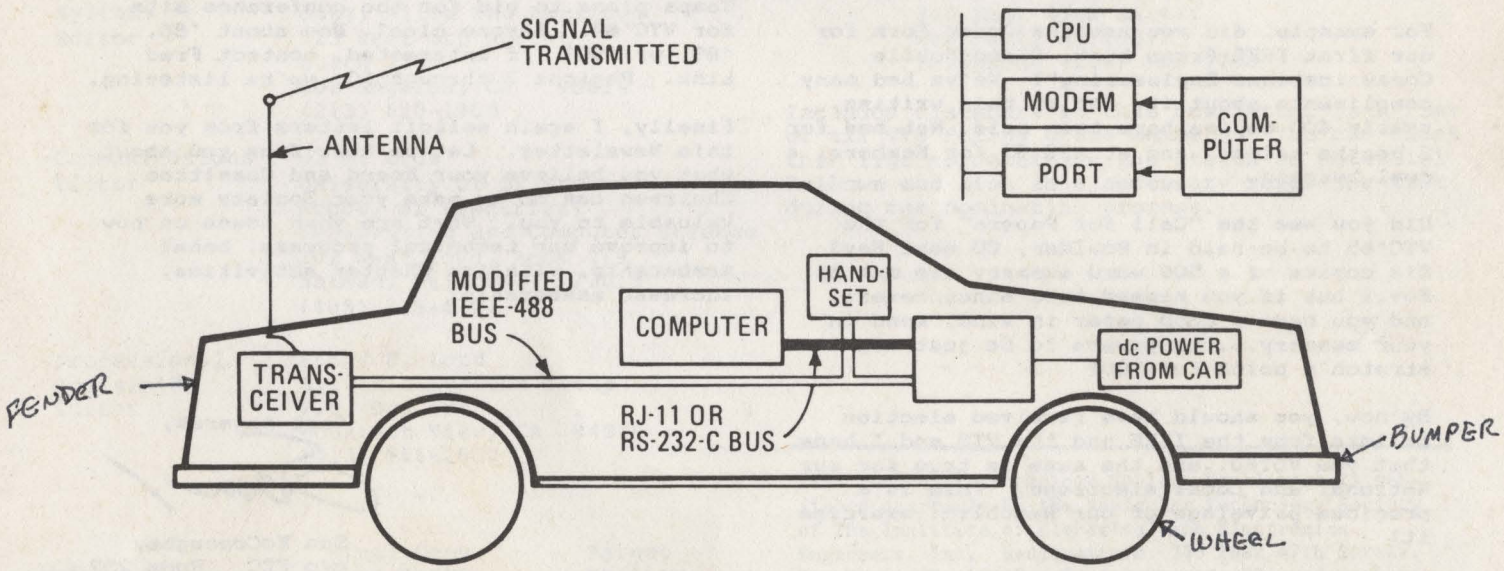
IEEE
VEHICULAR TECHNOLOGY SOCIETY
NEWSLETTER

Vol. 31, No. 4, November 1984 (ISSN 0161-7887) Editor: A. Kent Johnson



Schematic Diagram of a Mobile Office in a Passenger Car

President's Message

Sam McConoughey
President
IEEE Vehicular Technology Society

I wish all of you a Thoughtful Veterans Day, Rememberance Day, a Bountiful Thanksgiving Day a Happy Hanukkah, a Very Merry Christmas, and a Happy and Prosperous 1985! And last but not least, a Happy 80th Birthday to Board Member, Life Fellow, and Centennial Medal recipient, Fred Link. If I have left out any Holidays, please forgive me, but these are the ones my calendar displays from mid-September, as I write this message, until you receive the next issue of the Newsletter.

A Newsletter is, by definition, supposed to bring you a report of recent events. But strange as it seems in this day of instant communications, we have such a LONG lead time in publishing this Newsletter! If only what I had to say were timeless!! But News is usually only of fleeting value, so here goes.

First, I hope you have read the August issue, cover to cover. Not only for news of what has happened, but of coming events, and other matters of vital interest to you.

For example, did you see the Order Form for our first IEEE Press Book, "Land-Mobile Communicationa Engineering"? We've had many compliments about it, and at this writing, nearly 400 copies have been sold. Not bad for 3 months sales. And at $29.95 for Members, a real bargain.

Did you see the "Call for Papers" for the VTC'85 to be held in Boulder, CO next May? Six copies of a 500 word summary are due by Nov.1 but if you missed this announcement, and you have a good paper in mind, send in your summary...the powers to be just might stretch a point for YOU!

By now, you should have received election ballots from the IEEE and the VTS and I hope that you VOTED..and the same is true for our National and Local elections. This is a precious privelege of our Republic..exercise it!

My pleas for volunteers to serve in the VTS has not gone unheeded. My thanks to those who have come forward. But we can still use more volunteers. May I hear from you?

Your Society sponsored a technical session at the Electronic Industries Association's first Land Mobile Showcase, held in Las Vegas in August. More than 400 persons attended the session. In addition we had a booth at which Membership and Press Book application forms were available. Reports received on the technical session were highly favorable and interest in joining IEEE & VTS and ordering our Press Book ran high.

Your Board of Directors and Committee Chairmen will have met during the Convergence '84 conference in Dearborn which the VTS is sponsoring this year. The February issue of the Newsletter will contain details of this meeting, election results, and of our October and December Board meetings.

