Schematic Diagram of a Mobile Office in a Passenger Car
President's Message

Sam McConoughy
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 Christmast, and a Happy and Prosperous 1984! And last but not least, a Happy 80th Birthday to Board Member, Life Fellow, and Centennial Medal recipient, Fred Lim. 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 instantaneous communications, we are 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 Communications Engineering"? We've had so many compliments about it, and at this writing, nearly 400 copies have been sold. Not bad for 3 months sales. And at $9.95 for Members, a real bargain.

Did you see the "Call for Papers" for the VTC '84 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, 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 privilege of our Republic...exercise it!

By pleas for volunteers to serve in the VTS has not gone unanswered. 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 to the technical session were highly favorable and interest in IEEE & VTS and ordering our Press Book ran high.

Your Board of Directors and Committee Chairmen will have set during the Convocation '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 Isenberg, Life Fellow has agreed to chair our Fellow Committee, relieving Jim Niklasik who had to resign due to the press of other duties.

Tampa plans to bid for the conference site for VTC '87. Anyone else? Now 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 our 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 McConoughy
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November 1984

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Activities
Best regards.

IEEE Vehicular Technology Society Newsletter
November 1984

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 approaching when the IEEE is looking for Fellows 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 nominations kits are available and will be furnished upon request from:

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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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 404
Boulder, CO 80309

Summaries should be typed single-spaced with a 2 inch left margin in a 4 inch column with a 1 1/2 inch top and bottom margin. The title, names, and affiliations should be included, with a complete address and telephone number.

Authors will receive notice of acceptance by January 1, 1985. The complete 2 page manuscript should be submitted by March 1, 1985, and will be published in the 35th Vehicular Technology Conference Record which will be available at the conference.

Just Published
3. LAND MOBILE COMMUNICATIONS ENGINEERING

Edited by Dennis Section, National Communications Laboratory, George McCulloch, Bell Communications Research, Inc., and Carl A. Rady, University of Arizona. The first volume in the Advances in Radio Engineering Series sponsored by the IEEE Vehicular Technology Society and the IEEE Communications Society. The book will shortly be available to order through publications. It is aimed at those interested in the engineering aspects of the design, implementation, and operation of land mobile radio communications systems. It is particularly intended for the bands below 1 gigahertz, as well as the more familiar lower frequency bands. The book emphasizes the design of radio systems as an engineering discipline, and includes chapters on propagation, antennas, and transmitters as well as system design and implementation. The book is intended for engineers or students who have an understanding of the principles involved and who wish to become familiar with the practical aspects of land mobile radio systems.
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Transporation Systems

David B. Turner
Transportation Systems Editor

The entire history of the railroads reflects the technological developments of the times. Track 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 the decade, the great discoveries of communications and electrical engineering have found application on the railroads, to increase 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 technologies can deliver.

However, these strata of technical use create powerful opportunities for cost-effective advance 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, railroad customers and competitors. The need for this 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 resources will be utilized 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 hierarchical 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 new technologies 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 upgradable 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 replaced or replaced.

ATCS must provide the railroad 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 32 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 indicate 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 requirement 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 acknowledgment of the enormous power which the technologies have to economically and efficiently provide existing and extended functions for control of railway operations.

---

Gasper Messina
Editor and Chapter Activities Chairman
IEEE Vehicular Technology Society Newsletter
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 who have professional matters within the Institute. On this occasion we are able to make presentations 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 grassroots activities that provides a link between the members in Sections and Societies and the policy 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. I have summarized one of the many items discussed and presented 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 Young Members” were two pamphlets furnished by the Internal-External Communication Committee. The following information from the 1983 Congressional Fellows, OnNEF, and the Institute Circulation, was prepared. The Congress Fellows for 1983 are: Guy Copeland (University of California, Los Angeles, Calif), the Emidstone (University of California, Los Angeles, Calif), and K. F. Lai (1983). The Technology Transfer Committee has initiated a paper to restate the importance of USAB attaches to continuing government restrictions on technology transfer and has sent a letter to the government’s attempts to restrict the flow of technical information within USAB. This is directly involved will be documented and monitored.

The Government Activities Council organized the 1984 Technology Policy Conference held on February 20 and 21 at the Regency in Washington, D.C. The goals and objective of this conference were to have a bilateral exchange of information between various governmental organizations and the Institute. The technical committee chairmen were Dr. George Keworth, Director of the White House Office of Science 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 conference. A presentation at the Smithsonian Institute was held to unveil a new computerized information system for electronics. The chairman of this Council is Mr. George R. Stearns.

