech coding and an efficient error correction coding is indispensable for toll quality voice transmission in mobile radio. A design procedure for the Bit Selective Forward Error Correction (BS-FEC) scheme is proposed as a promising solution to this problem, and backward-type prediction speech coding is shown to be more robust against transmission errors than forward-type prediction. Combinations of BS-FEC (channel coding) and backward-type prediction speech coding are designed, and improvements in SNR's of transmitted voice signals are examined. Simulation results show that BS-FEC can provide good speech quality even at a bit error rate (BER) of 10^{-2} in Rayleigh fading environments, at the cost of a slight degradation in SNR at low BER's.

February 1, 1988

PROPOSED CONSTITUTION

FOR

IEEE VEHICULAR TECHNOLOGY SOCIETY

Article I

Name and objective

Section 1. This organization shall be known as the Vehicular Technology Society of the Institute of Electrical and Electronics Engineers, Inc. (IEEE-VTS).

Section 2. Its objective shall be scientific, literary, and educational in character. The Society shall strive to advance the theory and practice of electro-technology engineering and of the allied arts and sciences, with specific application to vehicular systems, and the maintenance of a high professional standing among its members.

Section 3. The Society shall promote close cooperation and exchange of information among its members and shall hold meetings for the presentation of papers and their discussion, and through its committees shall study and provide for the needs of its members.

Section 4. The Society will conduct its affairs according to the Constitution and Bylaws of the IEEE and of this Society.

Article II

Fields of Interest

Section 1. The fields of interest of the Society are the theoretical, experimental and operational aspects of electrical and electronics engineering in mobile radio, motor vehicles and land transportation.

(a) Mobile radio shall include all terrestrial mobile services.

(b) Motor vehicles shall include the components and systems and motive power for propulsion and auxiliary functions.

(c) Land transportation shall include the components and systems used in both automated and non-automated facets of ground transport technology.

Article III

Membership

Section 1. Membership in the Society shall be available only to members of the IEEE in any grade, including Students.

Section 2. Affiliates may participate in the Society as provided by the IEEE Bylaws and any additional limitations imposed by the Society Bylaws.

Article IV

Financial Support

Section 1. The Society shall collect from its members and Affiliates an annual fee in accordance with the IEEE Bylaws.

Section 2. The Society may raise revenues by advertising, exhibits, requests for contributions and charges for sending notices to non-Society members provided such means are consistent with IEEE Bylaws. Any revenue means not explicitly covered by IEEE rules must be approved by the General Manager of the IEEE before being adopted by the Society.

Article V

Administration

Section 1. The Society shall be managed by an Administrative Committee (AdCom) of 15 elected members of the Society, which shall be known as the Board of Governors.

Section 2. Sub-entities of the Society shall be prescribed in the Society Bylaws.

Section 3. The terms of the members of the Board of Governors shall be for 3 years, 5 members to be elected each year.

Section 4. The Board of Governors shall elect from its membership the governing officers as specified in the Society Bylaws, which will include the election of the Society President. The Society President shall be Chairman of the Board of Governors and shall be a member of the IEEE Technical Activities Board.

Section 5. The duties and responsibilities of the officers shall be specified in the Society Bylaws.

Section 6. The Board of Governors shall have the responsibility for managing all aspects of the Society including the establlishment of Society policies to the extent which is authorized by the IEEE Constitution, Bylaws and Policies.

Section 7. The Board of Governors shall utilize the services of IEEE Headquarters as bursar for all or part of Society funds, as provided by the IEEE Bylaws. If any part of the Society funds are received and deposited separately, the terms and conditions shall be in accordance with IEEE policies and Society Bylaws and subject to any special conditions of the Board of Governors.

Section 8. Neither the Vehicular Technology Society nor any officer or member thereof shall have authority to contract debts for, pledge the credit of, or in any way bind the IEEE or the Vehicular Technology Society, except within the terms of previously approved budgets.

Article VI

Meetings, Conferences, Conventions and Related Business

Section 1. The Society may hold meetings, conferences, symposia or conventions either alone or in cooperation with Sectional, Regional or other convention committees of the IEEE or other not-for-profit organizations, subject to the IEEE Bylaws. The Society shall sponsor at least one technical conference of major scope each year.

Section 2. Meetings, conferences or conventions of the Society shall be open on an equal basis to all members of the IEEE. The Society shall not sponsor or co-sponsor a meeting which is subject to security clearance. The registration fee for members and non-members shall be in accordance with IEEE policies.

Article VII

Publications

Section 1. Publications undertaken by the Society shall be subject to IEEE policies and to any further guidance or controls prescribed by the Board of Governors or its duly appointed committees. The Society shall be responsible for the financial aspects of its publication program.

Section 2. The President, with the consent of the Board of Governors, shall appoint such editors as may be required to implement the publication program. The duties of an editor shall be prescribed in the Society Bylaws.

Article VIII

Amendments

Section 1. Amendments to this Constitution may be initiated by a petition submitted by at least 50 voting members of the Society or by an affirmative vote of at least 10 members of the Board of Governors. Proposed amendments to the Constitution brought by petition do not require further approval by the Board of Governors.

Section 2. Approved or petitioned amendment proposals must be submitted to the IEEE Executive Committee for approval. If so approved, the proposed amendment will be published in the Society Transactions and/or Newsletter, or otherwise publicized by direct mailing to the membership, with notice that it goes into effect unless 50 or more Society members object in writing within 30 days. If such objections are received, a copy of the proposed amendment shall be mailed with a ballot to all voting members of the Society at least 30 days before the date appointed for return of the ballots, and the ballots shall carry a statement of the time limit for their return to the IEEE office. Approval of the amendment by at least two-thirds of the members voting shall be necessary for its enactment.

Section 3. Amendment of the Society Bylaws may be initiated by a petition signed by at least 50 voting members of the Society or by a member of the Board of Governors of the Society.

Section 4. Proposed amendments to the Society Bylaws must be mailed to each member of the Board of Governors at least 20 days prior to a scheduled meeting of the Board of Governors and receive at least 10 affirmative votes to be adopted.

Section 5. Adopted amendments will not be enacted until at least 30 days subsequent to publication in the Society Newsletter.

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October, 1969

Approved: 3-6-52
Amended: 4-12-55 4-27-61
6-13-57 3-18-67
7-13-60 11-11-67
10-15-69

CONSTITUTION
FOR
IEEE VEHICULAR TECHNOLOGY GROUP

Article I
Name and Object

Section 1. This organization shall be known as the IEEE Vehicular Technology Group of the Institute of Electrical and Electronics Engineers, Inc.

Section 2. Its objects shall be scientific, literary, and educational in character. The Group shall strive for the advancement of the thoery and practice of electro-technology engineering and of the allied arts and sciences, and the maintenance of a high professional standing among its members, all in consonance with the Constitution and Bylaws of the IEEE and with special attention to such aims within the field of interest of the Group as are hereinafter defined.

Section 3. The Group shall aid in promoting close cooperation and exchange of technical information among its members and to this end shall hold meetings for the presentation of papers and their discussion, and through its committees shall study and provide for the needs of its members.

Article II
Field of Interest

Section 1.0 The field of interest of the Group shall concern itself with vehicular communications and electrical and electronic engineering, defined as follows:

(a) Vehicular communications shall include all land, airborne and maritime mobile services as well as portable or hand carried and citizen's communications services, when used as an adjunct to a vehicular system.

(b) Vehicular electrical and electronic engineering shall include equipment and systems ordinarily identified with the automotive industry, excluding systems associated with public transit.

Article III
Membership

Section 1. Membership in the Group shall be available only to members of the IEEE in any grade, including students, having a professional interest in any phase of the field of interest of the Group.

Section 2. Affiliates may participate in the Group activities, as provided by the IEEE Bylaws and subject to the applicable IEEE rules and regulations and any additional limitations imposed by the Group's Bylaws.

Article IV
Financial Support

Section 1. The Group shall collect from its members an annual assessment or fee, in accordance with the IEEE Bylaws and applicable rules and regulations. The amount of the fee shall be prescribed in the Bylaws.

Section 2. The Group may raise revenues by other means, such as advertising, shows, requests for contributions, and charges for sending out notices to non-Group members, provided such means are consistend with applicable IEEE rules and regulations, and do not encroach on revenue fields of prior established Groups or Sections. Any new revenue means not explicitly covered by IEEE rules and regulations must be approved by the General Manager before being adopted by the Group.

Article V
Administration

Section 1. The Group shall be managed by an Administrative Committee of 15 elected members of the Group.

Section 2. Sub-groups may be formed as provided in the IEEE Bylaws. The nature of such sub-groups and the supervision of sub-group affairs, if other than by the Administrative Committee, shall be prescribed in the Group's Bylaws.

