



# VEHICULAR TECHNOLOGY SOCIETY

## NEWSLETTER

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Editor: A. Kent Johnson

### 37th Annual Conference



The VTS Board of Governors Meeting

June 1-3, 1987

# President's Message



**Stuart Meyer**  
President  
IEEE Vehicular Technology Society

On Wednesday, June 3, 1987 our Board of Governors elected me president of the Vehicular Technology Society. Once before I had this high honor, by serving as your president for two terms, ending with our annual conference in Toronto four years ago.

Outgoing President Bob Fenton and Vice President Roger Madden deserve a rousing round of applause for their "well done" performance this past two terms. Fortunately for me, they have indicated a desire to remain on the board. This will be of considerable help to yours truly. The above referenced board meeting was held as this years annual Vehicular Technology Conference at Tampa, Florida was winding down. Conference chairman Alan Gondeck and his committee deserve our standing ovation for a very successful event.

One of my targets as your new president is to help increase chapter activity and I invite you to get in touch with me that subject. Possibly we can arrange for a mutually agreeable date for me to speak before your local group.

George McClure of Orlando, Florida was elected Vice President and Arthur Goldsmith was re-elected Treasurer. In addition, I have reappointed Sam Leslie as our secretary and he has accepted this continuing assignment.

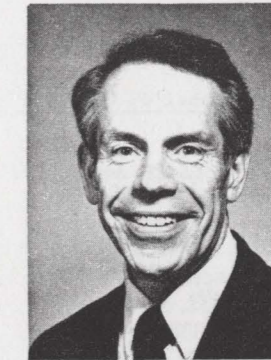
Since my picture and message last appeared on this page, I have retired from the E.F. Johnson Company as director of government and industry relations and I am now devoting considerable time and effort in serving organizations such as our Vehicular Technology Society. I look forward to meeting you for the first time (or again and again) at the many trade shows and activities around the country and especially at your local chapter meetings.

Most Sincerely,  
Stuart Meyer  
2417 Newton Street  
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# Editor's Notes



**A. Kent Johnson**  
Newsletter Editor

Our Annual Conference in Tampa was a huge success and Alan Gondeck and his committee deserve a big vote of thanks from all of us. We appreciate the conference information and photographs which are included throughout the newsletter.

One of the highlights of the Board of Governors meeting following the conference was the transfer of the Society Presidency from Robert Fenton to Stuart Meyer. Those of us who have worked closely with Bob appreciate his efforts very much and extend our thanks to him while at the same time we look forward to working with Stu because we know of his dedication and great experience.

Month of Issue	Final Copy to be Rec'd By VTS Editor	Target Mailing Date
November	9-13-87	10-15-87
February	12-30-87	1-27-88
May	3-10-88	4-14-88
August	6-09-88	7-13-88

# Society Officers and Board of Directors

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## BOARD OF DIRECTORS

NAME(Term thru)	RESPONSIBILITY
Robert E. Fenton(88)	Junior Past President
Arthur Goldsmith(87)	Treasurer
Leo M. Himmel(89)	Chairman, Education Committee
A. Kent Johnson(89)	Newsletter Editor
Samuel A. Leslie(89)	Society Secretary
Fred M. Link(89)	Chairman, National Site Selection
Charles Lynk(88)	Chairman, Paper of Year Comm.
Roger Madden(87)	Chairman, Constitution revision
Robert A. Mazzola(87)	Chairman, Membership Comm.
George F. McClure(88)	Vice President, Chairman of Publications Comm. and Transactions Editor
Samuel R. McConoughey(89)	Senior Past President
Stuart Meyer(88)	President
William Misskey(87)	Canadian Editor, Newsletter
Evan B. Richards(87)	National Conference Coordinator
Eric Schimmel(88)	Chairman, Personal Radio Comm.

# Board of Directors Report

## Samuel A. Leslie VTS Secretary

### MINUTES OF THE IEEE VTS BOARD OF GOVERNORS MEETING

The IEEE VTS Board of Governors met on June 3, 1987 in conjunction with the 1987 annual Vehicular Technology Conference in Tampa, Florida. The meeting was called to order at 1:05 PM.

### ROLL CALL

The following were in attendance:

# Robert E. Fenton	President
# Arthur Goldsmith	Treasurer
Al Isberg	Fellows Committee
# Kent Johnson	Newsletter Editor
W. C. Y. Lee	Communications Editor
# Sam Leslie	Secretary
# Fred Link	Conference Site Sel.
# Chuck Lynk	Awards Committee
# Roger Madden	Vice President
# George McClure	Transactions Editor
# Sam McConoughey	Junior Past President
# Stu Meyer	Senior Past President
# Bill Misskey	Assoc. Trans. Editor
Jack Neubauer	Standards & Awards
# Evan Richards	Conference Committee
Neal Shepherd	Propagation Committee
Dave Talley	Financial Advisor
Frank Thatcher	1989 San Francisco Conf.
Tony Eastham	Transportation Systems

(# denotes elected Board member)

Twelve of the eighteen present were elected Board members. A minimum of eight elected is necessary for voting on matters that come before the Board. Thus, a quorum was present.

Fred Link moved, Kent Johnson Madden seconded that the minutes of the February 5, 1987 Board meeting be approved as published. The vote was unanimous in favor.

## VICE PRESIDENT'S REPORT

Roger Madden summarized the results of the last IEEE TAB meeting, and noted that the COMSOC proposed change of scope to include vehicular communications has been indefinitely put on hold.

It was also noted that Roger is running for the Division III Director's slot. The board members unanimously wished him well in this endeavor.

## TREASURER'S REPORT AND FINANCIAL ADVISER'S REPORT

Arthur Goldsmith submitted his treasurer's report, and noted that the Society finished the 1986 year with a surplus of \$30.2K. 1987 is being predicted as a break-even year, with a surplus of \$21K being budgeted for 1988. Also, Art stated that the Dan Noble Scholarship fund currently has a balance of \$99K. Dave Talley presented his financial adviser's report, and noted that the Society's membership has more or less remained constant with some seasonal variations. Sam McConoughey moved, Bill Misskey seconded that the treasurer's and the financial adviser's reports be accepted as presented. The vote was unanimous in favor.

## CONFERENCES AND MEETINGS

### 1989 VTC San Francisco Conference

Frank Thatcher and Al Isberg reported on the planning progress for the 39th Conference to be held in San Francisco. The dates for this conference have tentatively been selected for April 30 through May 2 or possibly May 3, 1989.

Frank Thatcher also reported that the San Francisco Chapter has planned a Vehicular Communications Development Seminar for June 11, 1987, as a means of increasing chapter participation.

Tony Eastham reports that ASME is reluctant to have their ASME/IEEE Joint Railroad Conference in conjunction with the 1989 VTC, primarily due to the scheduling of their winter annual meeting in San Francisco in 1988. However, they have agreed to co-sponsor with the Land Transportation Division of VTS two sessions at the 1989 VTC. The annual ASME/IEEE Joint Railroad Conference will be held in a location further east, possibly Kansas City.

Evan Richards moved, Fred Link seconded that up to \$2000 seed money be provided to the San Francisco VTS Chapter to aid with start-up expenses, contingent upon submission of a proposed IEEE-format budget. The vote was unanimous in favor.

### 1987 Tampa VTC Conference

Alan Gondeck, the Tampa Conference Chairman, reported that the conference was a success with the attendance being 262, expenses being around the \$27K mark and income being nominally \$34K.

Fred Link moved, Roger Madden seconded that Alan Gondeck be authorized to treat the Tampa Conference Committee members to a dinner meeting in recognition of their volunteer help in putting on the conference. The vote was unanimous in favor.