MEMBER ACTIVITIES COUNCIL

The Member Activities Council has been active in various areas related to the professional development and growth of IEEE members. The current active task forces and committees are: Salary Survey Task Force, Chairman, James Pale; Professional Activities Committee for Engineers (PACE), Chairman, Herb Hopf; Usability Conference (USAC), Member and Recognition Committee, Chair, Herb Haller; Opinion Survey Task Force, Chair, Alex Gruenwald; Student Awareness Task Force, Chairman, Larry Donn; and Engineering Awareness Task Force, Chair, Russ Cherney. The additional activities are: Technical Conference Networking, Regional/Divisional Forums, and the publication of the magazine entitled “IMPACT,” edited by Ben Leon. The 1983 IEEE Membership Salary and Safety Benefit Survey was published and the survey for the 1985 edition is under way. Several Student Professional Awareness Conferences (SPACs) were organized by the Student Awareness Task Force. The objective of the Technical Conference Networking task force is to involve the active technical areas of total USAB activities by presenting sessions, panels, and workshops by USAB at major EE Conferences. The Committee is also actively involved in pre-college education. The Committee also plays a key role in IEEE activities for the benefit of the educational system.

CAREER ACTIVITIES COUNCIL

The Career Activities Council has appointed the following committees to meet its objectives: Government Procurement and Examination, Regulations, Government; Denis Boll; Pensions Committee, Benjamin Leon; Intellectual Property; Chairman, Joseph Laney; Employment Committee, Jack Doyle; Age Discrimination of Personnel; Employment Assistance Committee, Richard Back; Ethics Committee, William Middleton; Licensure and Registration Committee, Wallis Reid; USAB/IEEE Ad Hoc Committee, Lawrence Grayson; Entrepreneurial Activities Committee, Ronald Wasielewski.

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 the problem. The Employment Assistance Committee has initiated a Professional Engineering Employment Registry (PEER) to help USAB 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 employment needs.

The Licensure and Registration Committee has reviewed the questions submitted for the PE examination taken by the members of the International Conference for Professional Examination Advisory Committee (PCAC), and the NCEC Participating Organizations Licensure 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 Pension Plans. The AKH Committee has been supporting the increased contribution limits for spousal Individual Retirement Accounts as a part of the Deficit Reduction Proposals in the U.S. Senate debate.

The Intellectual Property Committee (IPC) has prepared a letter of recommendation for the House Judiciary Subcommittee on Courts, INS, and the District of Columbia of Justice. The Manpower Committee has reviewed its manual of the PACE publication on the allen engineer issue. The committee has taken a position on manpower utilization and continuing education. Mr. Carl Beytes is the chairman of the Career Activities Council.

TECHNICAL ACTIVITIES COUNCIL

The Technical Activities Council consists of the following committees: Energy Committee, Finance 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.” The committee has also decided to play an active role in antinuclear state referendum which are emerging during 1984. The Energy Committee has appointed a subcommittee to understand, evaluate, and participate in emerging national issues on acid rain. This is the conjunction with the Environmental Quality Committee.

The Health Care Committee is examining the participation of the computer engineering expert 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, the National Bureau of Standards, the NASA Advanced Computer Technology Program, the National Institute of Standards and Technology Program, and the Department of Defense Technology Program. The R&D Committee has prepared an analysis of electro-technology in 1985 and the introduction of 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-level task force for preparation of a paper entitled, “Targeting the Productivity and Innovation Committee on Communications and Information Policy have been evaluating issues in connection with legacy and public electronic mail, cable TV, law enforcement, and proximity data communication. The following subcommittees are currently active: Computer Privacy, Communications ACT Rewrite, Network Standards Policy, Technical Leadership, Technical Resources, Legislation, Policy/Technical Interaction, Technical Liaison with FCC. The Committee has discontinued the following committees: Industrial Production Standards, Deregulation, Technical Characteristics of Networks. These tasks were completed.
Communications

J. R. Cruz
Communications Editor

ABSTRACTS


A serial or "one channel" approach to the generation of the modified CMPSK (modulated CMPSK) signal has been presented. This approach is simple and concise. It is applicable for both digital and analog modulations. The discussion is based on the assumption that the signal is to be transmitted over a single channel.