Section 3. The terms of the 15 members-at-large of the Administrative Committee shall be for three years, 5 members to be elected each year.

Section 4. The Administrative Committee shall elect annually from its membership a Chairman, Vice-Chairman and Treasurer whose term of office shall be for one year. They may be reelected except that a Chairman may not be reelected for more than two consecutive terms.

Section 5.0 The Chairman with the approval of the Administrative Committee shall appoint a Secretary who does not have to be an elected member of the AdCom. The Secretary shall not have the right to vote, if he is not a member of AdCom.

Section 6. The duties and responsibilities of the officers shall be as defined hereunder and in the Bylaws.

Section 7. The Administrative Committee shall have control of the affairs and property of the Group and shall fix its policies. It shall have power to hold meetings, appoint Committees, and take all necessary and proper steps to carry out the principles and field of interestof the Group, and to promote its best interest.

Section 8. The Chairman, under direction of the Administrative Committee, shall have general supervision of the affairs of the Group. He shall preside at meetings of the Administrative Committee, at general meetings of the Group, and at the "Annual Meeting of the Group", and have such other powers and perform such other duties as may be provided in the Group Bylaws, or as may be delegated to him by vote of the Group Administrative Committee. In his absence or incapacity, his duties shall be performed by the Vice-Chairman. In the absence of both the Chairman and Vice-Chairman, the Treasurer shall preside and assume the duties of the Chairman.

Section 9. The Chairman shall be an ex-officio member of all Committees of the Group. He is a member of the IEEE Technical Activities Board and when notified of a meeting of said Board, he shall take appropriate steps to provide representation of the Group at such meeting.

Section 10.0 The Administrative Committee may establish standing or ad hoc committees as prescribed in the Bylaws, including both functional committees and technical committees. Technical Committees may be established as needed to develop specific areas of the field of interest. A Vehicular Systems Standards Committee may be established in support of the Institute Standards Committee. It's membership and objectives will be established by the AdCom. All appointments to committee and similar posts will be for a term of one year or until successors are appointed.

Section 11. The Administrative Committee may utilize, the services of Headquarters as bursar, for all or part of the Group funds, as provided by the IEEE Bylaws and rules and regulations. If any part of the Group funds are received and deposited separately, the terms and conditions shall be in accordance with IEEE policies and subject to the provisions of the Group Bylaws and to any special limitations imposed by the Administrative Committee.

Section 12. Neither the Vehicular Technology Group, nor any officer, member or representative thereof, shall have authority to contract debts for, pledge the credit of, or in any way bind the IEEE or the Group, except within the terms of previously approved budgets.

Article VI
Nomination & Election of Administrative Committee

Section 1. The nominating procedure shall include provision for petition by Group members to place a name on the ballot.

Section 2. Election of the 15 members-at-large of the Administrative Committee, shall be as prescribed in the Bylaws.

Section 3. If a vacancy occurs among the members of the Administrative Committee, such vacancy shall be filled for the unexpired term by the Administrative Committee.

Article VII

Section 1. The Group may hold meetings, conferences, symposia, or conventions either alone or in cooperation with Sectional, Regional, or the Convention Committee of the IEEE, or other technical organizations, subject to IEEE rules and regulations. The Group shall sponsor at least one technical conference of major scope each year, which may be held during the International Convention, or during some other IEEE meeting, or as a separate conference.

Section 2. Meetings, Conference or Conventions of the Group shall be open on an equal basis to all members of the IEEE. The Group may not sponsor or cosponsor a meeting which is subject to security clearance.

Section 3. The Administrative Committee shall hold at least two meetings per year at times and places specified by the Administrative Committee. Special meetings of the Committee may be called by the Chairman at his own discretion or upon request of five other members of the Committee with at least 20 days notice.

Section 4. Eight members of the Administrative Committee shall constitute a quorum.

Section 5. Business of the Administrative Committee may be handled by correspondence, telephone, or telegraph where in the opinion of the Chairman matters requiring action can be adequately handled in that manner. A majority vote of the voting members of the Committee is necessary for approval of actions handled in this matter, unless otherwise provided.

Article VIII
Publications

Section 1. Publications undertaken by the Group shall be subject to IEEE policies and to any further guidance of controls prescribed by the Administrative Committee or its duly appointed committees. The Group shall be responsible for the financial aspects of its publication program.

Section 2. The Chairman, with the advice and consent of the Administrative Committee, shall appoint such editors as may be required to implement the publication program. The duties of an editor, and his compensation, if any, shall be prescribed in the Bylaws.

Article IX
Amendments

Section 1. Amendments to this Constitution may be initiated by petition submitted by at least fifty members of the Group or by the Administrative Committee, such petition being submitted to the IEEE Technical Activities Board, and to the Executive Committee of the IEEE for approval. After such approval, the proposed amendment shall be mailed with a ballot to all members of the Group at least 30 days before the date appointed for return of the ballots, and the ballots shall carry a statement of the time limit for their return to the IEEE office. Approval of the amendment by at least two-thirds of the members voting shall be necessary for its enactment.

Section 2. Suitable Bylaws, and amendments thereto, may be adopted by a two-thirds vote of the Administrative Committee present in meeting assembled, provided that notice of the proposed Bylaw, or amendment, has been sent to each member of the Administrative Committee at least 20 days prior to such meeting. No Bylaw, or amendment, shall take affect until it has been published and has been mailed to the Technical Activities Secretary of the IEEE, and approved by the General Manager of IEEE has been obtained.

IEEE VTS
Vehicular Technology Conference VTC-88
June 15-17, 1988

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1800 Market Street
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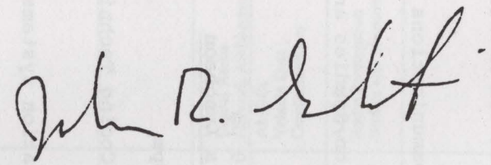
The 1988 Vehicular Technology Conference is being hosted in historic Philadelphia, Pennsylvania on June 15-17. I believe this upcoming conference will prove informative and should allow for informal discussion among those attending. Many of our presentations will outline future technologies, while others will review innovative new ideas which are currently impacting our marketplaces.

The conference will feature over 100 technical papers on various topics of interest, half of which will be international in scope. Many of the presentations will focus on the next generation of cellular technology which, given recent FCC rulemaking proposals and current market demands, should be of interest to all.

In addition, special evening programs, of a more relaxed nature, will be available to those interested. Even with this expanded schedule, I am sure there will be adequate time to enjoy some of the fine restaurants in the downtown area, the site of another conference some two hundred years ago that made history. I can't promise that our conference will be equally historic but I hope you'll join us anyway.

I have found our past gatherings to be enjoyable and of great benefit. I look forward to meeting some of the new faces in our industry and to renewing old acquaintances. See you in Philadelphia.



John R. Galanti
Conference Chairman

kam

PRELIMINARY PROGRAM SCHEDULE

WEDNESDAY JUNE 15

AM 8:30am - 12:00noon

DCT-01
.Channel Coding Techniques-Trellis and Punctured Convolutional Codes

DNA-01
.Digital Radio Network Architectures

AMS-01
.Vehicle Data Communications

AAP-01
.Radio Propagation Studies and Measurements

12:00 noon - 1:30 pm
Keynote Speaker's Luncheon

PM 1:30pm - 5:00pm

DCT-02
.Digital Speech Coding Techniques

CSD-01
.Mobile Communication Systems Design

AAP-02
.Radio Propagation Characteristics and Models

AET-01
.Automotive Electronics and Transportation Systems

7:00pm - 9:00pm
Evening Panel Sessions
"Cellular Technology in the 90's - A Prospective from Outside the U.S."