### International Conference on MagLev & Linear Drives

A written report from Tony Eastham indicates that

this conference, which was held on May 19-21 was a success with 35 papers being presented and printed in the proceedings. This conference was co-sponsored by VTS with no financial obligation. This conference is scheduled to be held in Germany next year.

### 1988 VTC Philadelphia Conference

The theme for the Philadelphia VTC is "Telecommunications Freedom - Technology on the Move. A call for papers has been printed and mailed. John Galanti is the chairman for this conference, and Bob Swint is to be the liaison between the VTC and the ICC functions, both being held in Philadelphia the same week. The 1988 VTC is scheduled for June 15-17.

Evan Richards moved, George McClure seconded that up to \$2000 seed money be provided to the Philadelphia conference committee contingent on the receipt of a request for funds and a conference budget that is formatted in the required IEEE format. The vote was unanimous in favor.

### EUROCOM '88, June 13-17, Stockholm

The VTS is affiliated with this conference but has no financial responsibility or interest. The Eurocom conference committee has asked for a distinguished speaker from the U.S. for this conference. The Board noted that the scheduled dates for this conference conflicts with the Philadelphia VTC, but that a determined effort should be made to find a volunteer with distinguished status since this is a well-known European Conference. The Board further discussed the feasibility of offering an honorarium to such a speaker.

Roger Madden moved, Evan Richards seconded the establishment of an honorarium in the amount of \$1000 to sponsor a distinguished speaker for the Eurocom '88 Conference. The motion passed with 9 in favor, 1 opposed and 2 abstaining.

The president appointed a three-man committee consisting of Chuck Lynk, Kent Johnson, and Sam McConoughey to locate a volunteer speaker of distinguished status for this conference.

### Scandinavian Distinguished Speaker Tour

A request to provide distinguished speakers for two tours was also discussed. The first tour in the spring of 1988 involves electric power, and the second tour in 1989 involves communications. Each tour would take place over a one-week period (total) with a series of seminars being given in different cities in Scandinavia. The Board liked the idea, but noted that no action was required at the present since the subject for the first year is not in VTS's domain. Rather, the board is interested in monitoring the success of the first year's tour before committing to obtaining a volunteer for the communications tour in 1989. Bob Fenton is to answer their request indicating that the VTS likes the idea and that we will proceed pending the outcome of the first tour.

### Annual Conference on Road Traffic Data Collection

A query has been received from IEE in London in regard to whether VTS would be willing to be associated with this conference. After discussion, Roger Madden moved, George McClure seconded that VTS

is willing to be associated with this conference (with no financial interest), and that VTS would publicize this conference in the U.S. through the VTS's usual publicity channels. The vote was unanimous in favor. The Secretary is to correspond with IEE to inform them of our desire for association with this conference.

#### Convergence '88 Conference

A letter from Bob Mazzola, IEEE Convergence Liaison, indicates that plans are well under way for next year's conference. The conference is scheduled for October 17-18, 1988, at the Hyatt Regency Hotel in Dearborn, Michigan. Bob also requested that publicity be given to the conference at the VTS annual conferences as well as other mediums.

#### 1987 Joint IEEE/ASME Railroad Conference

Tony Eastham reported that this conference was held at the Royal York Hotel, Toronto, April 21-23, 1987. This conference was also a solid success with 135 delegates attending. Twenty-two papers were published in the conference proceedings.

#### 1989 VNIS Conference

The VNIS (Vehicle Navigation & Information Systems) is a new conference that is being started by the Toronto IEEE VTS Chapter. It is in the early stages of planning, but is expected to be held in Toronto some time during the month of May in 1989. The chapter is asking VTS to co-sponsor this conference. The Board discussed this issue at length, with two major concerns emerging. The first concern is the planned period for the conference, which is in the same month as the annual VTC in San Francisco. The second concern is with the proposed budget, which was felt by the Board to be too optimistic for a start-up conference. However, the sense of the Board was that the Toronto Chapter should be strongly encouraged to follow through with this conference.

Roger Madden then moved, Bill Misskey seconded that the Conference Coordinator Chairman convey the Board's encouragement to the Toronto Chapter, but that the conference date and secondly the budget will need to be negotiated to avoid conflicts. The vote was unanimous in favor.

One suggestion that was put forward after the motion was voted on was that the Toronto Chapter may consider participating in the 1988 Philadelphia VTC with a session or sessions devoted to vehicular navigation.

#### 1990 VTC

Fred Link and Evan Richards both reported that they have been unable to generate any support from VTS members in Detroit for the annual VTC in that city. Fred further reports that Orlando is more than willing to have the VTC in their city. Fred Link thus moved, Bill Misskey seconded that the Board accept Orlando's request for the 1990 VTC. The vote was unanimous in favor.

#### 1991 VTC

After the locations of Chicago, Tokyo, Washington D.C., Cleveland, Toronto, St. Louis, and Kansas City

were mentioned, the Board decided to concentrate on Washington D.C. and Cleveland as the two most promising locations for the 1991 VTC.

#### CTIA Conference

The board noted that CTIA is having a conference in digital communication technology on June 17. This subject is of common interest to many of the VTS members, the board directed the conference coordinator to explore the possibility of cooperating with CTIA on a co-located but separate conference in conjunction with our annual VTC conferences.

#### PUBLICATIONS

George McClure reported that publication schedules have been pretty close on schedule, but that the May issue is running behind. He expects the August and November issues to be pretty close to schedule. He also anticipates that the number of papers published per issue to increase from the present average of five or six to around ten. This could be achieved by the use of invited papers, tutorials, and applications-oriented papers as well as the use of special issues.

George is also still working on topics for special issues, and welcomes any inputs from VTS members.

Kent Johnson reported that the publication of the VTS newsletter continues to run smoothly, with the usual problems of getting inputs in a timely manner from the editors.

Bob Fenton reported that he still hasn't received VTS's portion of papers from the 1986 joint VTS/IES Convergence workshop.

#### COMMITTEE REPORTS

##### Transportation Systems

Tony Eastham reports that the new chairman for the Land Transportation Division of VTS is Al P. Engel.

##### Constitution and Bylaws

Roger Madden reported that IEEE HQ indicates that minor editing of the Society's proposed Constitution revision is required before it can be mailed to the VTS membership for ratification. Art Goldsmith moved, Kent Johnson seconded that Roger Madden be authorized to approve the necessary editorial changes to the proposed constitution when they are received from IEEE HQ. The vote was unanimous in favor.

##### Membership Report

Jim Sears reported that Mark Sihlanick is no longer able to serve as membership chairman due to work commitments. He reported that the membership brochure has been updated for 1987 with the correct membership rates.

Jim asked for suggestions on how to increase membership, and a suggestion was made that the registrants for future VTS conferences be given the opportunity of joining VTS (and IEEE, as appropriate) as a part of the registration process, possibly with an attractive discount. After discussion, the sense of the board was that this was an excellent idea. The membership chairman was thus charged with the task

of implementing this idea for future conferences.

#### Publicity

Bob Fenton passed around two issues of the IEEE Student Potentials magazine with the VTS membership ad. A note from Bob McKnight indicates that he has not receiving advance information for many conferences in a timely manner, and that several opportunities are being missed for publicity. The sense of the Board was that the publicity chairman, Bob McKnight, is continues to to an excellent job with publicity, and that the conference committees and the secretary should strive to get information to the publicity chairman in the future as early as possible.

#### CCIP Representative

Stu Meyer reported that the CCIP committee as decided on a non-controversial approach of listing the pros and cons of regulatory issues, and not to take a stand that may not be representative of the general membership.