Al Iseberg, Life Fellow has agreed to chair our Fellow Committee, relieving Jim Mikulski who had to resign due to the press of other duties.

Tampa plans to bid for the conference site for VTC'87. Anyone else? How about '88, '89, or '90? If interested, contact Fred Link. Regions 7 through 10, we're listening.

Finally, I again solicit letters from you for this Newsletter. Let us hear from you about what you believe your Board and Committee Chairmen can do to make your Society more valuable to you. What are your ideas on how to improve our technical programs, boost membership, vitalize Chapter activities, increase membership?

Best regards,

Sam

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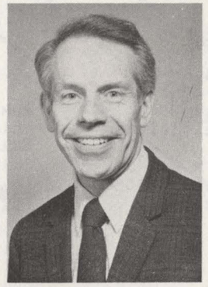
Month of Issue	Final Copy to be Rec'd By VTS Editor	Target Mailing Date
February	12-21-84	01-27-85
May	3-10-85	04-14-84
August	6-09-85	7-13-85
November	9-13-85	10-15-85

Editor's Notes



A. Kent Johnson
Newsletter Editor

Fellow Nominations Urged

As the November issue of the VTS newsletter goes to press, the time is once again approacning when the IEEE is looking for Fellow nominations from among its' ranks. We are always anxious to see qualified members of VTS receive this honor. We accordingly urge any of you who know of a qualified VTS member who has not yet been nominated to receive the rank of Fellow to submit such a nomination. The new IEEE Fellow nomination kits are available and will be furnished upon request from:

Staff Secretary, IEEE Fellow Committee
345 East 47th Street
New York, NY 10017
Telephone (212) 705-7750

Included elsewhere in this newsletter is a list of all VTS Fellow grade members. You can check this list to determine the status of potential Fellows and also as a necessary reference list during the nominating process.

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VTS 1884 1984 A CENTURY OF ELECTRICAL PROGRESS IEEE

Boulder, Colorado

CALL FOR PAPERS
IEEE VEHICULAR TECHNOLOGY CONFERENCE
May 21 - 23, 1985
Boulder, Colorado

EFFICIENCY, CONSERVATION AND PRODUCTIVITY

Papers are sought covering the full range of electronics in vehicular technology, with special emphasis on the following:

- MOBILE RADIO Planning Methodology
- NEW TECHNOLOGY
- DIGITAL COMMUNICATIONS
- CELLULAR RADIO - New Technology, Operating Experience
- SATELLITE MOBILE COMMUNICATIONS
- AUTOMOTIVE SYSTEMS
- TRANSPORTATION SYSTEMS
- PERFORMANCE MEASURES FOR MOBILE COMMUNICATIONS
- PERFORMANCE ASSESSMENT OF MOBILE COMMUNICATIONS
- COMPUTERS AND MOBILE COMMUNICATIONS
- MULTI-SERVICE FACILITIES COMMUNICATIONS
- FREQUENCY PLANNING AND USAGE
- ANTENNAS AND PROPAGATION
- GUIDED COMMUNICATIONS
- PAGING
- USER CONSIDERATIONS IN RADIO SYSTEM DESIGN

We also encourage papers for a special session on **Requirements: issues in Vehicular Technology requiring further research and development.** We are particularly interested in those topics which may not receive adequate attention in the course of commercial research and development.

Six copies of a 500 word summary should be submitted by December 1, 1984, to:

IEEE VTC 85
Office of Conference Services
University of Colorado
Campus Box 454
Boulder, CO 80310

Summaries should be typed single-spaced with a 2 inch left margin in a 4¾ inch column with a 1½ inch top and bottom margin. The title, name(s), and affiliations should be included, with a complete address and telephone number.

Authors will be notified of acceptance by January 1, 1985. The complete text must be submitted by **March 1, 1985** and will be published in the 35th Vehicular Technology Conference Record which will be available at the conference.

1984 IEEE Vehicular Technology Society Directory of Chapters and Chairpersons

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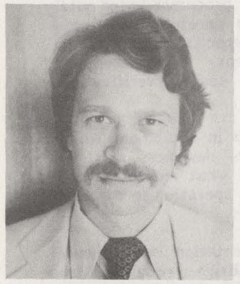
WASHINGTON, D.C.	Charles F. Turner 9979 Campus Way South Largo, MD 20772 Tel: (301) 632-6497

Transporation Systems



David B. Turner
Transportation Systems Editor

The entire history of the railroads reflects the technological developments of the times. Block signaling and switch interlocking equipment has been used to protect railroad traffic and equipment since the middle of the nineteenth century. Centralized train control systems were introduced more than 60 years ago. In each decade, the great discoveries of communications and electrical engineering have found application on the railroads, to insure the safety of operations, to increase the railroad's carrying capacity, to speed the flow of goods and passengers, and to reduce the cost of operations. In that long history of train control, dedicated men with elegant and powerful ideas have evolved a practice which safely and efficiently governs railroad operations, making best use of available technologies.

The explosive development of electronics components has provided a wealth of opportunity for improvements in all train control and communication systems. However, the penetration of the microprocessor has so far generally been limited to replacing older mechanizations. Only a few railroads have taken advantage of the economic and technical opportunities presented by operating fiber optic or microwave communications systems. We have just begun to see the quantum improvements in the control, communication, and information handling which contemporary and emerging techniques can deliver.