THURSDAY JUNE 16

AM 8:30am - 12:00noon

DCT-03
.Digital Channel Modulation and Detection Techniques

DMC-01
.Digital Mobile Communications - CDMA and TDMA Systems

AAP-03
.Antennas and Two-Way Signal Boosters

PPM-01
.Mobile Communications Systems - Performance Predictions, Analysis and Simulation Tools

12:00 noon - 1:30
Awards Luncheon

PM 1:30pm - 5:00pm

DCT-04
.Synchronization Techniques for Digital Mobile Systems

DMC-02
.Digital Mobile Communications - Packet Switching and Access Protocols

AMS-02
.Satellite Communications

TBD-01
.Base Station and Terminal Equipment Design

7:00pm - 9:00pm
Evening Panel Sessions
"Future Cellular Service Opportunities - The Service Provider's Prospective"

FRIDAY JUNE 17

AM 8:30am - 12:00noon

DCT-05
.Error Correction Codes and Protocols for Digital Mobile Systems

DMC-03
.Digital Mobile Communications Systems

TBD-02
.Vehicle Terminal and Portable Equipment Design

PPM-02
.Mobile Communications Systems-Performance, Analysis, & Field Results

PM 1:30pm - 5:00pm

DCT-06
.Modulation and Detection Techniques

CSD-02
.Spectral Efficiency in Digital Mobile Radio Systems

AMS-03
.Vehicle Location Techniques

PPM-03
.Mobile Communications Systems - Performance Improvement Techniques and Evaluation Tools

THEME/TRACK	Wednesday, June 15, 1988		Thursday, June 16, 1988		Friday, June 17, 1988	
	8:30 am-12 noon	1:30pm - 5:00 pm	8:30am-12 noon	1:30pm-5:00 pm	8:30am-12 noon	1:30pm-5:00pm
Digital Cellular RF Channel Technology (DCT)	DCT-01 Channel Coding Techniques-Trellis and Punctured Convolutional Codes	DCT-02 Digital Speech Coding Techniques	DCT-03 Digital Channel Modulation and Detection Techniques	DCT-04 Synchronization Techniques for Digital Mobile Systems	DCT-05 Error Correction Codes and Protocols for Digital Mobile Systems	DCT-06 Modulation and Detection Techniques
Digital Mobile Communications Systems (DMC)			DMC-01 Digital Mobile Communications - CDMA and TDMA Systems	DMC-02 Digital Mobile Communications - Packet Switching and Access Protocols	DMC-03 Digital Mobile Communications Systems	
Mobile Communication Systems Design (CSD)		CSD-01 Mobile Communication Systems Design				CSD-02 Spectral Efficiency in Digital Mobile Radio Systems
Digital Radio Network Architectures (DNA)	DNA-01 Digital Radio Network Architectures					
Advanced Mobile Communications Services (AMS)	AMS-01 Vehicle Data , Communications			AMS-02 Satellite Communications		AMS-03 Vehicle Location Techniques
Antennas and Propagation (AAP)	AAP-01 Radio Propagation Studies and Measurements	AAP-02 Radio Propagation Characteristics and Models	AAP-03 Antennas and Two-Way Signal boosters			
Vehicle Terminal Base Station Equipment Design (TBD)				TBD-01 Base Station and Terminal Equipment Design	TBD-02 Vehicle Terminal and Portable Equipment Design	
Mobile Communications Systems - Planning and Performance Measurement (PPM)			PPM-01 Mobile Communications Systems-Performance Predictions, Analysis and Simulation Tools		PPM-02 Mobile Communications systems-Performance, Analysis, & Field Results	PPM-03 Mobile Communications Systems-Performance Improvement Techniques and Evaluation Tools
Automotive Electronics and Transportation Systems (AET)		AET-01 Automotive Electronics and Transportation Systems				

Technical Program

CHANNEL CODING TECHNIQUES
TRELLIS AND PUNCTURED CONVOLUTIONAL CODES
(DCT-01)

SESSION CHAIRMAN: G. I. ZYSMAN

TIME: WEDNESDAY, JUNE 15
8:30 A.M. - 12:00 NOON

ON OPTIMAL DETECTION OF NON-COHERENT TRELLIS CODED MODULATION SIGNALS; D. Makrakis, P. Mathiopoulos, and K. Feher; University of Ottawa, Ottawa, Ontario, Canada

TRELLIS DECODING OF LINEAR BLOCK CODES USING RECEIVED SIGNAL ENVELOPES IN DIGITAL MOBILE RADIO; T. Matsumoto; NTT Radio Communicaton System Laboratories, Yokosuka, Japan

PERFORMANCE OF TRELLIS ENCODED TAMED FREQUENCY MODULATION; F. Morales-Moreno, New Jersey Institute of Technology, Newark, N.J., U.S.A.; W. Holubowicz, Polytechnic University, Brooklyn, N.Y., U.S.A; and S. Pasupathy, University of Toronto, Ontario, Canada

IMPROVED STRUCTURES FOR TRELLIS CODED AND DIFFERENTIALLY DETECTED SYSTEMS; D. Makrakis, A. Yongacoglu, and K. Feher; University of Ottawa, Ottawa, Ontario, Canada

THE PERFORMANCE OF RATE-COMPATIBLE PUNCTURED CONVOLUTIONAL CODES WITH VITERBI DECODING FOR MOBILE RADIO CHANNELS; C-E. W. Sundberg and N. Seshadri, AT&T Bell Laboratories, Murray Hill, N.J., U.S.A., and J. Hagenauer, DFVLR, Oberpfaffenhofen, West Germany.

VEHICLE DATA COMMUNICATIONS
(AMS-01)

TIME: WEDNESDAY, JUNE 15
8:30 A.M. - 12:00 NOON

PERFORMANCE ANALYSIS OF A PACKETIZED DATA COMMUNICATION SYSTEM ON MOBILE RADIO CHANNELS; Y. Yao and A. Sheikh, Carleton University, Ottawa, Canada

THE PERFORMANCE OF 16-QAM AND 32-QAM FOR VHF/UHF MOBILE RADIO USING FIR-BASED FADING CORRECTION TECHNIQUES; P. Martin, A. Bateman, and J. McGeehan, University of Bristol, Bristol, England.

MOBILE DATA LINK FIELD TRIALS: AN EVALUATION OF ATCS; A. Sheikh, Lapp-Hancock Associates, Ottawa, Canada, and J. Kraav and W. Marcos, Canadian Pacific Rail, Montreal, Canada

FACSIMILE SIGNAL TRANSMISSION IN DIGITAL MOBILE RADIO; S. Ito, T. Miki, and F. Adachi, NTT Electrical Communications Laboratories, Yokosuka, Japan

IMPROVED FFSK MOBILE DATA TRANSMISSION; J. Bustillo, Telettra Espanola, Torrejon de Ardoz, Madrid, Spain.

TELE-TERMINAL SYSTEM; M. Wakao and N. Murayama, Research & Development Center for Radio Systems, Tokyo, Japan; K. Watanbe and T. Shimizu, NEC Corporation, Kanagawa, Japan; K. Noguchi, Toshiba Corporation, Tokyo, Japan; Y. Nagane, Matsushita Comm. Ind. Co., Ltd., Yokohama, Japan; T. Ogawa, Fujitsu Limited, Kawasaki, Japan; and M. Ono, Mitsubishi Elec. Corp., Amagasak Kita, Japan.

DIGITAL RADIO NETWORK ARCHITECTURES
(DNA-01)

TIME: WEDNESDAY, JUNE 15
8:30 A.M. - 12:00 NOON

RADIO ACCESS PROTOCOLS OF THE NEW DIGITAL GSM PLAN; W. Fuhrmann, German Telepost Consulting, Ltd., Bonn, West Germany, and A. Eizenhofer, PKI

PERFORMANCE EVALUATION OF THE NETWORK ARCHITECTURE OF THE EUROPEAN MOBILE COMMUNICATION SYSTEM; R. Thomas, Centre National D'Etudes Des Telecommunications/PAA/RDS/RCM, Issy Les Moulineaux, Paris, France and M. Mouly, LCT, Velizy-Villacoublay, France

BROADBAND NETWORKS FOR LAN AND RADIO APPLICATIONS; A. Glass and R. Brewster, University of Aston, Birmingham, England.

PERSONAL TELECOMMUNICATIONS - THE NEED FOR MULTIPLE AIR INTERFACES; A. Urie and R. Coutts, Telecom Australia Research Laboratories, Clayton, Victoria, Australia

NETWORKING - A KEY TO THE SUCCESS OF CELLULAR; H. Lundqvist, Ericsson Radio Systems, Stockholm, Sweden

DESIGN OF AN INTEGRATED VOICE/DATA MOBILE RADIO SYSTEM; H. Stern, ElectroCom Automation, Inc., Arlington, Texas, U.S.A.

RADIO PROPAGATION STUDIES
AND MEASUREMENTS
(AAP-01)

TIME: WEDNESDAY, JUNE 15
8:30 A.M. - 12:00 NOON

RADIO PROPAGATION STUDIES IN A SMALL CITY FOR UNIVERSAL PORTABLE COMMUNICATIONS; D. Devasirvatham, Bell Communications Research, Red Bank, New Jersey, U.S.A.

WIDEBAND MULTIPATH PROPAGATION MEASUREMENTS FOR DIGITAL MOBILE RADIO APPLICATIONS; R. Lorenz, Forschungsinstitute der Deutschen Bundespost, West Germany and P. Kartaschoff, PTT Research and Development, Bern, Switzerland

A COMPARISON OF POINT-TO-POINT COMPUTER-AIDED RADIO PROPAGATION MODELS WITH FIELD TEST DATA; T. Sheive, C. Chang, and C. Hsu, ElectroCom Automation, Inc., Arlington, Texas, U.S.A.