Continuous-phase, constant-envelope digital modulation schemes are used to combat fading in the presence of nonstationary channels. The proposed technique is based on a tapped frequency modulation (TFM) filter bank. The TFM filter bank is designed to have a constant envelope in the time domain and to provide a constant envelope in the frequency domain. The proposed technique is shown to be superior to the conventional frequency modulation (FM) technique in terms of the signal-to-noise ratio (SNR) and the bit error rate (BER).


FRA is a synthesized 128 channel portable radio whose channel list is in the most up-to-date format. The device meets all ITU-T specifications and is a significant improvement over previous models. The FRA is designed for use in a variety of environments, from remote locations to large cities.


Quasi-synchronous AM mobile radio operation is often used to provide extensive area coverage in large mobile radio systems. An analysis is made of the QAM receiver performance when it is operating in such a system. The effects of multiaccess interference and multipath fading are analyzed and the recommended design parameters are presented. The analysis is based on the assumption that the type of distortion likely to arise from each transmitter is independent of the other transmitters and that the probability of errors is determined by the BER of each channel.


A generalized form of the serial MSK (GSM) modem is presented. The impulse response of the channel is estimated and adjusted to produce a GSM signal whose power is proportional to the ratio of the channel bandwidth and the symbol rate. The effect of the channel on the signal is simulated. The performance is analyzed and compared with the performance of the conventional MSK modem. The proposed modem does not have intersymbol interference and has a lower symbol error probability than the conventional MSK modem.

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November 1984

Numerical results are shown for a particular trellis curvature.


It is pointed out that the degradation effect due to premodulation filtering in CMSE (Coherent-Matched-Filter Estimator) is caused by the phase error resulting from the use of a discrete-time estimator. A proposed method has been adopted as the sample timing in the conventional coherent detector of CMSE. This new coherent detector employs signals sampled at a different timing in a delayed-frequency-locked loop scheme to achieve a better bit-error-rate performance versus carrier-to-noise ratio.


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, it is important to determine the time-varying and time-variant power of the received signal. From these, the outage probability can be calculated. A ray-tracing model is used to compute the outage probability for two rays and both fading and shadowing.

Outage probability is computed for a variety of path-loss distributions. Results are given for a variety of system parameters: channel number, baseband bandwidth, and shadowing power. Cumulative probability curves of the short-term average-log-normal duration are presented for a variety of system parameters. A large shadowing power does not affect the network performance.

An important observation is the large sensitivity of the outage performance to the short-term average lognormal distribution. It is shown that the outage probability varies by 10 percent in the order of 10 percent in the range of the shadowing power. It is recommended that the delay is used for all propagation parameters. These variations are seen to have little effect on the final design of the system. Outage probabilities are also easily compared by using the Rayleigh diversity approach. Details on the system are given for several representative cases.

*Outage Probability in Multiple Log-Normal Interferers is a joint publication between the IEEE Vehicular Technology Society and the IEEE Antennas and Propagation Society.
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 stay far from basic TV (MTV). In addition to the usual comforts, the vans include receiving dish antennas; 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].

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 G.E. following close behind. CVTs are being fitted to small front-wheel-drive cars and basically are all using the Koenne 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 unattainable. 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. In the other hand, a sport drive gear selection can be selected. In this position, engine speed is generally kept above 3,000 rpm (+1). 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 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].

With cellular radio-telephone communications rapidly becoming more than just talk, the availability may soon be fitted with computer-data transmissions as well. A new modulator-demodulator system that guarantees free 300- or 1200-bps 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 fields sales, repair services and mobile on-line links to mainframe data bases. It brings the concept of the portable office into reality.

Error eliminating firmware 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 milliseconds 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 300 milliseconds. The Bridge will cost $300 in its basic configuration, with RJ-11 phone jack, power supply, and microphone.
TO WELL WITH ELECTRONICS, GIVE ME A GOOD HORSE

Phillip Barnes of Hamea England developed his third prototype "Horseiicle" [8]. Barnes put his horse, Polly, onto a rubber conveyor belt that drives a transmission with four forward gears and one reverse. The "Horseiicle" 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. The hard anti-electronic proponents who wish that vehicles had never been fitted with today's 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 marketplace. Examples are the stationary engine electronics from the Fort Lauderdale Florida-based Dynaco 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 Cheltenham England which produces the LODAX electronic weighing system. The newest addition to TRW Group is also based in the United Kingdom; it is a joint venture (60-40 TRW ownership) with ASD 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].

REFERENCES
4. A. Hope, "CVT: Drivers Impressions are Crucial," Automotive Engineer (GD), February/March, 1984, Pages 47-49.
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