#### USAB Engineering R&D

Art Goldsmith reported that little or no activity has taken place with the USAB committee since the last Board meeting.

#### Coordinating Committee on Transportation

Likewise, Art Goldsmith reports no activity by this committee for the past several months.

#### Transportation Electronics Fellowship

Roger Madden reported that this fellowship has been approved by the IEEE Executive Committee, subject to the submission and approval of an administration plan by the IEEE foundation. Roger stated that he will follow up with the administrative details, and that he is striving for the awarding of the first Transportation Electronics Fellowship this fall.

#### Noble Fellowship

The Noble Fellowship committee has selected Mr. Theodore Stoner as the 1987 recipient for this fellowship.

Although the Board voted last year to increase the amount of the award from \$5000 to \$7500, the paperwork with the Fellowship has not been changed to reflect this increase. Thus, Chuck Lynk moved, Roger Madden seconded that this year's recipient be awarded the \$7500 amount, provided that arrangements can be made in a timely manner through the appropriate IEEE channels. The vote was unanimous in favor. The Noble Awards chairman, Tony van den Heuvel, is to expedite the amount change with IEEE.

#### Chapter Activities

Stu Meyer indicated that a letter writing campaign is being considered to improve the reporting of chapter activities.

#### Standards

Jack Neubauer reported on the problems with IEEE Standard 263 being overdue for reaffirmation, and the proposals by IEEE EMC and SAE to drop this standard since the SAE 551 standard appears to somewhat parallel IEEE 263. Jack Neubauer thus moved, Roger Madden seconded that VTS should also consider letting this standard expire rather than being renewed.

Subsequent discussion centered on the impact on the mobile communications industry, since the other standards currently in place do not appear to adequately consider the effects of all types of automobile electrical noise (electrical and electronic-generated as well as ignition) on communications receivers, nor especially on the susceptibility of on-board vehicle electronics from near-by communications transmitters. Based on this discussion, Roger Madden moved, Kent Johnson seconded that this motion be tabled and the subject put on the agenda for the next meeting. The vote was unanimous in favor.

Stu Meyer then moved, Roger Madden seconded that Jack Neubauer be authorized to request transfer of responsibility for IEEE 263 from its current joint EMC/VTS status to VTS to allow our Society to pursue the updating and upgrading of this standard. The vote was unanimous in favor.

Additionally, Roger Madden moved, Sam McConoughey seconded that IEEE Standard 104 be affirmed to IEEE HQ as being within the jurisdiction of VTS. The vote was unanimous in favor. Stu Meyer moved, Roger Madden seconded that IEEE Standard 176 also be affirmed to IEEE HQ as being within the jurisdiction of VTS. This motion also passed with all in favor.

#### Propagation Committee

Neal Shepherd reported that editing of the text for the Propagation special issue is to be completed by July. Neal also submitted a budget for existing travel expenses involved with the chairmanship of this committee. Sam McConoughey moved, Fred Link seconded that the budget submitted by Neal Shepherd be accepted as presented, with the budget to be submitted using an IEEE-accepted expense account format, and for a total amount not to exceed \$1000.

#### Awards

Stu Meyer reported that IEEE is considering a new award for "Outstanding Service".

#### Milestones

Evan Richards reported that the Detroit and Bayonne milestone ceremonies have already taken place, and that the Hartford ceremony will take place June 15. Evan reported that the ceremonies have been elaborately planned and executed, and were well-received by all attending.

Sam McConoughey noted that he is stepping down as the chairman of the milestones program since it is for all practical purposes completed.

#### Fellows Report

Al Isberg reported that IEEE has now expanded the criteria for Fellows nominations to allow those that are "practitioners in the art" to also be con-

sidered. In the pass, it was felt that the criteria was slanted toward those in academia or in research.

OLD BUSINESS

Arthur Goldsmith moved, Sam McConoughey seconded that the item on the agenda concerning subsidized board travel be delayed to the end of the meeting due to its controversial nature. The vote was unanimous in favor.

NOMINATIONS REPORT AND ELECTION OF OFFICERS

Candidates for Board Election

Sam McConoughey that he has an impressive list of well-qualified candidates for election to the board. Those that have either agreed to run or are considering running include:

- |                |                  |
|----------------|------------------|
| Greg Gagarin   | Jim Evans        |
| Jose Cruz      | Sang Rhee        |
| Joe Schmidt    | Ray Trott        |
| Bob Mazzola    | Arthur Goldsmith |
| William Miskey | Evan Richards    |

Sam McConoughey moved, Kent Johnson seconded that this slate be presented to the VTS membership. The vote was unanimous in favor.

Five from this field will be elected by the VTS membership for a three-year term starting January 1988.

Executive Election

Sam McConoughey presented a slate consisting of Stu Meyer for President, George McClure for Vice President, and Arthur Goldsmith for Treasurer, and asked the board members for other nominations for any of these positions.

Fred Link moved, Kent Johnson seconded to close the nominations for president. The vote was unanimous in favor. Evan Richards moved, Bill Miskey seconded that the board accept Stu Meyer as the president for the next year. The vote was unanimous in favor.

Roger Madden moved, Fred Link seconded to close the nominations for vice president. The vote was unanimous in favor. Roger Madden moved, Fred Link

seconded that George McClure be accepted as the vice president. The vote was unanimous in favor.

Kent Johnson moved, Bill Miskey seconded to close the nominations for treasurer. The vote was unanimous in favor. Kent Johnson thus moved, Bill Miskey seconded that Arthur Goldsmith be accepted as treasurer for the upcoming term. The vote was unanimous in favor.

NEXT MEETING

The next board meeting is tentatively planned to be held in conjunction with a Convergence '88 planning session in Detroit in the October/November time frame. The secretary will inform the board members of the meeting date and location as soon as it is determined.

SUBSIDIZED TRAVEL

Sam McConoughey moved, Bill Miskey seconded that his updated May 12 proposal concerning subsidized travel for members "with dignity" be accepted. After considerable and heated discussion on the pros and cons of this motion by various board members, Roger Madden moved, Arthur Goldsmith seconded that this motion be tabled. The vote was four for, five against, and three abstaining. Therefore the motion did not pass.

A counter motion by Roger Madden to expand the discretionary status that the President is currently authorized to use on a selective basis died for the lack of a second.

Roger Madden and Sam McConoughey have agreed to get together and see if a common ground can be reached to satisfy the various issues, and to bring this issue before the board at the next meeting.

ADJOURNMENT

The meeting was adjourned at 6:39 PM.

Respectfully submitted,

*Sam Leslie*  
Samuel A. Leslie  
Secretary

Scenes From the VTS Conference in Tampa



From left to right: Stuart Meyer, Jack Neubauer, and Fred Link.



Michelle Shea and Sang Rhee.



Milhanten speaking at the Luncheon.



Noble receiving his VTS award presentation.

## Chapter News



**Gaspar Messina**  
Chapter News Editor

### MEETINGS

#### CLEVELAND VTS

Perry Nuclear Power Plant Communications Systems by Mr. Warren Benditz, Planning Engineer with the Genterior Energy Corporation.

Held April 21, 1987, with 8 attending (including 2 guests).

#### SACRAMENTO (ComSoc/VTS)

Lightwave Trends in the Telecommunications Industry by Ms. Eileen M. Healy, Senior Engineer with Pacific Bell.

Held April 21, 1987, with 7 attending

Meeting held to discuss potential topics for future technical meetings by Mr. Maynard A. Wright, Presiding Officer.

Held May 14, 1987, with 3 attending.