COMPARISON OF MULTIPATH DELAY CHARACTERISTICS WITH BER PERFORMANCE OF HIGH SPEED DIGITAL MOBILE TRANSMISSION; T. Takeuchi, F. Ikegami, S. Yoshida, and N. Kikuma, Kyoto University, Kyoto, Japan

PROPAGATION AND BIT ERROR RATE MEASUREMENTS IN THE MILLIMETRE-WAVE BAND ABOVE 60 GHz; A. Tharck and J. McGeehan, University of Bristol, Bristol, England

DIGITAL SPEECH CODING TECHNIQUES
(DCT-02)

TIME: WEDNESDAY, JUNE 15
1:30 P.M. - 5:00 P.M.

ENHANCED ASET VOICE CODING - ALGORITHM AND IMPLEMENTATION; B. Mazor, D. Veeneman, D. Borkowski, and T. Cao, GTE Laboratories, Inc., Waltham, Massachusetts, U.S.A.

VARIABLE-RATE EMBEDDED SUB-BAND SPEECH CODING AND MATCHED CONVOLUTIONAL CHANNEL CODING FOR MOBILE RADIO CHANNELS; J. Hagenauer, DFVLR, Oberpfaffenhofen, West Germany, and N. Seshadri and C-E. Sundberg, AT&T Bell Laboratories, Murray Hill, New Jersey, U.S.A.

LOW BIT RATE SPEECH FOR THE FUTURE PAN-EUTOPEAN DIGITAL CELLULAR MOBILE TELECOMMUNICATIONS SYSTEM (GSM SYSTEM); G. de Brito, Centre National d'Etudes des Telecommunications, Issy les Moulineaux, Paris, France.

SPEECH CODING QUALITY MEASUREMENTS; K. Swaminathan, AT&T Bell Laboratories, Whippany, New Jersey, U.S.A.

USE OF ERROR-CONTROL CODING AND ANTENNA DIVERSITY TO IMPROVE PERFORMANCE OF SUB-BAND CODING; V. Varma and L. Chang, Bell Communications Research, Red Bank, New Jersey, U.S.A.

CONTROLLED ADAPTIVE PREDICTION DELTA MODULATION IN MOBILE RADIO VOICE COMMUNICATIONS; C-C. Huang, General Electric Company, Schenectady, New York, U.S.A.

RADIO PROPAGATION CHARACTERISTICS
AND MODELS
(AAP-02)

TIME: WEDNESDAY, JUNE 15
1:30 P.M. - 5:00 P.M.

DELAY SPREAD AND TIME DELAY JITTER FOR UHF INDOOR PROPAGATION; T.S. Rappaport, Virginia Polytechnic Institute, Blacksburg, Virginia, U.S.A.

OPERATIONAL CONSIDERATIONS IN THE SELECTION OF PROPAGATION MODELS FOR LAND MOBILE RADIO PLANNING; J. P. Murray, John Murray Associates, Boulder, Colorado, U.S.A.

ERROR FLOORS IN DIGITAL MOBILE RADIO SYSTEMS DUE TO SELECTIVE FADING; D. Subasinghe and K. Feher, University of California, Davis, California, U.S.A.

MULTIPATH DELAY MEASUREMENTS USING PARALLEL PROCESSING; S. Huse and S. S. Soliman, Southern Methodist University, Dallas, Texas, U.S.A.

LONG TERM FADING CHARACTERISTICS OF VHF BROADCAST SIGNALS IN AN URBAN ENVIRONMENT; T. Banik and T. Pavlasek, McGill University, Montreal, Canada; and J. LeBel, Communications Research Centre, Ottawa, Canada

A SIMPLE DIGITAL RAYLEIGH FADING SIMULATOR FOR MOBILE RADIO; E. F. Casas and C. Leung, University of British Columbia, Vancouver, British Columbia, Canada

AUTOMOTIVE ELECTRONICS AND
TRANSPORTATION SYSTEMS
(AET-01)

TIME: WEDNESDAY, JUNE 15
1:30 - 5:00 P.M.

A VEHICLE LONGITUDINAL CONTROLLER, A. Hauksdottir and R. E. Fenton, Ohio State University, Columbus, Ohio, U.S.A.

A MICROPROCESSOR BASED ROUTE INTERLOCKING SYSTEM FOR CONTROL OF TRAINS IN RAILROAD YARDS; V. Chandra, Florida Atlantic University, Boca Raton, Florida, U.S.A. and M. R. Verma, Indian Institute of Technology, New Delhi, India

AN AXLE COUNTING SYSTEM FOR AUTOMATIC SIGNALLING OF TRAINS; V. Chandra, Florida Atlantic University, Boca Raton, Florida, U.S.A.; S. Vedantham, CONRAIL, Philadelphia, Pennsylvania, U.S.A.; and P. Indiresan, Indian Institute of Technology, New Delhi, India

THE PRELIMINARY DESIGN FOR HIGH SPEED GROUND LEVITATION VEHICLE - SINGLE SIDE SHORT SECONDARY; Y-L Ma and T-Y. Tu; National Taiwan University, Taipei, Taiwan, Republic of China

DIAGNOSIS OF ONBOARD SENSORS IN INTERNAL COMBUSTION (IC) ENGINES, P. Min, Bell Communications Research, Inc.; Livingston, New Jersey, U.S.A.

SOLAR POWERED RACING VEHICLE CONCEPT; J. Worden and G. Pratt, Massachusetts Institute of Technology, Cambridge, Massachusetts, U.S.A.

FAULT ISOLATION AND ANALYSIS FOR IC ENGINE ONBOARD DIAGNOSTICS; G. Rizzoni, J. Pipe, R. Riggins, M. VanOyen; University of Michigan, Ann Arbor, Michigan, U.S.A.

MOBILE COMMUNICATION SYSTEMS DESIGN
(CSD-01)

TIME: WEDNESDAY, JUNE 15
1:30 - 5:00 P.M.

AN IMPROVED ALGORITHM FOR PORTABLE RADIO ACCESS; R. Bernhardt, Bell Communications Research, Red Bank, New Jersey, U.S.A.

A HAND-OFF ALGORITHM FOR MICROCELLULAR SYSTEMS; T. Kanai and Y. Furuya, NEC Corporation, Kawasaki, Kangawa, Japan

INVESTIGATION ON A DYNAMIC CHANNEL ALLOCATION SCHEME FOR HIGH CAPACITY TDMA MOBILE RADIO SYSTEMS; G. Falciasecca, University of Bologna, Bologna, Italy; M. Frullone, G. Riva and A. Serra, Fondazione Ugo Bordoni, Pontecchio Marconi (BO); and M. Sentinelli, S.I.P.

ON THE APPLICATION OF REUSE PARTITIONING, T. Salvaggio, Bell Cellular, Rexdale, Ontario, Canada

ON RE-ARRANGING FREQUENCY PLANS; A. Gamst, Philips GmbH Forschungslaboratorium, Hamburg, West Germany

DIGITAL CHANNEL MODULATION AND DETECTION TECHNIQUES
(DCT-03)

TIME: THURSDAY, JUNE 16
8:30 A.M. - 12:00 NOON

MODULATION TECHNIQUES FOR DIGITAL CELLULAR SYSTEMS; J. Tarallo, AT&T Bell Laboratories, Whippany, N.J., U.S.A.

ON THE BIT ERROR RATE OF GMSK WITH MSK-TYPE RECEIVER IN MOBILE RADIO CHANNELS; S. U. Lee and Y. M. Chung, Seoul National University, Seoul, Korea; and J. M. Kim, Electronics and Telecommunications Research Institute, Taejun, Korea.

PREDICTION FILTERING EFFECT ON THE PROBABILITY OF ERROR OF GMSK WITH DISCRIMINATOR DETECTION IN MOBILE RADIO CHANNELS; S. N. Elnoubi, University of Alexandria, Alexandria, Egypt.

SOFTWARE SIMULATIONS FOR MSK AND RC MODULATION SCHEMES IN TIME- AND FREQUENCY-SELECTIVE MOBILE RADIO CHANNELS; M. Werner and H. Brehm; University of Erlangen-Nurnberg, Nurnberg, West Germany.

AN IMPROVED SEQUENTIAL DECODER FOR THE DISCRIMINATOR DETECTION OF CONTINUOUS PHASE MODULATION SCHEMES BASED ON NOISE ESTIMATION TECHNIQUES; D. Makrakis and K. Feher; University of Ottawa, Ottawa, Ontario, Canada.