However, these strata of technical use create powerful opportunities for cost-effective advancement for train control practice. Two recent events indicate the growing extent to which these technical opportunities are being pursued.

* * * * *

First, the Railway Association of Canada (RAC) and the Association of American Railroads (AAR) are preparing to develop a new generation train control system. This undertaking has the potential to dramatically affect all sectors of the industry, including equipment manufacturers and suppliers, railroad operating and maintenance departments, and, ultimately, railway customers and competitors. The need for the new system is economic. The objective is to more effectively and profitably compete in the transportation marketplace. This new system of intelligent control will improve transportation productivity, lower capital expenses, provide better service, and reduce operating costs.

The Advanced Train Control System project (ATCS) seeks to bring the latest electronic and microprocessor technologies into play. The greatest innovation will be in the conceptual integration of the various elements of railway signal systems train control, presence detection, fault and condition detection, and train, crew, and equipment information systems. The proposed Advanced Train Control System is, in fact, much more than a train control system: it is an integrated operating command, control, and information system.

Much of the technology needed to develop such a system is available in the world marketplace in some form. Some transit systems have more fully automated control information systems than are commonly seen on railroads. Communications technology has advanced significantly in recent years. Aviation traffic control systems use a form of location detection/position interrogation. The defense industry has made commonplace the integration of information from many sources into a network for complex command and control decision-making. All of these sources will be utililized in developing the ATCS.

The commercial rail system has evolved a large set of detection, protection, and control devices of various levels of sophistication, but few are integrated into a whole system. The ATCS project contemplates the integration of such systems and the development of a heirarchical system of control and response along with the development of new technology to perform tasks or provide information or control capability not now available on railroads.

The new systems will provide better detection and prediction of train movements allowing improved control and reduced fuel consumption, lower crewing costs, and improved equipment utilization. Some technologies used will result in reduced field maintenance costs and improved reliability.

The new system is to be modular so that it can be assembled in building blocks to meet the needs of a particular railroad, and to be upgraded when conditions or funds permit. The new technologies that are to be employed must take cognizance of the vast investment in existing rail signal systems, must work with this investment and improve its utility as well as offer quantum improvements in information and control when used exclusively in new installations.

The safety and reliability of the new equipment must meet or exceed the levels now existing in standard applications on Class I rail systems. These levels will be achieved by applying the concepts of fail safe and fault tolerant design, the use of hardware and functional redundancy and self-diagnostic techniques. The new equipment will also be easier to maintain since it will allow defective equipment or components to be quickly identified and repaired or replaced.

ATCS must provide the railroads the capability to make a quantum jump in productivity. The value of ATCS to the rail industry will be measured by its economic contribution, not by its technical sophistication or elegance.

* * * * *

The second major indicator of the pace of development in train control technology was seen at the recent International Conference of the Institution of Railway Signal Engineers, held in London in late September. The conference title, "Railway Safety Control and Automation Towards the 21st Century," suggests the decisive interest and action towards higher technology which the conference papers demonstrated.

Of the 52 papers presented at the conference, half were explicitly concerned with the techniques, issues, and experiences of applying microprocessors and computers to mainline railway signaling and train control. Another major area of attention at the conference was the application of fiber optics to the extensive voice and data communication requirements of the railways. Papers were also presented on operating and human factors considerations, on the impacts of advancing technologies on railway operators and maintenance staff, on industrial relations, and on financial considerations. And on the conference exhibit floor, engineers demonstrated a complete prototype of the British Railways Solid State Interlocking machine, scheduled for mainline deployment in May 1985.

Several crucial issues were highlighted by the conference proceedings:

- The established concept of "fail-safe" equipment for safety-related, or vital, functions cannot be directly applied to processor-based equipment, since it is deemed impossible to predict and therefore control all the failure modes of processors.

- Instead, engineers, managers, and regulatory agencies must establish estimates of risk, or mean time between failure, or hazard interval, as design goals for the equipment. Engineers must then be able to demonstrate analyses which indicates achievement of the design goals.

- The process of design of processor-based vital equipment must follow a carefully structured path of functional specification, design structuring, equipment requirements specification, equipment design, verification, and testing.

- When processors are used in equipment which provides a vital function, designers must be fully prepared to explain what measures have been taken to ensure safe operation in the face of equipment failure.

- The design and implementation of software with safety responsibilities requires the creation and use of careful plans for software verification, validation, simulation, testing, and commissioning. These plans must be established at the earliest phases of project planning.

The discussions of these issues is a step in the process by which the profession recognizes the design requirements which the new technologies impose. The discussion itself is an acknowledgement of the enormous power which the technologies have to economically and efficiently provide existing and extended functions for control of railway operations.

Gaspar Messina
Chapter News Editor

Chapter News

Meetings

New Jersey Coast (EMC/VTS)

Tempest Receiver Technology; Dynamic Sciences Inc, DSI 9000
by Mr. Paul Glovins, Director of Technical Operations,
Dynamic Sciences Inc. Washington Operations
Held June 19, 1984, with 25 attending including 6 Guests.