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

### 1986 PAPER OF THE YEAR AWARD

The "Paper of the Year" committee reviewed 20 papers from the 1986 VTS Transactions. There were many fine papers and once again the committee had a difficult time selecting a clear winner. The criteria for selection is that the paper must be based on original work, clearly written and be of archival value. That is, the paper must have the potential to be an original reference work.

The winning paper this year is titled "Performance Evaluation of Differential and Discriminator Detection of Continuous Phase Modulation" and was co-authored by Mr. N. Arne B. Svensson of the University of Lund in Sweden, and Mr. Carl-Erik W. Sundberg of Bell Laboratories, Holmdel, New Jersey. Both authors were present at the June, 1987 VTS Conference awards luncheon in Tampa, Florida, and were each presented a \$250 check and a certificate in recognition of their fine paper. The entire VTS membership extends our congratulations to these two fine authors.

Chuck Lynk  
Chairman, Paper of the Year Committee

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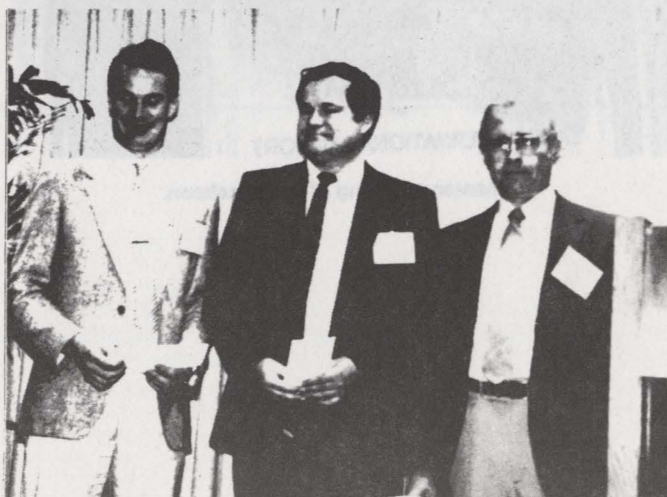
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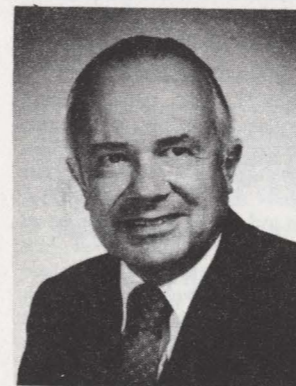
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**Chuck Lynk, VTS Major Awards Chairman, VTS Paper of the Year Committee, presenting awards to designated winners of the years best papers submitted to VTS - IEEE. Presentation made at VTS Awards Luncheon June 2, 1987 at the Tampa, FL VTS Conference.**

## Professional Activities



**Frank E. Lord**  
Professional Activities Editor

### PENSION UPDATE

One of the most disturbing aspects of the massive layoffs of engineers in the late 60's and early 70's, was the realization that the vast majority of engineers could not stay with one organization long enough to vest in a pension plan. This factor was one of the big drivers in creating the interest that brought about the overwhelming approval (87%) by the members for the institute to engage in professional activities. One of our outstanding leaders in pension improvement over the years has been John J. Guarerra, our Institute's President in 1974. In the years that followed his presidency, John served in many capacities with the United States Activities Board (USAB) including a term as its Chairman and Institute Vice President of Professional Activities. During all his service, he maintained his strong stance on pension improvement for engineers.

When House members active in pension reform recently set up a forum to examine the portable pension concept, they made special efforts to gather IEEE's views. John Guarerra was once again on the scene to testify, this time before a House Education & Labor subcommittee on April 21. Rep. William L. Clay (D-MO), chairs the subcommittee that is examining the bills on pension portability (H.R. 1961 and H.R. 1962). Other groups represented include AARP (the American Association of Retired Persons); the pension Rights Center; the National Association of Manufacturers; and the Association of Private Pension & Welfare Plans. Sadly, we must note that few other engineering or technical societies follow our lead in representing their members' interests on this critical matter.

The following material from the April 27, 1987 issue of the Legislative Report published by our Washington Office reports our involvement.

Guarerra, a veteran member of the Pensions committee of USAB, noted IEEE's long involvement with the Congress in legislation designed to create and maintain workable pension programs from 1974 onward. However, in spite of the milestones represented by enactment of ERISA in 1974, the IRA provisions in 1981, and the retirement equity section in the tax act of 1986, there are several deficiencies in the pension system, Guarerra said. "Chief among them are continuing deficiencies in coverage, vesting, integration and portability requirements, and inadequate protection against ... inflation," he added.

Overall, IEEE believes that H.R. 1961 (sponsored by Rep. James Jefford (R-VT) and a corresponding bill (sponsored by Sen. Dan Quayle (R-IN) will greatly improve the private pension system.

The IEEE view is that the Pension Portability Act (H.R. 1961) will improve the present retirement system "by permitting employers to transfer pension assets and cashed-out pension benefits into and out of tax-qualified portable pension arrangements maintained by pension asset managers. These portable pension arrangements ... provide for the receipt and investment of distributions from qualified pension plans and for

the transfer of plan investment accumulations to other tax-qualified plans, including other portable pension plans." H.R. 1961 will also benefit employees of small business firms. "By shifting costly administrative burdens associated with pension plan management from plan sponsors to plan asset managers," Guarerra said, "the bill removes economic impediments that discourage many small businesses from offering retirement plans to their employees."

In sum, IEEE supports H.R. 1961 because it "provides a much needed form of pension portability for a significant number in increasingly mobile American workers."

Jeffords described the portability concept in a floor speech on April 7, as follows:

The portable pension plan concept can be likened to a statutory prototype tax-qualified defined-contribution pension plan. The arrangement is established and maintained by pension assets managers, in other words, those insurance companies, banks, mutual funds, and other managers now serving the pension investment community. Under the arrangement the employee-participants would self-direct their accumulated investments and each portable pension plan would, consistent with ERISA section 404(c), have to provide several investment options-one of which would have to be principally backed by Treasury obligations to serve both as an employee investment safe-haven and as a new source of Treasury financing to help lower interest costs. To emphasize the role of portable pension plans as a supplement to Social Security death, disability, and retirement benefits, all distributions would be made in a stream-of-income form unless spousal consent is otherwise obtained.

Besides offering the employers of uncovered workers new incentives and a no-frills mechanism to make pension contributions, portable pension plans would provide employers who already have pension plans with a more meaningful option-a pension portability option-which contrasts with today's practice of cashing-out the vested benefits of terminated employees. Instead of retaining the accounts of terminated employees, an employer could transfer the cash-value of vested amounts to a portable pension plan.

Legislation amending pension law may run into major political obstacles since the Administration proposal for change has stirred up some passion in the pension community. Two planks in the Labor Department plan have caused great controversy: 1) a section permitting "reversion," e.g., allowing companies to withdraw surplus cash from an existing pension plan (possibly an "overfunded" one) without terminating the plan; and 2) a section permitting the bail-out of the Pension Benefit Guaranty Corporation, the Federal agency that insures private pension plans; the agency has a \$3.8 billion deficit as a result of the collapse of several steel companies. Organized labor and retiree groups strongly oppose reversion. Rep. Edward Roybal (D-CA), chairman of the House aging committee, has promised to block any reversion attempts.

As for the bill at issue, the Administration gave guarded support in the form of testimony from David Walker, a Labor Department official. Walker said portability is a desirable goal but perfection of the concept is a difficult and complex legislative task. The Labor Department would welcome the opportunity to work with Congress on the right approach.

Because the bills have revenue implications, they will also have to be reviewed by the Ways and Means Committee. On April 8 Reps. Robert Matsui (D-CA) and Edward Feighan (D-OH) introduced H.R. 1992, a portable pension version that will be referred to the Ways & Means.