PERFORMANCE ANALYSIS FOR CPM WITH MSE OPTIMUM DETECTOR IN A MOBILE GAUSSIAN CHANNEL WITH INTERFERING SIGNALS; W. Refai and S. C. Gupta; Southern Methodist University, Dallas, Texas, U.S.A.

ANTENNAS AND TWO-WAY SIGNAL BOOSTERS
(AAP-03)

TIME: THURSDAY, JUNE 16
8:30 A.M. - 12:00 NOON

REGENERATION OF RADIO SIGNALS EMPLOYING SLOTTED TRANSMISSION LINE ANTENNA SYSTEM OPERATING IN TANDEM WITH TWO-WAY SIGNAL BOOSTER AMPLIFIER; J. Harrington and D. Geller, The Port Authority of New York and New Jersey, New York City, New York, U.S.A.

DEVELOPMENT AND APPLICATION OF A CELLULAR REPEATER; E. Drucker, U.S. West Advanced Technologies, Bellevue, Washington, U.S.A.

VEHICLE MOUNTED DIVERSITY ANTENNAS FOR CELLULAR MOBILE RADIO; Y. Ebine and Y. Yamada, NTT Radio Communication Systems Laboratories, Yokosuka, Japan

A METHOD FOR ESTIMATING ANTENNA EFFECTIVE GAIN IN MOBILE COMMUNICATIONS; T. Taga and M. Aikawa, ATR Optical and Radio Communications Research Laboratories, Osaka, Japan

DIGITAL MOBILE COMMUNICATIONS - CODE DIVISION AND TIME DIVISION MULTIPLE ACCES SYSTEMS
(DMC-01)

TIME: THURSDAY, JUNE 16
8:30 A.M. - 12:00 NOON

EXPERIMENTAL RADIO LINK WITH FAST CARRIER RECOVERY FOR UNIVERSAL DIGITAL PORTABLE COMMUNICATIONS; A. Afrashteh and C. Chukurov, Bell Research Corporation, Red Bank, New Jersey, U.S.a.

BURST TRANSIENTS AND CHANNELIZATION OF A NARROWBAND TDMA MOBILE RADIO SYSTEM; F. Muratore and V. Palestini, Centro Studi e Laboratori Telecommunicazioni, Torino, Italy

THROUGHPUT ANALYSIS OF A DS-CDMA SYSTEM IN A MULTIPATH FADING CHANNEL; D. Noon, Jr., Electronic Systems Division, Hanscom AFB, Massachusetts, U.S.A., and T. Ha, Naval Postgraduate School, Monterey, California, U.S.A.

PERFORMANCE OF MULTI-SUBCHANNEL DIRECT-SEQUENCE SPREAD-SPECTRUM MULTIPLE-ACCESS COMMUNICATIONS OVER MULTIPATH FADING CHANNELS; Y. Yao and A. Sheikh, Carleton University, Ottawa, Canada.

QUEUEING PERFORMANCE OF VOICE-DATA FREQUENCY HOPPING NETWORKS WITH BACKOFF; C. Ellement, A. Elkakeem, and J. Hayes, Concordia University, Montreal, Canada and S. Mahmoud, Carleton University, Ottawa, Canada

MOBILE COMMUNICATIONS SYSTEMS - PERFORMANCE PREDICTIONS, ANALYSIS, AND SIMULATIONS
(PPM-01)

TIME: THURSDAY, JUNE 16
8:30 A.M. - 12:00 NOON

FORECASTING TECHNIQUES IN CALL HAND-OFFS FOR CELLULAR COMMUNICATION; D. Munoz Rodriquez and D. Lara Rodriquez, CINVESTAV-IPN, Mexico, D. F., Mexico

PERFORMANCE ANALYSIS OF MOBILE RADIO CARRIER SENSE MULTIPLE ACCESS; Y. Murata, NTT Radio Communications Systems Laboratories, Yokosuka, Japan

PERFORMANCE OF AN ADAPTIVE MULTIPATH DIVERSITY RECEIVER IN A FREQUENCY SELECTIVE RAYLEIGH FADING CHANNEL; C. Sandeep and S. Gupa, Southern Methodist University, Dallas, Texas, U.S.A.

SPECTRUM EFFICIENCY POTENTIAL OF 25 KHz OFFSET CHANNEL ASSIGNMENT IN THE 821-824/866-869 MHz PUBLIC SAFETY BANDS; G. Hess, Motorola, Inc., Schaumburg, Illinois, U.S.A.

A COMPARISON OF COHERENT AND DIFFERENTIALLY COHERENT DETECTION SCHEMES FOR FADING CHANNELS; R. Haeb and A. Aghamohammadi, Aachen University of Technology, Aachen, West Germany

SYNCHRONIZATION TECHNIQUES FOR DIGITAL MOBILE SYSTEMS
(DCT-04)

TIME: THURSDAY, JUNE 16
1:30 P.M. - 5:00 P.M.

NEW CARRIER AND SYMBOL SYNCHRONIZATION TECHNIQUES FOR DIGITAL MOBILE SYSTEMS; D. Y. Kim and K. Feher, University of California, Davis, California, U.S.A.

BIT SYNCHRONIZATION AND TIMING SENSITIVITY IN ADAPTIVE VITERBI-EQUALIZERS FOR NARROWBAND-TDMA DIGITAL MOBILE RADIO SYSTEMS; A. Baier, G. Heinrich, U. Wellens, Phillips Kommunikations Industrie AG, Nurnberg, Federal Republic of Germany

SYNCHRONIZATION IN FH-MFSK SPREAD SPECTRUM SYSTEMS; K. Defly, W. Xiande, W. Geng, M. Lecours, Laval University, Quebec City, Canada

IMPROVED FRAME SYNCHRONIZATION FOR MOBILE PACKET RADIO SYSTEMS WITH STANDARD VLSI SYNCHRONOUS INPUT/OUTPUT DEVICES; P. Driessen, University of Victoria, Victoria, B.C., Canada

ANALYSIS OF SYSTEM FRAME SYNCHRONIZATION ON A FH-BFSK SYSTEM PERFORMANCE FOR MOBILE RADIO APPLICATIONS; W. Geng, M. Lecours, K. Defly, G. Y. Delisle, Laval University, Quebec City, Canada

SATELLITE COMMUNICATIONS
(AMS -02)

TIME: THURSDAY, JUNE 16
1:30 - 5:00 P.M.

DEMAND ASSIGNMENT FOR MOBILE RADIO NETWORKS OVER SATELLITE; V. Leung, A. Spolsky, M. Ali, G. Acres; Microtel Pacific Research Ltd., Burnaby, B.C., Canada.

MSAT INTERFERENCE ANALYSIS AND SIMULATION, A. V. Kantak, Jet Propulsion Laboratory, Pasadena, CA., U.S.A.

CONVOLUTIONALLY INTERLEAVED PSK AND DPSK TRELLIS CODES FOR SHADOWED, FAST FADING MOBILE SATELLITE COMMUNICATIONS CHANNELS, A. Lee and P. J. McLane, Queens University, Kingston, Ontario, Canada.

CONFIGURATION AND CHARACTERISTICS OF NTT'S MOBILE SATELLITE COMMUNICATION SYSTEM FOR THE EMSS PROGRAM; Y. Nishi, H. Komagata, and Y. Yasuda, NTT Electrical Communications Laboratories, Yokosuka, Japan.

NTT'S MULTI-BEAM MOBILE SATELLITE COMMUNICATIONS SYSTEM; S. Shindo, E. Hagiwara, NTT Electrical Communications Laboratory and K. Ogawa, NTT Mobile Communications Division, Yokosuka, Japan.

A 20/30 GHZ PERSONAL SATELLITE COMMUNICATIONS SYSTEM FOR CONUS, M. K. Sue, Jet Propulsion Laboratory, Pasadena, CA., U.S.A.

DIGITAL MOBILE COMMUNICATIONS PACKET SWITCHING AND ACCESS PROTOCOLS
(DMC-02)

TIME: THURSDAY, JUNE 16
1:30 P.M. - 5:00 P.M.

A SLOTTED ALOHA PACKET RADIO SYSTEM WITH MULTIPLE ANTENNAS AND RECEIVERS; C. Lau and C. Leung, University of British Columbia, Vancouver, British Columbia, Canada

MULTISITE THROUGHPUT OF MOBILE DIGITAL COMMUNICATION SYSTEMS; C. Chang, ElectroCom Automation, Inc., Arlington, Texas, U.S.A.