Elections

New Jersey Coast (EMC/VTS)

Term of Office June 19, 1984 - June 1985

Chairman: Mr. Luke G. Schimpf (Bell Labs Retired)
31 Winding Brook Way
Holmdel, N.J. 07733
Telephone (201)- 946-8639

Vice Chairman: Mr. John Mumbauer
Honeywell Inc.
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Telephone (201)- 542-1400

Secretary/
Treasurer: Mr. Michael Sligh
Honeywell Inc.
P.O. Box 54
Eatontown, N.J. 07724
Telephone (201)- 542-1400

Interim Chairman

Montreal VTS

Prof. David Haccoun of the Ecole Polytechnique De Montreal will head the Montreal Vehicular Technology Chapter until elections are held.

Awards

Congratulations are extended to Ms. Sandra Sue Metzgar for being the recipient of the 1984 Daniel E. Noble Fellowship award. Ms. Metzgar is attending the University of Connecticut.

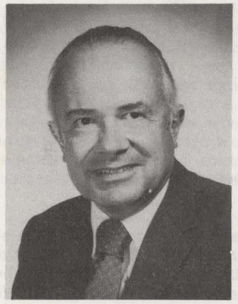
Awards

Congratulations are extended to Ms. Anna Hauksdottir from Ohio State University for being selected by the Vehicular Technology Society Board as nominee to the "Centennial Keys to the Future" program.

Congratulations are extended to Dr. Donald Cox of AT&T Bell Laboratories. Dr. Cox submitted the winning paper of the year, entitled: "Time Division Adaptive Retransmission for Reducing Signal Impairments in Portable Radiotelephones".

Congratulations are extended to Mr. Jack Winters, also of AT&T Bell Laboratories for his runner-up paper, entitled: "Switched Diversity with Feedback for DPSK Mobile Radio Systems".

Gaspar Messina
Editor and Chapter Activities Chairman
9800 Marquette Drive
Bethesda, Maryland 20817



Professional Activities

Frank E. Lord
Professional Activities Editor

On last Labor Day weekend I attended the National PACE (Professional Activities Committees for Engineers) Conference in Phoenix. This conference is a once-a-year event and certainly is a highlight for those of us working on professional matters within the Institute. On this occasion we are able to participate in discussions on any item under way or contemplated among the broad field of USAB (United States Activities Board) enterprises. I should explain that PACE is a distributed grass roots activity that provides a link between the members in Sections and Societies and the policy and decision makers of USAB. A great deal of the action directed by USAB, particularly at the national level, is carried out by Task Forces which are grouped into four Councils. One of the many items distributed and discussed at the PACE Conference was a summary of the Council's activities. This material follows and will serve to bring you up to date on recent activities in the professional area.

GOVERNMENT ACTIVITIES COUNCIL

A "Guide to Pensions" and "Profile of IEEE Women Members" was recently published by the Internal-External Communication Committee. The final reports from the 1983 Congressional Fellows, Orin Marvel and Doyce Satterfield, was prepared. Other Congressional Fellows are: Guy Copeland (1983-84), George Swetman (1983-84), Joe Edminister (1984), and K. P. Lau (1985).

The Technology Transfer Committee has initiated a task to prepare a paper to restate the importance IEEE attaches to continuing government restrictions on technology transfer. The cases of government's attempts to restrict the flow of scientific and technical information in which IEEE is directly involved will be documented and monitored.

The Government Activities Council organized the 1984 Technology Policy Conference held on February 22 and 23 at the Hyatt Regency in Washington, D.C. The goals and objective of this conference were to have a bilateral exchange between the various governmental organizations and the technical community. The key speakers were Dr. George Keyworth, Director of the White House Office of Sciences and Technology Policy; Dr. Richard De Lauer, under Secretary of Defense Research and Engineering; Dr. Erich Block, Vice President of Technical Personnel Development of IBM; and Dr. Simon Ramo, Director of TRW. More than 300 attendees participated in this exchange. A reception at the Smithsonian Institute was held to unveil a new exhibit on the history of micro-electronics. The chairman of this Council is Mr. George R. Dean.

MEMBER ACTIVITIES COUNCIL

The Member Activities Council has been active in various areas relevant to the professional development and growth of IEEE members. The current active task forces and committees are: Salary Survey Task Force, Chairman, Dave McLaren; Professional Activities Committee for Engineers (PACE), Chairman, Harb Hayre; USAB Awards and Recognition Committee, Chairman, Herb Heller; Opinion Survey Task Force, Chairman, Alex Gruenwald; Student Awareness Task Force, Chairman, Larry Dwon; and Engineering Awareness Task Force, Chairman, Hans Cherney. The additional activities are Technical Conference Networking, Regional/ Divisional Funds, and the publication of the magazine entitled "IMPACT," Editor, Ben Leon. The 1983 IEEE Membership Salary and Fringe Benefit Survey was published and the survey for the 1985 edition is under way. Several Student Professional Awareness Conferences (SPACs) were organized by the Studend Awareness Task Force. The objective of the Technical Conference Networking task force is to increase member awareness of total USAB activities by presenting sessions, panels, and workshops by USAB at major EE Conferences. The Member Activities Council is also actively involved in pre-college education program. The Council also plays a key role in IEEE activities for the benefit and professional growth of IEEE members. The Chairman of this council is Dr. Charles K. Alexander.

CAREER ACTIVITIES COUNCIL

The Career Activities Council has appointed the following committees to meet its objective: Government Procurement and Regulations Committee, Chairman Valdemar Bodin; Pensions Committee, Benjamin Leon; Intellectural Property Committee, Orin Laney; Manpower Committee, Jack Doyle; Age Discrimination Committee, Walter Nial; Employment Assistance Committee, Richard

Backe; Ethics Committee, William Middleton; Licensure and Registration Committee, Wallace Decker; USAB/EAB Ad Hoc Committee, Lawrence Grayson; Entrepreneurial Activities Committee, Ronald Wojtasinski.