Members are urged to follow this subject in the media including IEEE publications and to contact your Congressmen when appropriate. Contact the Washington Office at (202) 785-0017 to be added to the distribution list for Legislative Alerts. You might also check occasionally on the Information Line (202) 785-2180. Your participation can lead to considerable benefit to you in the future. Remember, the other guy doesn't always do it.

# Transportation Systems



**Bob McKnight**

Transportation Systems  
Editor

## FRA Holds Public Hearing on Proposed Orders for Automatic Train Control for the NEC

Federal Railroad Administration holds a public hearing on June 24, 1987 concerning its proposal to issue carrier-specific orders requiring that all trains operating on the Northeast Corridor between Washington, DC and Boston, MA be controlled by locomotives equipped with automatic train control.

For background, FRA says the NEC is a high speed corridor serving more than 28,000 intercity railroad passengers every day on 97 trains operating at speeds up to 125 mph. In addition, three freight carriers operate approximately 40 trains per day (many of which carry hazardous materials) at speeds up to 50 mph. Further adding to the operational mix on the NEC are various commuter carriers operating more than 750 trains carrying at least 220,000 passengers daily. The extent of this operational and speed mix is unique in this country.

FRA has determined that public safety can and should be increased by ensuring to the extent technologically possible, that all trains obey signal indications.

The only system now capable of ensuring that a train is operated in conformity with signal indications is the automatic train control system. When a locomotive equipped with an ATC device encounters a more restrictive indication and the engineer fails to reduce speed to the prescribed limit, the system brings the train to a stop.

At present, all Amtrak locomotives used in passenger service on the NEC are equipped with ATC devices, and the limited number of locomotives currently used for work train service soon will be equipped with ATC devices. All Massachusetts Bay Transportation Authority, Maryland Department of Transportation and most Metropolitan Transportation Authority (New York City commuter railroad system) trains operating on the NEC are equipped with ATC devices, while a portion of New Jersey Transit's NEC fleet is also ATC equipped.

The remaining NEC users (ConRail, Delaware & Hudson Railway, Providence & Worcester Railroad, and the Southeastern Pennsylvania Transportation Authority) have a combination of automatic train stop and automatic cab signal equipped locomotives.

There are two "hardware" elements to the ATC system: (1) a signal transmission system set in the roadbed (circuits in the track rails); and (2) the ATC receiver units built into the locomotives and power units.

FRA estimates the cost for installing the signal transmission in a double-track railway line to be up to \$240,000 per mile. Receiving units for locomotives or power units on MU-type commuter cars would run to between \$25,000 and \$40,000 per unit.

Fortunately, the signal transmission system or train control track circuits are already in place on the Northeast Corridor. Thus it is a matter of equipping those locomotives or power units of commuter trains not presently equipped.

FRA proposes progressive implementation of ATC on the NEC over the next 24 months. The FRA proposed timetable is as follows:

June 15-October 15, 1987: Construction/procurement of test ATC systems modified in accordance with FRA specifications.

October 16-December 15, 1987: Service testing of prototype systems.

December 15, 1987: Fra will issue notice of modifications required to adapt ATC devices to freight operation.

January 15, 1988: All freight and passenger carriers operating on the Nec must have completed ordering "receiver units" for all power units that will operate as lead locomotives on the NEC.

Each carrier will, in carrier-specific orders be given 69 to 24 months to complete retrofitting of existing power units. The time period will begin to run on the date of delivery of the first unit. Installation shall proceed at a pace of one-third on the units installed in the first one-third of the time, and so on until all units operating in the NEC are equipped with ATC devices.

FRA's projection now is that all locomotives and power units will be equipped with ATC devices by July 1, 1990. FRA also estimates that locomotives affected range from a minimum of 456 to a maximum of 763. FRA cost estimates range from \$17.5 million to \$30.5 million.

Those who will receive FRA order to install ATC devices are:

Consolidated Rail Corp.  
Delaware & Hudson Railway Co.  
Providence & Worcester Railroad Co.  
New Jersey Transit Rail Operations, Inc.  
Southeastern Pennsylvania Transportation Authority  
National Railroad Passenger Corp.  
Metro North Commuter Railroad Co.

## NTSB Concerned over Train Separation Asks for Installation of Train Control Systems for Mainline Track Operation

National Transportation Safety Board in a May 19 Safety Recommendation is asking the Federal Railroad Administration to "Promulgate Federal standards to require the installation and operation of a train control system on mainline tracks which will provide for positive separation of all trains."

NTSB's concern stems from these four recent accidents which it cites as having caused 19 fatalities, 356 injuries and a total estimated damage of \$21.1 million.

- CSX Transportation collision of two freight trains on February 6, 1987, near East Concord, NY.
- Amtrak collision with ConRail freight train on January 4, 1987, at Chase, MD.
- Union Pacific Railroad collision of two freight trains on July 10, 1986, near North Platte, NE.
- Boston & Maine commuter train collision with ConRail freight train on May 7, 1986, at Brighton, MA.

To put the subject in perspective, NTSB notes the principle of safely and successfully operating more than one train on a given railroad segment is predicated on the establishment of a system that will keep the trains separated. Such a system using the existing technology of the period was prevalent on most high-density freight and passenger railroads in the 1930's.

Due to economic pressures and lower traffic densities, such train control systems were removed over the years following World War II.

NTSB admits that the Advanced Train Control systems project of the North American railroads might well be a key element in train control progress. NTSB notes that "an interesting safety aspect of the ATCS Project is the design premise of train separation which includes the ability of the systems to stop trains when they exceed authorized limits.

"Unfortunately, the ATCS Project lacks any FRA oversight to ensure a successful completion of the project from an operational safety standpoint. In conversations between FRA and Safety Board staff, the FRA has indicated that their only involvement with ATCS has been through briefings by the industry and monitoring by technical staff. FRA has not indicated to the Safety Board that they were exploring other advanced technologies of systems for controlling movements of trains. The Safety Board believes that the railroad industry is presently designing and testing state-of-the-art railroad operating systems and that the FRA should take an active role to help formulate the operational and safety aspects of these systems. Further, by taking a more active role, the FRA could assure that train separation is a required component of any train control system ultimately installed."

## C&S Division, AAR, Features High Tech and State-of-Art Applications to Railway Signals & Communications

The 1987 meeting of the Communication & Signal Division, Association of American Railroads will be held October 12-14, 1987 at the Pittsburgh Hilton, Pittsburgh, PA.

Keynote speaker will be L. Stanley Crane, Chairman and Chief Executive Officer, Consolidated Rail Corp. Other speakers at the opening session include:

- Report of C&S Division activities by L. M. Himmel, Sr., Executive Director.
- A. W. Johnston, Vice President, Operations & Maintenance, AAR.
- J. H. Riley, Administrator, Federal Railway Administration.
- C. F. Turner, Chief, Operations Review Branch, Federal Communications Commission.

A Communications session will be held Monday afternoon (following the opening session October 12). Speakers and papers presented include:

- Report of the Communications Liaison Subcommittee by F. R. Wix, CSX Transportation.
- Report of Committee C- Telecommunications Systems, by L. W. Allen, CSX Transportation.
- Implementation of Fibre Optics Communications Systems by an engineer of Rockwell International.
- Voice Mail System in Service on C&NW by Eric Crane, Chicago & North Western Transportation Co.
- Centralized Call Accounting by W. P. Everett, Consolidated Rail Corp.
- Call Oriented Communication System by R. Vanstone, Motorola, Canada.