PACKET RESERVATION MULTIPLE ACCESS FOR LOCAL WIRELESS COMMUNICATIONS; D. Goodman, AT&T Bell Laboratories, Crawford Hill, New Jersey, U.S.A.

PACKET SWITCHING IN DIGITAL CELLULAR SYSTEMS; K. Felix, Motorola, Inc., Arlington Heights, Illinois, U.S.A.

MODELING THE USE OF DIRECTIONAL ANTENNAS AND DIRECT SEQUENCE PSEUDONOISE SIGNALING IN THE DENSE SCATTERER ENVIRONMENT; F. Amoroso and W. Jones, Hughes Aircraft Company, Fullerton, California, U.S.A.

BASE STATION AND TERMINAL EQUIPMENT DESIGN
(TBD-01)

TIME: THURSDAY, JUNE 16
1:30 P.M. - 5:00 P.M.

16 CHANNEL DIELECTRIC TRANSMITTER MULITPLEXER FOR CELLULAR BASE STATIONS; T. Nishikawa, K. Wakino, K. Takehara, T. Tanizaki, and Y. Ishikawa, Murato Manufacturing Company, Ltd., Kyoto, Japan

FRONT END FILTER DESIGN FOR THE CELLULAR EXPANDED SPECTRUM; A. K. Johnson, AT&T Bell Laboratories, Whippany, New Jersey, U.S.A.

THE DESIGN OF DIGITAL PHASE-LOCKED LOOPS WITH APPLICATIONS TO DIGITAL COMMUNICATIONS; M. Melester, Electrospace Systems, Inc., Richardson, Texas, U.S.A.

45 WATT PROGRAMMABLE AMPLIFIER; R. Pillmeier and K. Tracy, AT&T Bell Laboratories, Whippany, New Jersey, U.S.A.

LINEAR TRANSCEIVER ARCHITECTURES; A. Bateman, D. Haines, and R. Wilkinson, University of Bristol, Bristol, England.

ERROR CORRECTION CODES AND PROTOCOLS FOR DIGITAL MOBILE SYSTEMS (DCT - 05)

TIME: FRIDAY, JUNE 17
8:30 A.M. - 12:00 NOON

REED-SOLOMON ERROR AND ERASURE CORRECTION FOR PAM/FM MODULATIONS IN MOBILE RADIO CHANNELS; G. D'Aria, Centro Studi e Laboratori Telecomunicazioni S.p.A., Torino, Italy

ERROR-FREE HIGH-SPEED DATA COMMUNICATION PROTOCOL AVAILABLE FOR WIRE-LINE AND MOBILE RADIO CHANNELS SIMULTANEOUSLY; T. Sato, M. Kawabe, T. Kato, Digital Communications Lab, OKI Electric Industry Co., Ltd., Tokyo, Japan

REED-SOLOMON CODES FOR MOBILE FADING DISPERSIVE - CHANNELS; K. Mokrani and S. S. Soliman, Southern Methodist University, Dallas, Texas, U.S.A.

A NEW CONCURRENT SLOT ASSIGNMENT PROTOCOL FOR TRAFFIC INFORMATION EXCHANGE; A. Mann and J. Ruckert, RWTH Aachen, Lehrstuhl Informatik IV, Templergraben, Aachen, West Germany

FORWARD ERROR CODING FOR MOBILE COMMUNICATION SYSTEMS; M. H. Khan, Y. R. Shayan, T. Le-Ngoc and V. K. Bhargava, Lakehead University, Thunder Bay, Ontario, Canada

VEHICLE TERMINAL AND PORTABLE EQUIPMENT DESIGN (TBD-02)

TIME: FRIDAY, JUNE 17,
8:30 A.M. - 12:00 NOON

STABILITY - ENHANCED FREQUENCY SYNTHESIZER BY RECEIVED SIGNAL FOR MOBILE RADIO; I. Shimizu and S. Urabe, NTT Mobile Communications Division, Yokosuka, Japan

DIGITAL SUBSCRIBER CHANNEL (DSC) DEMONSTRATION SYSTEM DESCRIPTION; S. B. Rhee, AT&T Bell Laboratories, Whippany, New Jersey, U.S.A.

DUAL MODE EQUIPMENT FOR THE NEXT GENERATION DIGITAL CELLULAR SYSTEM; R. Fisher, AT&T Bell Laboratories, Whippany, New Jersey, U.S.A.

DEVELOPMENT OF THE SPEAKER - DEPENDENT VOICE ACTIVATED DIALING EQUIPMENT; S. Sato, Y. Suzuki, and Y. Takizawa, OKI Electric Industry Company, Ltd., Tokyo, Japan

AN 800 MHz BAND HIGH-EFFICIENCY POWER AMPLIFIER MICROWAVE INTEGRATED CIRCUIT; E. Nakanishi, J. Shibata, O. Ohsawa, OKI Electric Industry Company, Ltd., Honjo, Japan

A NEW TYPE DUPLEXER; K. Gunji, T. Komazaki, and N. Onishi, OKI Electric Industry Company, Ltd., Honjo, Japan

MOBILE COMMUNICATIONS SYSTEMS - PERFORMANCE ANALYSIS, SIMULATIONS, AND FIELD RESULTS (PPM-02)

TIME: FRIDAY, JUNE 17
8:30 A.M. - 12:00 NOON

PERFORMANCE OF A MOBILE DIGITAL COMMUNICATION SYSTEM; C. Chang, ElectroCom Automation, Inc., Arlington, Texas, U.S.A.

LOCATION PROBABILITY ESTIMATION OF SERVICE AVAILABILITY IN PORTABLE RADIO TELEPHONE SYSTEMS; K. Ogawa and M. Sakamoto, NTT Mobile Communications Division, Yokosuka, Japan

ESTIMATE OF CHANNEL CAPACITY IN RAYLEIGH FADING ENVIRONMENT; W. Lee, PacTel Personal Communications, Irvine, California, U.S.A.

FIELD PERFORMANCE RESULTS OF THE DIGITAL CELLULAR SUBSCRIBER CHANNEL; R. Malupin and G. Reed, AT&T Bell Laboratories, Whippany, New Jersey, U.S.A.

SIMULATION RESULTS OF DIRECT-CONVERSION FSK RECEIVER SENSITIVITY; U. Oishi, Fujitsu Laboratories, Ltd., Nakahara-ku, Kawasaki, Japan

DIGITAL MOBILE COMMUNICATIONS SYSTEMS (DMC-03)

TIME: FRIDAY, JUNE 17
8:30 A.M. - 12:00 NOON

DIGITAL TECHNOLOGIES IN CELLULAR RADIO; J. Uddenfeldt, B. Hedberg and K. Raith, Ericsson Radio Systems, Stockholm, Sweden

A PROPOSAL OF PORTABLE TELEPHONE SYSTEM; S.Ito, Iwatsu Electric Company, Ltd., Tokyo, Japan

SPECTRALLY EFFICIENT DIGITAL UHF MOBILE SYSTEM; D. Bolgiano, International Mobile Machines Corporation, Philadelphia, Pennsylvania, U.S.A.

A STUDY ON THE CO AND ADJACENT CHANNEL PROTECTION REQUIREMENTS FOR MOBILE SATELLITE ACSSB MODULATION; J. Sydor, Space Systems Directorate, Dept. of Communications, Ottawa, Ontario, Canada

SIMULATION OF DIGITAL TRANSMISSION IN CELLULAR MOBILE RADIO ENVIRONMENT; H. Hashemi, Sharif University of Technology, Tehran, Islamic Republic of Iran.

MODULATION AND DETECTION TECHNIQUES (DCT-06)

TIME: FRIDAY, JUNE 17
1:30 P.M. - 5:00 P.M.

ABSOLUTE POSITION RECOVERY FOR AUTOMATED PATH-GUIDED VEHICLES E. M. Petriu, University of Ottawa, Ottawa, Ontario, Canada

A BANDWIDTH EFFICIENT SIGNALING FOR MFSK SYSTEMS; G. E. Atkin and H. P. Corrales, Illinois Institute of Technology, Chicago, Illinois, U.S.A.