The Government Activities Council has initiated its activities in support of Pre-college Science and Math education. During this year a committee was formed to plan IEEE participation in understanding and seeking solution for this problem.

The Employment Assistance Committee has initiated a Professional Engineering Employment Registry (PEER) to help IEEE members in seeking employment. This service is a joint venture between IEEE and JobNet Inc. Under the terms of this venture JobNet will provide its computerized employment information to IEEE members in the United States without fee to IEEE or its members. This is a unique venture. It will help IEEE members in meeting their career objectives.

The Licensure and Registration Committee reviews the questions submitted for the PE exams. It works closely with the NCEE Professional Examination Advisory Committee (PEAC); and the NCEE Participating Organizations Laison Committee (POLC). The Career Maintenance and Development Committee has currently distributed the USAB position statement on "Professional Practices." The Pensions Committee has recently published a PACE Guide to Pensions. The committee is supporting the increased contribution limits for spousal IRAs, as is being proposed as a part of the Deficit Reduction Proposals in the U.S. Senate debate.

The Intellectual Property Committee (IPC) has reviewed the testimonies presented to the House Judiciary Subcommittee on Courts, Civil Liberties, and the Administration of Justice. The Manpower Committee has recently completed its review of the PACE publication on the alien engineer issue. The committee has begun work on IEEE position on manpower utilization and continuing education. Mr. Carl Bayless is the Chairman of the Career Activities Council.

TECHNICAL ACTIVITIES COUNCIL

The Technical Activities Council consists of the following committees: Energy Committee, Committee on Communications and Information Policy, Health Care Engineering Policy Committee, Research and Development Committee, Scientific Super Computer Committee, Productivity and Innovation Committee, and Environmental Quality Committee.

The Energy Committee has delivered four testimonies in response to the proposed 1985 Department of Energy Research Budget. These testimonies were on Magnetic Fusion Power Research, Energy Systems Research, the DOE programs in general, and on the DOE renewable and conservation research program. The Energy Committee also sponsored a seminar on "Breeder Reactors and Nuclear Fuel Cycle." This committee has also decided to play an active role in antinuclear state referenda which are emerging during 1984. The Energy Committee has appointed a subcommittee to understand, evaluate, and participate in emerging national issue on acid rain. This is the conjunction with the Environmental Quality Committee.

The Health Care Committee is examining the participation of engineering expertise on the governing board of a new health care technology.

The Research and Development Committee has presented six testimonies. These testimonies are in the areas of research in the National Science Foundation and National Bureau of Standards, the NASA Advanced Communications Technology Satellite Program, and the Department of Defense RDT&E Program. The R&D Committee prepared an analysis of electro-technology in the FY 1985 budget and submitted it to the American Association for the Advance of Science. The R&D Committee also sponsored its annual federal budget briefing.

The Productivity and Innovation Committee supported a high technology task force in preparation of a paper entitled, "Targeting the Process of Innovation." The Committee on Communications and Information Policy has been evaluating issues in connection with legislation dealing with electronic mail, cable TV, law enforcement, and privacy in data communication. The following subcommittees are currently active: Computer Privacy, Communications ACT Rewrite, Network Standards Policy, Technical Leadership, Professional/ Technical Resources, Legislation, Policy/ Technology Interaction, Technical Liaison with FCC. The Committee has discontinued the following committees: Industrial Productivity, Network Standards, Under Deregulation, Technical Characteristics of Networks. These tasks were completed.

Communications

J. R. Cruz
Communications Editor

ABSTRACTS

"Generation of Serial CPMFSK Signal", S.K. Ray, Proc. IEEE, vol 72, no. 1, Jan. 1984.

A "serial" or "one channel" approach to the design of an M-ary CPFSK (CPMFSK) generator of arbitrary modulation index has been described. Uniformly spaced quadrant samples of the signaling sinusoids are stored in a ROM, appropriately retrieved by means of a simple digital processor and finally passed through a digital-to-analog converter (DAC) followed by a discretely tracking low-pass filter (LPF) to generate the CPMFSK signal. The design and implementation procedure of the proposed generator has been presented.

"Phase-Locked Transparent Tone-in-Band (TTIB): A New Spectrum Configuration Particularly Suited to the Transmission of Data Over SSB Mobile Radio Networks", J.P. McGeehan and A.J. Bateman, IEEE Trans. Comm., vol. COM-32, no. 1, Jan. 1984.

The paper describes a new pilot tone SSB configuration, transparent tone-in-band (TTIB), which may be used in mobile radio systems from low-band VHF to microwave frequencies. By utilizing audio signal processing techniques in the transmitter and receiver, the pilot reference tone may be positioned centrally within the RF channel bandwidth without losing the property of data transparency and also retains the many system advantages of tone-in-band SSB over the pilot carrier and tone-above-band schemes. Besides speech transmissions, results are presented for noncoherent FSK and DPSK data formats under white noise and Rayleigh fading conditions. Finally, a new technique utilizing TTIB is suggested to facilitate the use of coherent data systems.

"The Trunking of Radio Channels in Private Mobile Radio Networks", J. de Boer and J.G. de Jager, Philips Telecomm. Rev., vol. 42, no. 1, 1984.