Monday afternoon's Signal session will feature the following:

- Report of Signal Liaison Subcommittee by F. H. McIntyre, Southern Railway.
- Remarks by Joseph W. Walsh, Associate Administrator for Safety, FRA.
- Railway Signaling in China by Ms. Wang Ju-Zhen of Northern Jiaotong University.
- Signal Maintenance Inventory Management- A Signal Engineer's View by D. W. McCord of Union Pacific.
- Introduction to Fail-Safe Design by H. Glickenstein of T. K. Dyer, Inc.
- Integrated Micro-systems for Modern Railway Signaling by E. K. Holt and C. W. Wall, Union Switch & Signal.
- Committee E- Signal Systems report by R. S. Thomas of Norfolk & Western.

Tuesday October 13 session in the morning will be devoted to the Advanced Train Control System project of the North American railroads. Papers are:

- The Engineering of the Advanced Train Control Systems by G. K. Pruitt of Arinc Research; J. R. Strickland of Norfolk Southern;

and G. D. Wilson of Southern Pacific.

- ATCS- The Route to More Cost Efficient Railroad by J. D. Merrick of Union Pacific; G. M. Mott of CSX Transportation and J. A. Reoch, CN Rail.
- ATCS as a Control Enhancement or a Total Light Traffic Control System by F. E. Young and T. B. Levine of Union Switch & Signal.

- Space Rail- Signaling by Radio by J. H. Auer of General Railway Signal.
- Radio Code Terminal Eliminates Code Lines by R. Daniels of Harmon Electronics.

The Tuesday afternoon session will have the following:

- Report of Committee G- Education & Training by R. A. Spain of Atchison, Topeka & Sante Fe.
- CN Rail signal training programs by B. Paterson.
- How ConRail trains first line supervisors by R. D. Mays.
- Report of Committee D- Highway Grade Crossing Warning Systems by E. T. Eveland of ConRail.
- Report on Federal funding for safety at rail-highway grade crossings by John Scherlinger of AAR.
- Report on testing of new devices for focusing, aligning and measuring light output of flashing-light signals by R. A. Mather of Oregon PUC.

- Description of new solid-state grade crossing control system by J. E. Moe of Safetran Systems.

- Report of Committee H- Electromagnetic Compatibility by J. L. Sinclair of Southern Railway.
- Report of research effort of AAR and Electric Power Research Institute to develop a Mutual Design for Overhead Transmission Lines and Railroad Facilities.

The Wednesday morning session on October 14 will have these reports and papers:

- Report of Committee F- Special Applications by W. J. Scheerer of CSX Transportation.
- Results of testing at AAR's Transportation Test Center in Pueblo, Colorado of rail freight equipment trucks passing representative models of existing hot box detectors.
- The Detection of Acoustical Noise & Heat Signatures Generated by Defective Railroad Roller Bearings by J. E. Bambara of Servo Corp.
- Three-Computer Solid State Interlocking by G. Astengo and R. Jahn of Ansaldo Co.
- Safety Analysis of Advanced Train Control Systems by R. Rudnicki of Rockwell International.

## LAND TRANSPORTATION DIVISION OF VTS HOLDS SUCCESSFUL 1987 CONFERENCE

Over 100 persons attended the 1987 IEEE/ASME Joint Railroad Conference in Toronto, Ontario, April 21-23, 1987. In addition to the 22 papers presented on rail and transit subjects, field trips to the Scarborough Rapid Transit line plus the Government of Ontario (GO) Transit Maintenance Facilities were included in the program.

In Conjunction with the Toronto meeting, the Executive Committee of the Land Transportation Division of the Vehicular Technology Society held its annual elections. Officers for the 1987-1988 year are:

Albrecht P. Engel, Chairman, of LS Transit Systems, Inc., 1515 Broad St., Bloomfield, NJ 07003; (201) 893-6532.

Linda Sue Boehmer, Vice Chairman, of Rail Systems Center, Carnegie-Mellon University, 4400 Fifth Ave., Pittsburgh, PA 15213; (412) 268-2960.

Anthony Daniels, Secretary-Treasurer, Morrison-Knudsen Engineers, Inc., 180 Howard St., San Francisco, CA 94105; (415) 442-7300.

Dr. T.A. Kneschke, Meetings Chairman, Parsons Brinckerhoff/De Leuw Cather, 1701 N. Market St., Dallas, TX 75202; (214) 573-8944.

Dr. Tony R. Eastham, Past Chairman, Dept. of Electrical Engineering, Queen's University, Kingston, Ont., K7L 3N6, Canada; (613) 545-6081.

#### LAND TRANSPORTATION DIVISION PUTS OUT CALL FOR PAPERS FOR PITTSBURGH '87

The ASME/IEEE Joint Railroad Conference will be held April 12-14, 1987 in Pittsburgh, PA at the William Penn Hotel. This meeting is co-sponsored by Vehicular Technology Society's Land Transportation Group.

Papers are sought covering the following subjects:

- Traction electrification system alternatives
- Signal and communication system innovations
- Electromagnetic compatibility
- Energy efficiency of locomotives or transit vehicles
- AC and DC propulsion
- Automation and microprocessor control
- Monitoring, fault detection and maintenance of equipment
- High speed rail operations
- New transit system starts, planning design, construction and start-up
- People mover technology

Authors are requested to submit five copies of the abstract for their proposed paper by September 15, 1987 to:

Dr. Tristan Kneschke  
Meeting Chairman, Land Transportation Division,  
VTS  
Traction Electrification Systems Dept.  
Parsons Brinckerhoff/De Leuw Cather  
1701 North Market Street  
Dallas, TX 75202

Authors will be notified if their papers are selected for presentation at the April 12-14, 1988 meeting. Papers are to be ready for publication by December 15, 1987. Details can be obtained by calling Dr. Kneschke at (214) 573-8944.

#### GANESH NILAKATAN

Ganesh Nilakatan was born in India and obtained his schooling and university education with the Jesuit institutions there. He pursued further studies in Cambridge, U.K., and in Europe.

He is registered as a Chartered Engineer in the United Kingdom, is a member of the Institution of Danish Engineers and is registered as a Professional Engineer with the European Federation of Engineers in Paris.

He has worked with mobile radio since the early fifties. He is presently with the Philips Radio Communications System organization as General Manager for International Policy, having come to this post from the Danish Post and Telegraph where he was Chief of Land Mobile Systems.

#### TALK GIVEN BY GANESH NILAKATAN AT CONFERENCE LUNCHEON

ON 1ST JUNE, 1987.

The topic upon which I have chosen to address you is "The Future of International Mobile Communications". Now, when we talk about mobile communication there could be several types. This could be private radio communications business, it could also be trunking systems. However, when one talks about the international mobile telephone, then the discussion would confine itself to the cellular radio scene internationally and the operation of non-cellular terrestrial radio systems. The non-cellular terrestrial radio system is really a way by which the satellites are being used to cover vast areas where the implementation of cellular type infrastructure would be prohibitively expensive. My talk to you today will concern itself with the technology issues here, although I would not elaborate too much on any one subject because there are so many eminent scientists who are going to present very good papers on individual aspects of this and I would refrain from making any comments on these now. The second aspect I am going to talk to you about is the general climate one needs to implement such systems and give a prospective look into certain areas in the world to enumerate whether such climates are present and what results they are obtaining. Thirdly, to point out some of the areas where we need to work intensively on an international level if we are going to realize this goal.

Basically, there are several viewpoints to be considered, mostly they are of a political nature however one would like to look at it. We technicians would like to explain it all in a matter of technology but that is not so easy when you come to get such a system to function over national borders.