A NEW POWER EFFICIENT MULTI-LEVEL CORRELATIVE DIGITAL FM SYSTEM; J. S. Seo and J. W. Boyd, International Datacasting Corp., Ottawa, Ontario, Canada

PROBABILITY OF ERROR ANALYSIS OF DIGITAL PARTIAL RESPONSE CONTINUOUS PHASE MODULATION WITH DISCRIMINATOR DETECTION IN MOBILE RADIO CHANNELS; S. M. Elnoubi, University of Alexandria, Alexandria, Egypt

USE OF THE EM ALGORITHM IN IMPULSIVE NOISE CHANNELS; D. Zeghlache, Cleveland State University, Cleveland, Ohio, U.S.A; S. S. Soliman and W. R. Schucany, Southern Methodist University, Dallas, Texas, U.S.A

A GILBERT-LIKE MODEL FOR THE MOBILE RADIO CHANNEL; G. Petrovic, D. Drajic, and D. Bajic, University of Belgrade, Belgrade, Yugoslavia

SPECTRAL EFFICIENCY IN DIGITAL MOBILE RADIO SYSTEMS (CSD - 02)

TIME: FRIDAY, JUNE 17
1:30 - 5:00 P.M.

SPECTRAL EFFICIENCY OF CELLULAR LAND MOBILE RADIO SYSTEMS; H. Hammuda, J. P. McGechan, and A. Bateman; University of Bristol, Bristol, England

SCPC/FDMA DIGITAL MOBILE RADIO SYSTEMS WITH SPECTRUM EFFICIENT CHANNEL STRUCTURE; N. Nakajima and K. Kinoshita, NTT Radio Communication Systems Laboratories, Kanagawa-ken, Japan

SPECTRAL EFFICIENCY IMPROVEMENT TECHNIQUES FOR NON-LINEAR AMPLIFIED MOBILE RADIO SYSTEMS, J. Wang and K. Feher, University of California, Davis, California., U.S.A.

VIABILITY OF PACKET RADIO FOR FUTURE DIGITAL MOBILE COMMUNICATIONS; G. Bharatula, Telecom Australia Research Laboratories, Clayton, Victoria, Australia

SPECTRUM EFFICIENCY AND DIGITAL CELLULAR; W. Lee, PacTel Cellular, Irvine, California., U.S.A.

VEHICLE LOCATION (AMS-03)

TIME: FRIDAY, JUNE 17
1:30 - 5:00 P.M.

RADIO POSITION DETERMINATION BY SATELLITE, Klaus G. Johannsen, Hughes Aircraft Company, Los Angeles, CA., U.S.A.

A NEW TRANSMITTER LOCATION SEARCHING ALGORITHM BASED ON GEOMETRIC PARTITIONING AND LOCAL OPTIMIZATION, Chia-Chi Huang, General Electric Company, Schenectady, N.Y., U.S.A.

VEHICLE LOCATION AND TRACKING, Tri T. Ha, Naval Postgraduate School, Monterey, CA., and R. Clark Robertson, Virginia Polytechnic Institute and State University, Blacksburg, VA., U.S.A.

NEW SATELLITE-BASED VEHICLE LOCATION TECHNOLOGY, A. R. Dennis, Analytical Technology Laboratories, Inc., Houston, TX., U.S.A.

MOBILE COMMUNICATIONS SYSTEMS - PERFORMANCE IMPROVEMENT TECHNIQUES AND EVALUATION TOOLS (PPM-03)

TIME: FRIDAY, JUNE 17
1:30 P.M. - 5:00 P.M.

CELLO - A POWERFUL OPERATIONS TOOL FOR TROUBLE-SHOOTING IN CELLULAR SYSTEMS; J. O. Lejdal, Ericsson Radio Systems, Stockholm, Sweden

CELLULAR MOBILE TELEPHONE FIELD MEASUREMENTS - TOOLS AND TECHNIQUES; H. Rubin, NYNEX Mobile Communications, Pearl River, New York, U.S.A. and R. Meek, III, SAFCO Corporation, Chicago, Illinois, U.S.A.

CELLULAR OPERATIONS IN THE 90'S; M. Detrano and R. Brown, AT&T Bell Laboratories, Whippany, New Jersey, U.S.A.

OPERATIONS TOOLS FOR MANAGING CELLULAR NETWORKS; K. Kelly, II, AT&T Bell Laboratories, Whippany, New Jersey, U.S.A.

REDUCTION OF CO-CHANNEL INTERFERENCE IN CELLULAR SYSTEMS BY INTRA-ZONE CHANNEL REASSIGNMENT AND ADAPTIVE TRANSMITTER POWER CONTROL; T. Fujii and M. Sakamoto, NTT Mobile Communications Division, Yokosuka, Japan

TRAVEL

The Philadelphia International Airport is easily accessed from most domestic and some international airports. The following transportation modes are available from the airport to center city Philadelphia:

- Direct train service from airport terminal to Suburban Station (16th & Market Street) which is two city blocks east of the Holiday Inn located at 18th and Market Streets; one-way cost is approximately $4.00 (trains run approximately every 30 minutes.)
- Limelight Limo service from airport terminals to all center city hotels costs approximately $7.00 (Limo leaves approximately every 30 minutes.)
- Taxicabs to center city or car rentals at airport. Parking is available at the hotel for about $5.00 per day.

HOTEL

The conference technical program is at the Holiday Inn, Center City, 1800 Market Street, Philadelphia, PA. 19103, U.S.A. The VTC'88 Executive Committee has booked a block of rooms at this hotel with the special rates of $69.00 per night for single room occupancy and $77.00 per night for double occupancy plus 11% tax. A hotel registration form is attached to this program and should be sent directly to the hotel for advance room reservations. The above rates are guaranteed if you make reservations before May 14, 1988 by mail or by calling 1-800-465-4329. If you register at the hotel on arrival, without prior notice, please identify yourself as a VTC'88 attendee so that you may still get the reduced rate if rooms are available.

REGISTRATION

Although attendees may register upon arrival at the conference, advance registration by mail is strongly urged to take advantage of reduced fees and avoid waiting in lines. The form for advance registration is attached to this program and should be mailed, along with fees, to the Registration Chairman as indicated on form. Registration times at the Conference are as follows:

Tuesday	June 14, 1988	5:00 p.m. to 8:00 p.m.
Wednesday	June 15, 1988	8:00 a.m. to 3:00 p.m.
Thursday	June 16, 1988	8:00 a.m. to 3:00 p.m.

The charge for advance full registration is $150.00 for IEEE members and $175.00 for nonmembers if paid before May 14, 1988. Full registration includes access to all sessions, a copy of the Conference record and two luncheons. There will be no banquet.

Checks mailed for registration fees must be drawn on U.S.A. banks or U.S.A. branch of non-U.S.A. banks. Visa or Mastercard can be used to pay for registration at an additional $5.00 fee.

RECREATION

There is no formal recreation program scheduled. However, within a two mile radius of the hotel, you will find numerous fine restaurants, museums, theaters, historic sites and many cultural attractions. Also, Atlantic City is only a one hour's drive away. Brochures describing these attractions will be available in the registration area. A hospitality room will be available for spouses of conferees to meet and plan their days' activities.

SPECIAL ANNOUNCEMENT

The 1988 IEEE International Conference on Communications (ICC'88) will also take place in downtown Philadelphia from Sunday, June 12 through Wednesday, June 15, 1988. The Conference site will be the Wyndham Franklin Plaza Hotel at the corner of 17th and Race Streets. Consider coming early and attending both ICC'88 and VTC'88 during the same week. For advance program information or registration for ICC'88, write to: ICC'88, P.O. Box #302, Broomall, PA. 19008, U.S.A.

Announcing the 38th IEEE Vehicular Technology Conference VTC '88

Holiday Inn, Center City, Philadelphia, PA

June 15-17, 1988

- ★ Mobile Radio Systems
- ★ Network System Design
- ★ Cellular Radio
- ★ Land-Air & Marine Communication
- ★ Satellite Mobile Communication
- ★ Antennas & Propagation
- ★ Land Transportation Systems
- ★ Vehicle Location & Navigation
- ★ Vehicle On-board computer systems

CONFERENCE REGISTRATION FORM

Name: _____ Company: _____

Business Address: _____

_____ Telephone: (___) _____

IEEE Member? ☐ Yes ☐ No If yes, membership number: _____

Are you presenting a paper at this conference: ☐ Yes ☐ No Are you a Session Chairman at this conference: ☐ Yes ☐ No

Item		Member	Non-Member	Total
Full Registration (Sessions, Record & 2 Luncheons)	-paid before May 14	$150	$175	_____
	-paid after May 14	170	195	_____
Limited Full Registration (Sessions & Record)	-paid before May 14	120	145	_____
	-paid after May 14	140	165	_____
Full-Time Student (Sessions only)		25	25	_____
IEEE Life-Time Member (Sessions only)		25		_____
Additional Wednesday Kick-off Luncheon:	___at $19 each			_____
Additional Thursday Awards Luncheon:	___at $19 each			_____
Additional Conference Records		45	55	_____
Credit Card Fee (VISA/Mastercard only accepted)		5	5	_____
			TOTAL	_____

Make check (drawn on USA Bank) payable to IEEE VTC '88 or enter Credit Card information

_____ VISA _____ MC Acct. No._____ Exp. Date_____

Mail to: VTC '88, Attn. J. L. Carbo, Bell of PA, 7th Floor, One Parkway, Phila., PA 19102, USA Signature_____

HOTEL REGISTRATION FORM

Holiday Inn

CENTER CITY
1800 Market Street
Philadelphia, PA 19103 (215) 561-7500
USA 1-800-465-4329

IF RESERVING MORE THAN ONE ROOM, PLEASE LIST ONE NAME FOR EACH ROOM RESERVED

PLEASE PRINT OR TYPE

RATES: $69-Single $77-Double

FOR ARRIVAL ON _____ DAY/DATE DEPART ON _____ DAY/DATE

PLEASE RESERVE _____ ROOM(S) FOR _____ PERSONS

NAME _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

CHECK IN TIME: 2:00 p.m. CHECK OUT TIME: 12 Noon

I.E.E.E.
Vehicular Technology Conference
June 15-17, 1988

RESERVATIONS

- This reservation card must be used to insure accommodations.
- Cut off date for reservations is May 14, 1988 after which rooms will be sold on a space available basis at our published rate.