A considerable improvement of spectrum utilisation in mobile radio communication can be provided by radio channel trunking. Well known in public mobile radio systems, it can also be applied to private systems. The article describes some specific characteristics, defines a grade of service and, by computer simulation, finds that a spectrum gain of 1.8 to 5 can be reached. Some remarkable conclusions are reached, e.g. that PABX traffic, by its different nature, can improve efficiency when mixed with mobile speech traffic.

"Noncoherent Detection of Tamed Frequency Modulation", S. Bellini, M. Sonzogni and G. Tartara, IEEE Trans. Comm., vol. COM-32, no. 3, March 1984.

Continuous-phase, constant-envelope digital modulation schemes are useful in various applications where a high spectrum utilization as well as immunity to nonlinear distortion is required. From this point of view, typical efficient schemes are digital partial-response frequency modulation methods. The aim of this work is to investigate noncoherent detection in order to avoid the RF carrier recovery problem. In this paper we select for analysis tamed frequency modulation (TFM) as a particularly representative member of this class, but a similar analysis could be carried out for other partial-response digital FM systems. After an evaluation of the optimal noncoherent detection and of differential phase detection of TFM, we propose a demodulation method based on a simple and efficient baseband processing of the output of a frequency demodulator. It turns out that the power loss with respect to coherent or optimal demodulation of TFM is on the order of 2 dB. The baseband processing here proposed is in some way equivalent to a partial recovery of the carrier phase and could be improved by using a more complex baseband processing such as a decoding scheme based on the Viterbi algorithm.

"Generalized Serial MSK Modulation", A.R. Hambley and O. Tanaka, IEEE Trans. Comm., vol. COM-32, no. 3, March 1984.

A generalized form of the serial MSK (GSMSK) modem is presented. The impulse response of the conversion filter required to produce a GSMSK signal whose upward phase trellis arms have an arbitrary curvature is derived. Analysis is presented which shows that the proposed modem does not have intersymbol interference and that the BER performance is that of an antipodal signal set.

Numerical results are shown for a particular trellis curvature.

"Improved Coherent Detection of GMSK", M. Ishizuka and Y. Yasuda, IEEE Trans. Comm., vol. COM-32, no. 3, March 1984.

It is pointed out that the degradation effect due to premodulation filtering in GMSK (Gaussian-filtered minimum shift keying) is largest at the edges of time slots, which instant has been adopted as the sample timing in the conventional coherent detector of GMSK. Then a new coherent detector employing signals sampled at a different timing in a deviated-frequency-locking scheme is presented to achieve a better bit-error-rate performance versus carrier-to-noise ratio.

"PFX, a New Universal Portable", Q. Renni and J.R. Lange, Philips Telecomm. Rev., vol. 42, no. 2, 1984.

PFX is a synthesized 128 channel portable radio which uses the most up-to-date circuit techniques and component technology to meet present and future world market requirements. PFX meets international PTT specificatins and the construction combines cost-effective design with excellent reliability and performance in a small size.

"An Analysis of Quasi-Synchronous AM Mobile Radio Operation and Recommended Design Parameter Values", R.E. Fudge, IEE Proc., vol. 131, Part F, no. 2, April 1984.

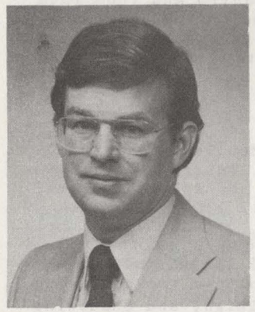
Quasi-synchronous operation of a number of base transmitters is often used to provide extensive area coverage in land mobile radio systems. An analysis is made of the responses of an AM receiver operating in such a system. The effects of automatic level control and the muting action are shown to nullify any predictions made of system performance based on harmonic distortion of sinusoidal modulating tones. A limited analysis of the types of distortion likely to arise from the mismatch of modulation between transmitters is made in order to give a guide to the parameters to be explored in subjective trials. The results of, first laboratory-based and subsequently field-based, trials are presented and from them recommendations are made for the allowable limits which should be used for the design and maintenance of a quasi-synchronous AM system.

"Outage Probability in Mobile Telephony Due to Multiple Log-Normal Interferers", Y.S. Yeh and S.C. Schwartz, IEEE Trans. Comm., vol. COM-32, no. 4, April 1984.

The mobile radio channel is characterized by three important factors: path losses larger than free space, fading typically taken as Rayleigh, and shadowing generally characterized as log-normal. For cellular systems, in order to determine acceptable reuse distances between base stations and to compare modulation methods, the probability of unacceptable cochannel interference (outage probability) has to be determined in the realistic situation where both fading and shadowing occur.

In this paper, the average outage probability is computed for centrally located base stations when multiple log-normal interferers are present. This is done for both the mobile-to-base and base-to-mobile communication links. An unexpected result of this study is that the outage probabilities for the two cases do not differ in a significant way.