Let us go back a few years to see the development of mobile telephones. The only classical example of an international mobile telephone system that I know of exists in Scandinavia. The Scandinavians were very foresighted and in 1973 the Nordic Union sat down and formulated a scheme of making a mobile telephone service available to their citizens. A commission went to work called the Nordic Mobile Telephone Commission, of which most of the vendors who are here representing companies may be aware of. I am sure you have at some point of time visited them and taken part in their technical discussions. In 1979, this commission presented a set of specifications for the total system split up in the mobile telephone exchange, the base stations, the signalling systems, as well as the subscriber equipment. Now these dockets, as they are called, represented the sum total of knowledge which the Nordic Administration had at its disposal within its own organization, together with the meetings it has held with manufacturers and thus paved its way for the implementation of the system, which was inaugurated on the 1st October, 1981.

Now that is hardly six years ago. Let us look at the system today. There are two switch manufacturers presently in the system, there are at least half a dozen base station equipment manufacturers, there are at least a dozen subscriber equipment manufacturers, thus providing the customer with a total freedom of acquiring his equipment and also providing the administrations freedom of purchase. It is not a one company designed system where the administration could feel somewhat clamped in. On the other hand, this system would never take off but for the fact that the Nordic Administrations had been very prudent in making two specific things. They insisted that the operators must have no retailing interest in the retailing mechanisms of the subscriber equipment either directly or indirectly. Secondly, they put forward a mild tariff policy with the result that Nordic as a system presents today the greatest penetration of mobile telephones within the population core of Scandinavia. Needless to say, all hardware is supported by Scandinavian manufacture.

I gave the credit of the Nordic system to the wisdom of the politicians explicitly here because politicians are, in my opinion, the real carriers of activities over strategic propositions. I remember the days when the P & T, including the FCC, will guard all radio frequencies with vigil and the standard answer to any request will be a "no!" for any use of these frequencies. Suddenly one sees new bands, new allocations, once forbidden services becoming lawful. Who would have imagined, in the 60's cordless

telephones would be permitted at all. If we look closely into all big breakthroughs in technologies we have witnessed, we observe politicians have had more say in all these matters. Kennedy said that he wanted two men on the moon by 1969. It was done. And thus, the U.S. ushered us into space technology and today we cannot do without satellites.

I do not submit that the American engineers are cleverer than their European counterpart, or vice versa, but the American engineers had the political backing for their talents and ability. The Nordic Administration did similar things in '79, as I said earlier, with the result that today the Nordic system could perhaps "be a model for similar international communications".

The reason for my sidestep here is to keep your attention focused on the importance of timely political decisions which are taken and become the prime movers for a certain progress the society, in general, wants to achieve in a given direction. Correct political decisions tend to reduce the so-called chicken or egg enigma. You can imagine where cellular radio would have been in the U.S. if the divestiture was not carried through. Similarly, the United Kingdom took a political decision in complying with the privatisation requirement and this was implemented by the British politicians in the telecommunications field. Thus, Britain today enjoys similar cellular radio advantage and it is unique in that there are two operators demonstrating their capability in competition and in co-operation, albeit no local manufacture.

Let us face it, we have today cellular radio in the U.S., in Europe, in the Federal Republic of Germany, in the United Kingdom, Austria, the Netherlands and in Switzerland and, indeed, in the Nordic countries and elsewhere in the World. However, the fragmented service does not allow the subscriber to roam between the countries and get an effective communication carried out. Hence, there is a strong case for an international mobile service. The Conference European Post and Telegraph, commonly known as the CEPT organization in Europe, identified this in 1982 and convened its first meeting of the GSM Group Special Mobile, with the task of specifying and putting into operation a Pan-European mobile system by 1991.

Bearing in mind that other cellular systems like AMPS and NMT had nearly a decade to put the service to work from its conception of idea, the GSM is working on very, very tight time schedules. However, much work has already been done and there is still a long way to go. The present situation in CEPT is that all member countries support a unified Pan-European system. This was what I was coming to earlier in my talk that some political decision is required before similar things can happen. Once the member countries agree that such a system should be put forward, then the national boundaries, differences in telephone PSTN, line network differences, and so on, could be eliminated because there is a political will to do that.

I would like, now, to take you into the digital radio area. However, before entering a new world of digital radio it may be interesting for us to record that the analogue systems have been around for several years and these benefits are being reaped by the user as well as the operator. The price of the subscriber equipment is low and is kept low by fierce competition and there is a marked tendency for the base radio channel price to come down. Indeed, today the major cost of infrastructure is plant and buildings, roads, masts. The lead time for implementation is decided by these factors primarily rather than the price of the radio channel. Indeed, competition in this area is also so keen, again the price for analogue channel is coming down rapidly. The cost effectiveness of the present analogue radio is felt at all levels. Hence, it is wise to expect more from the digital radio.

As I have stated earlier, the land mobile telephone market is expanding rapidly. One contributing factor has been much improved performance of the whole system through the introduction of new technologies such as large scale integration, ceramic technology in electrical resonator design, ECL high speed dividers and high resolution frequency synthesizers with low phase jitter and quick settling times, micro computer controlled stored programme logic, error control coding, signalling and small cell technique, not to mention the antenna and channel filter technology.

The basic speech transmission is analogue and, according to many,

digitized speech transmission in mobile telephony can only be considered if there is an inherent need for encryption in order to guarantee some degree of privacy for the public user or of other network requirements and if the quality of service is better, not to mention the cost which should also be lower.

Comparative tests conducted in Europe by the P & T CEPT Administration (Conference European Post & Telegraph) on digital speech over 900 megacycle radio channels conclusively proved that digital speech has shown great improvement over similar analogue systems and using voice companders. Thus, the CEPT has chosen a codec using 16K bit as a standard. This was engineered by Philips' organization in Europe. Thus, a case for digitized speech in cellular radio is established by the CEPT. There are other equally good reasons for employing digital technology in cellular radio. Let us look at some of these.

Firstly, lack of radio spectrum might seriously limit available traffic capacity of a system, or limit the market demand due to increased cost or poor performance if the system shall be so designed with frequency economy as the sole criteria.

We have witnessed repeated channel splitting from 50 kilocycles to 25 kilocycles and from 25 kilocycles to 12.5 kilocycles in combination with the move towards higher frequency bands has resulted in extremely severe technical requirements, both in technology and specification from administrative and regulatory authorities concentrating on severe selectivity requirements of the radio equipment leading to severe frequency stability and good noise performance of local oscillators in radio transmitters and receivers. A solution which would alleviate this problem could be digital transmission using wide band channels managed through some time shared scheme catering many subscribers. However, the total cost for implementing and operating the system must be investigated prior to deciding on the choice of the system.

The CEPT organization in Europe have just done that and they have chosen with overwhelming majority the narrow band time division multi-access system. However, I must stress here I do not wish to get into any discussions with the great controversy presently being brought forward by the U.S. on whether FDMA systems are not better but let us witness the outcome of the GSM system before we embark upon any discussions which no doubt will come up.

Secondly, notwithstanding extremely low cost effective digital VLSI circuits are available, these need yet to be proven and perhaps the GSM system will be able to witness this in a little while. If this could be achieved, indeed this will present a driving force for digital radio in the future as there is little chance for the analogue services to come down in cost from the present levels until some exceptional breakthrough is achieved in the analogue front. This should be obvious to the listener if he links the above to a hand portable equipment which could be a part of the entire system concept making requirements on low cost, size and low power consumption. Such a system design, which would lead to reduce requirements on lumped selectivity, could have a large impact on the market. Thus, the best long range solution on the terminal side seems to be digital radio in conjunction with analogue radio LSI make possible through the requirements for selectivity reduced to comply with the tolerance level of the digital system.