GUARANTEE POLICY

- You must guarantee your reservation with a first night's deposit or major credit card number.

METHOD OF GUARANTEE

_____AMX _____VISA _____DISC _____PERSONAL CHECK

_____BAC _____MC _____DC _____TRAVELERS CHECK

CC NAME_____

CC# _____ EXP. DATE_____

REFUND POLICY

- Full refund of deposit will be forfeited unless cancellation is received 2 days prior to arrival date.

IEEE - VTC '88

ADVANCE PROGRAM

REGISTRATION:

Holiday Inn - Center City, 1800 Market Street, Philadelphia - 2nd Floor Foyer.

Tuesday, June 14 - 5:00 to 8:00 PM.
Wednesday thru Friday, June 15-17 - 8:00 AM to 3:00 PM
(A mail-in registration form is included in this program.)

SPECIAL SESSIONS:

Speakers' Continental Breakfast, Wednesday thru Friday, 7:30 - 8:30 AM, for each day's speakers and session chairpersons.

Keynote Luncheon, Wednesday, 12 Noon - 1:30 PM. Speaker: C. Many, President, NYNEX Mobile Communications.

Evening Panel Discussion, Wednesday, 7:00 - 9:00 PM. "Cellular Technology in the 90's - A Prospective from Outside the US." Chairman: R. Notebaert, President, Ameritech Mobile Communications.

Awards Luncheon, Thursday, 12 Noon - 1:30 PM.

Evening Panel Discussion, Thursday, 7:00 - 9:00 PM. "Future Cellular Service Opportunities - The Service Provider's Prospective." Chairman: J. Stupka, President, Southwestern Bell Mobile Systems.

VTC '88, Attn. J. L. Carbo, Bell of PA, 7th Floor,

One Parkway, Phila., PA 19102, USA

CALL FOR PAPERS

Second International
Conference on

ROAD TRAFFIC MONITORING

7-9 February 1989

CONFERENCE OBJECTIVES

The conference will examine traffic data requirements and the current state-of-the-art in all forms of data collection and management. It will, therefore, be concerned with the automatic, semi-automated and manual vehicle monitoring techniques used for a variety of applications. The proceedings will be of interest to public sector practitioners, consultants, research workers and equipment suppliers. A parallel exhibition with practical demonstrations will bring participants up-to-date on new techniques, applications and opportunities.

SCOPE

The major topics to be covered by the conference are described below, however submissions on related subjects will be welcomed.

1. Needs and Requirements.
Overall objectives and applications of traffic data monitoring at both national and local levels; policy evaluation, vehicle surveillance, network control, strategic planning; the need for short-term and continuous surveys; manual traffic survey requirements and techniques.
2. Vehicle Detection and Classification Equipment.
Automatic counters, classifiers, monitoring systems and programmable microcomputers; data retrieval systems and telemetry; permanent and temporary sensors; speed monitoring and enforcement; classification schemes, speed, length and type; accuracy and reliability of monitoring systems.
3. Axle Weight Measurement.
Static and dynamic approaches; portable and fixed scales, weigh-in-motion, low-cost dynamic axle load sensors, equipment performance and cost; applications to highway maintenance, pavement design, overweight vehicle screening and enforcement; monitoring and enforcement of vehicle dimensions, and bridge formula compliance.
4. Data Processing and Management.
Expert systems for traffic data analysis; data processing techniques and software, statistical methods, microcomputer applications; OD matrices from traffic counts; data storage and handling, information retrieval, analysis and display; national and regional data networks, highway inventories; real-time traffic assessment and control.
5. Video, Photographic and Image Processing Systems.
Use of permanent and portable static cameras for traffic counting, vehicle classification and surveillance; solid-state and thermal camera systems, time-lapse and slow-scan video, data communication by high quality link or telephone line; mobile logging of visual data, manual and semi-automated methods of data abstraction; fully automatic off-line and real-time image processing systems, wide-area detection and tracking systems, automatic license-plate recognition and incident detection.
6. Monitoring and Surveillance.
Automatic vehicle identification by active and passive devices; heavy goods vehicle, bus, light-rail and emergency vehicle monitoring and location systems; network monitoring systems and vehicle tracking; selective vehicle detection; on-line traffic control and communications; automatic route information and guidance; applications to real-time information systems, toll systems, direct road pricing, weight-distance taxation, HOV enforcement; monitoring traffic and environmental conditions for roads, tunnels and bridges.

CONTRIBUTIONS

The Organising Committee invites offers of contributions for consideration for the programme.

Those wishing to offer a contribution should submit a synopsis of 300-500 words, to be received by the Secretariat on, or before **13 May 1988**. The paper title, mailing address and name of the author(s) should appear on each synopsis.

The synopsis should include the main points of the paper and should indicate where the emphasis will be placed.

Authors of selected synopses will be sent A3 typescript sheets and requested to provide a full typescript of not more than 4,000 words of text (or correspondingly less if illustrations are included) for assessment by **2 September 1988**.

DEADLINES

Intending authors should note the following deadline dates:

Receipt of synopses	13 May 1988
Notification of provisional acceptance	June 1988
Receipt of full typescripts for final review	2 September 1988

WORKING LANGUAGE

The working language of the Conference is English, which will be used for all printed material, presentations and discussion.

EXHIBITION

It is hoped to arrange an exhibition in association with the Conference. Those requiring further details of exhibition facilities and charges should so indicate on the attached reply form.

TECHNICAL VISITS

It is planned that a programme of technical visits and demonstrations will be organised for Conference participants. Details will be circulated with the Conference programme.

PROGRAMME AND REGISTRATION

The Conference programme and registration form will be published a few months before the event and will be sent to those who complete and return the attached form.

ORGANISERS

The Computing and Control Division of the Institution of Electrical Engineers

in association with the

County Surveyor's Society
Institute of Electrical and Electronics Engineers Inc (Vehicular Technology Society)
Institution of Civil Engineers
Institution of Highways and Transportation
Institution of Electronic and Radio Engineers

SECRETARIAT

Conference Services
The Institution of Electrical Engineers
Savoy Place, London WC2R 0BL, United Kingdom

Telephone: 01-240 1871 Ext: 222
Telex: 261176 IEE LDN G
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IEEE

THE INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS, INC.

CALL FOR PAPERS

IEEE

Workshop on Automotive Applications of Electronics

Sponsored by

Vehicular Technology Society and Industrial Electronics Society

October 19, 1988

HYATT REGENCY HOTEL

Dearborn, Michigan

The workshop follows Convergence 88 - International Congress on Transportation Electronics. October 17-18, 1988.

Papers are solicited on applications of sensors, microprocessors, actuators and control system theory to displays, instrumentation, engine, drivetrain, steering, braking, and suspension control as well as operating and servicing automobiles, trucks and off-road vehicles. Papers dealing with EMI/RFI suppression and avoidance are sought for this session, as are discussions on field maintainability of sophisticated onboard electronics, components and systems.

Prospective authors should submit four copies of a 300-500 word summary of their papers by April 22, 1988 to:

Roger D. Madden
FCC Room 5322
2025 M Street N.W.
Washington, DC 20554 U.S.A.
Telephone (202) 632-7197 (work)
(703) 425-9483 (home)

Contributors will be notified by May 15th of acceptance of their paper and author kits will be supplied at that time. Papers will be published for the workshop and selected papers are proposed to be published in the Transactions of the Society most closely allied with the nature of the individual paper.

VEHICULAR TECHNOLOGY SOCIETY