Cumulative probability curves of the short-term average-signal-to-average-interference ratio (SIR) are presented for a variety of system parameters: channel set number, propagation law exponent (γ), and dB spread (σ) of the log-normal distribution for the signal and interferers. An important observation is the large sensitivity of the performance curves to the propagation parameters: for a system with seven channel sets with a 10 dB SIR threshold, the average outage probability varies from 10 percent for $\gamma = 3.7$, $\sigma = 6$ dB, to 70 percent for $\gamma = 3$, $\sigma = 14$ dB. Alternatively, for a fixed outage objective of 10 percent, the required SIR threshold value ranges from -17 dB to 11 dB, depending on the propagation parameters. These variations make it imperative that accurate measurements of these parameters be obtained for the different service areas. Outage probabilities are also easily related to specific modulation methods and diversity approaches; detailed results are given for several representative cases.



Automotive Electronics

Dateline: Detroit

Bill Fleming
Automotive Electronics Editor

GENERAL ELECTRIC MOBILE VIDEO CENTER

General Electric Video Products is awarding ten Vans during a sweepstakes promotion for families who don't want to stray far from music TV (MTV). In addition to the usual comforts, the video vans include receiving dish antenna; video monitor/tuner; video cassette recorder with Dolby Stereo, keyboard tuning, and four-head special effects; video camera; AM/FM stereo system; Color TV; CB radio -- even a G.E. microwave oven, coffee maker, and can opener [1].

Mobile Video Center

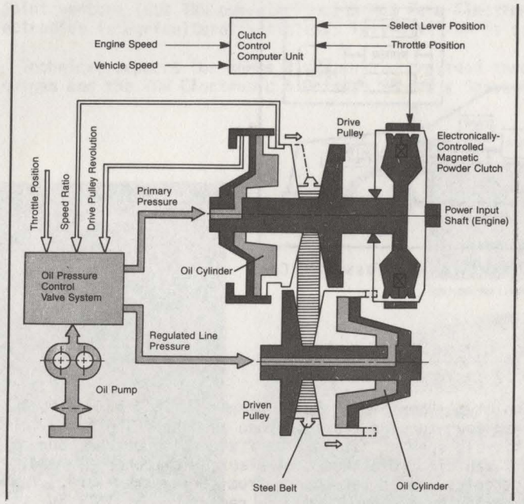
Video Electronic Entertainment Console

CVTS GO INTO PRODUCTION

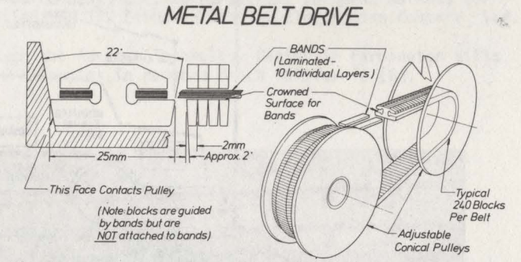
1984 will see the appearance of a number of production cars fitted with continuously variable transmissions, both in Europe and in Japan. Currently leading the field are Subaru, Fiat and Ford, with GM following close behind. CVTs are being fitted to small front-wheel-drive cars and basically are all using Van Doorne CVT technology. The CVT will be lighter, have fewer parts, greater reliability, and have fuel economy good or better than that of a 5 speed manual transmission. Although some of the CVTs going into production will have basically conventional hydraulic shifting mechanisms, similar to those used in standard automatic transmissions, most companies are furiously developing electronic control systems [2-4].

Electronic Control of the CVT offers superior shift quality and transmission shift features otherwise unobtainable. For example, shifting from neutral to drive or from neutral to reverse can be optimized for low and high idle engine speeds to avoid shift jerks and drive train reactions. In a normal drive position with moderate accelerator pedal pressure, the engine will speed up to about 1600 rpm before the CVT begins to change gear ratios. Engine speed and gear ratios climb continuously from that point. On the other hand, a sport drive gear selection can be selected. In this position, engine speed is generally kept above 3,000 rpm [2,4]. Thus the driver will be able to select different modes of operation depending on whether he wants performance or fuel economy from his vehicle. The control strategy will be stored in a microprocessor memory in the form of engine maps comprising speed/torque data tables. So far most problems associated with the electronics are related to sensitivity of electronic components and sensors to the high temperatures encountered in the CVT system.

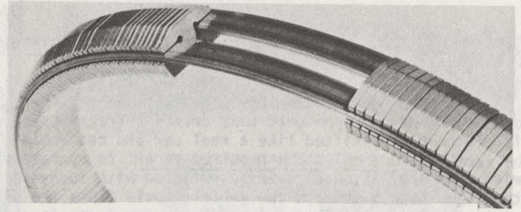
The biggest question may be one of public acceptance. In small-engine cars where CVTs will initially be used noise may be a problem. For some, just the different sensation of a CVT compared to the normal gear box may be a problem. Moreover, the CVT must withstand development of automatically shifted five-speed manual and six-speed manual transmissions which are under development at companies such as Isuzu and Ford [2].



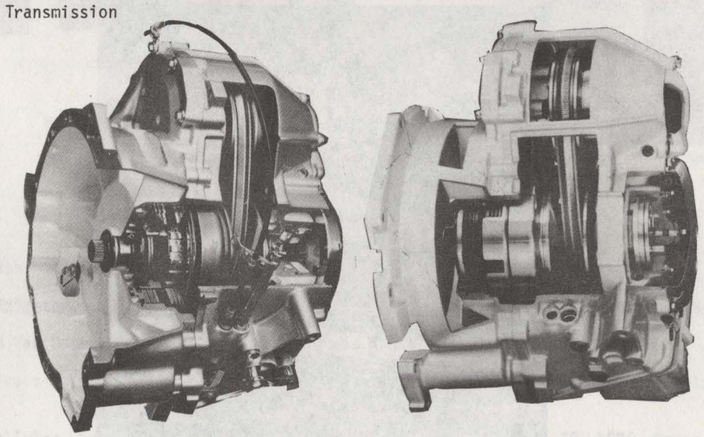
Schematic Diagram of Subaru Electro-Continuously Variable Transmission



This diagram shows how the metal belt rides on the variable diameter pulleys.



Compression-Loaded Steel Belt Used in CVT

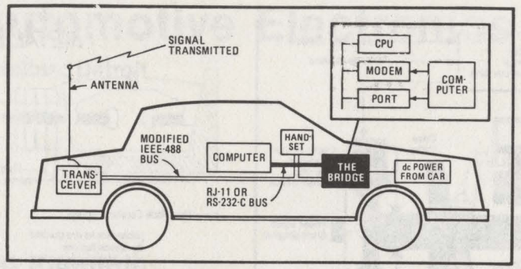


CVTs Under Development by Ford (Left) and Fiat (Right)

MOBILE OFFICE

With cellular radio-telephone communications rapidly becoming more than just talk, the airwaves may soon be filled with computer-data transmissions as well. A new modulator-demodulator system that guarantees error-free 300- or 1200-bit per second data transmissions to and from moving vehicles has been announced [5]. Called The Bridge, the system is designed to serve a wide range of portable-computer applications, particularly communications in field sales, repair services and mobile on-line links to mainframe data bases. It brings the concept of the portable office into reality.

Error eliminating firmwear which must be resident at both ends of the transmission to insure data integrity, has an algorithm that senses when a vehicle is driving out of the coverage of one cellular-transmission cell and into another. The Bridge compensates for blank-and-burst periods, which last about 100 miliseconds and which take place when cellular radio systems halt communications to hand off signals from one cell transmission station to its neighbor. The system has been designed for worst-case blank-and-burst times of 350 miliseconds. The Bridge will cost $300 in its basic configuration, with RJ-11 phone jack, power supply, and microphone.



Schematic Diagram of Mobile Office in a Passenger Car

TO HELL WITH ELECTRONICS, GIVE ME A GOOD HORSE

Philip Barnes of Manea England developed his third prototype "Horseicle" [8]. Barnes put his horse, Polly, onto a rubber conveyor belt that drives a transmission with four forward gears and one reverse. The "Horseicle" is clutched and shifted like a real car and can achieve bicycle speeds. It is also fitted with brakes, and to be sure no electronics are required at all to operate this vehicle. Die hard anti-electronic proponents who wish that vehicles had never been fitted with todays electronics should take heart from seeing this vehicle. On the other hand I suspect the vehicle would flunk the EPA pollution standards on many regards, certainly on solid particulates (although few in number, very large in size) and possibly also flunk on gaseous emissions.

An Honest HorsePower

TRW TRANSPORTATION ELECTRONICS GROUP

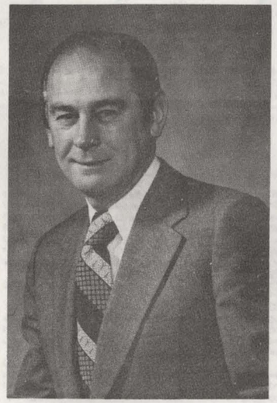
"Few people jump into the future with a verve and enthusiasm of TRW's Trevor O. Jones. Whether the subject is engines, mobile equipment or commercial trucks, Jones has the knack for establishing the frontiers of tomorrow through analysis of the basic needs of today [6,7]." Trevor has been the prime mover responsible for the rapid growth of the Transportation Electronics Group which contributes a growing share of business to TRW's Automotive World Wide Sector, which is part of TRW's nearly 6 billion dollars worth of sales in energy, defense and automotive activities.

Trevor's Transportation Electronics Group, headquartered near Cleveland Ohio, is now the parent organization for seven operating divisions around the globe, each dedicated to providing the latest in electronics technology to vehicle and engine marketplaces. Examples are the stationary engine electronics from the Fort Lauderdale Florida-based Dynalco Controls Division and the off-highway and agricultural instrumentation from the Eagle Controls Division in Addison, Illinois. A wide range of diesel engine controls for trucks and passenger cars are also manufactured at the Transportation Electronics Division in Farmington Hills, Michigan [7].

Overseas, the Transportation Electronics Group operates the Tokai Electronics Controls Laboratory in Nagoya Japan to serve the Asian marketplace and the Probe Electronics Company in Cirencester England which produces the LOADAX electronic weighing system. The newest addition to TRW Group is also based in the United Kingdom; it is

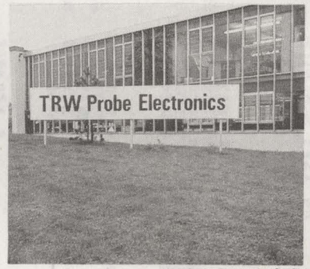
a joint venture (60% TRW ownership) with RDS Farm Electronics Company, Ltd. to pursue the European markets for electronics in agricultural vehicles. This division is called the TRW European Tractor Electronics Company, Ltd.

Technical support for these divisions is provided through the Advance Technology Center in Farmington Hills, Michigan and the TRW Electronic & Defense Sector's Space Park Complex in Redondo Beach California [6].



Trevor O. Jones

Transportation Electronics Division/Advance Technology Center



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