Replacement of analogue selectivity by acquiring coding selectivity in the system is by no means a mean feat, as these problems are merely transferred to other areas such as synchronization, equalizers, signal processing, etc., on which our present knowledge, especially on low power consuming signal processors, is not enough. However, it is by no means optimistic to assume that these problems will soon be solved as economy of scales with respect to fixed network and efficient frequency utilization have already witnessed that marked trend towards very large national and international systems. The institutions which provide wide area coverage and computer based additional services are aware that such large investment can only be shared by a large number of subscribers to make the economic budget balance. However, one must be aware of an impending risk in all such enterprises as they involve a point of no return because of the long gestation times for implementing the common part of the network and the heavy investments one is obviously faced with. Hence, the system can become too rigid to accommodate varying user requirements.



One way of alleviating this problem is to adapt some basic idea as ISDN concept for the ordinary public telecommunication network within the possibilities and restrictions offered by the mobile radio environment. Such a network will offer the user a digital transmission path which could be adapted to various user requirements on data rate, mode and transmission delay. By the addition of various peripheral equipment the terminals could readily and with high degree of flexibility be adapted for different end services such as data transmission, speech, paging, alarm, etc.

Thus, a case for digital radio, and hence digital speech is established and one can now contemplate that a good portion of the market segment for mobile telephones could also be an extension of the ISDN network to the mobile subscribers insofar as the radio environment allows. This could lead to the basic digital network to be standardized internationally, providing the subscribers with the simple interconnection between different systems and reduced cost of sub-systems made possible through large scale manufacture. As I said earlier, the CEPT has foreseen this and has initiated, in 1982, the task of specifying the common European mobile telephone system to be available in 1987/88.

There seems to be various ways of implementing a digital system and let us look at a few of the promising contenders in this contest. In order to obtain good frequency economy with high utilization of fixed network it is imperative to obtain suitable degree of flexibility in dividing the total available capacity between the different users. A user might call for a 16K bit duplex transmission part tolerating fairly high error ratio but low transmission delay. He might also request a 50 Bits/second simplex channel for Telex or only transmit 100 bits for a coded standard message. The required flexibility seems to be obtainable using wide band radio channels with digital transmission either in a circuit switched TDMA mode duplex speech or a stored and forward packet mode switched data transmission.

Packet transmission modes of data with requirements for low error ratio invariably would require ARQ procedures and such arrangements could be catered for in the transmission protocol used on the radio path in order that the errors introduced by fading radio channel could be reduced. It is obvious that digital radio provides many advantages. However, before all these could be fully exploited intense development work is needed on several aspects.

The radio propagation in mobile environment is not particularly kind towards digital signal transmission. Wide band signals are plagued with time dispersion effects due to multipath transmission with time varying delays between different paths. The system shall be so designed that the effect of time dispersion are suppressed. The speech codec and the channel coder must provide and protect the signal against fading and especially in time divided channel utilization schemes which may be very sensitive to dispersion delays. Such delays, including processing delays, in total can be of the order of some 100 milli-seconds. This does not make the integration of a mobile system with the PSTN easy.

These difficulties in a wide band digital system will be proportional to the radio path lengths. Thus in cities the above difficulties will be small at short distances from the radio base stations due to high coherence band width of the system and the low delay spread over short radio paths. One advantage of this can be that the hand portable transmitter may be low powered due to the short distance to the base and low signal processing power consumption due to inherently low delay spread due to short distances involved. Thus, this kind of system can provide high capacity traffic and subscribers. Whereas this may be attractive at first sight, the system cannot be extended easily into suburban and rural areas as such high coherence bandwidth will introduce considerable delay spread when the path lengths are long and indirect.

It is becoming increasingly apparent that most advantages of time division multiple access packet concept could be included in time duplex, i.e., time multiplexing from the two directions of a two-way connection. This has substantial advantage in digital transmission as one could eliminate the duplex filter in the terminal equipment. The duplex filter is responsible for an appreciable part of the size, weight and price of a hand portable equipment. Much R and D is required before a realistic assessment can be made on the pros and cons of wideband transmission, including the optimum bandwidth of the radio

channels system data relayed and, indeed, work is in progress at various European groups such as cost-207 as well as government administrations. Added to this there are other difficulties to introduce this configuration into existing framework largely based on different frequency bands for the two directions of transmission, i.e., duplex or two frequency simplex. There may be other electro-magnetic compatibility problems between TDMA and system based on duplex if they are geographically closely located on the same frequency bands. Systems in which speech communication is the dominating mode of operation are, as said earlier, the most difficult application of digital radio presently considering total cost performance in contrast to analogue radio.

As most of you are aware, the digital radio channel configuration contains three important sub-systems. They are (1) speech coder, (2) channel coder and processors, (3) radio modems. Needless to say, the speech coding technology is developing rapidly indicating that the required data rate for acceptable speech quality and complexity and power consumption is gradually decreasing. Some conservative estimates show that for mobile telephone system to be introduced in 1991 a speech coder could use 12K bit rate, including certain amount of channel coding to protect the most significant speech parameters against transmission errors. Channel coding in combination with interleaving is also combined with radio modems to eliminate most of the errors due to fading dips and other pulse type interference, such as ignition noise.

System rates of 16K bit are being entertained presently. When one would tolerate speech quality similar to synthetic speech, certainly very low data rates could be used with little or no cost penalty or range reduction. Fading radio channel exhibit statistical dependence amongst successive symbol transmissions such as, for example, when fading varies very slowly as compared with one symbol time. Biterbi and Omura state that these channels act as though they possess memory and such channel memory considerably degrades the performance of codes designed to protect memoryless channels. Providing a coding structure which caters for all time varying statistical models is said to be very difficult if not impossible. Therefore, codes matched to one set of memory parameters will be less efficient for other sets of values. Interleaving will eliminate the effects of memory to a point where air reduceable error rate causes more than one consecutive and significant symbol error to occur. However, interleaving is not a magic wand of the digital radio magician. It has its costs. It is firstly an information destroying process. It is stated that channel memory decreases channel capacity, decoding and decision feedback equalization algorithms therefore must perform efficiently if information about channel memory present underfading is to be fully utilized by the decoder and not just discarded as it would occur with interleaving alone and in conjunction with a poor decoder.

For digital speech quality there is a minimum acceptable delay. Let us suppose a delay of 10 milliseconds is tolerated and a data rate of 16K bit is made use of. This allows for 160 bits maximum shortage in the bit stream in question. Thus, there will be in the design a clear trade-off between the efficiency of the interleaver in combination with the error correcting code and acceptable delay associated with speech quality. This problem is aggravated more when the vehicle is moving slowly as the duration between fades can be considerably long. Presently, 50 milliseconds are tolerated as signal processing delay during digitizing process of speech signals alone. Therefore, echo cancelling equipment will be required at the base stations. However, during data only mode interleaving could be most useful as channel memory is not made use of and the above mentioned delays are of less consequence. This will call for acceptable specifications from various international administrations.

There are other problems associated with speech coding and decoding technology. There are current consumption of signal processing circuits at this data rate, not to mention size. When one contemplates hand portable application within the system, the problems get to be formidable. Even new technologies are needed in the signal processing and battery area.

There is yet another aspect where we need to concentrate, that is the international travelling public. Now the airlines already state that they would have twice the number of passengers in a decade from now and this would mean a lot of business travellers would

want to have the possibility of having to have radio services available in order that they can operate their telephone and data terminals they may carry with them over national borders.

Furthermore, when one looks at a map of Europe we have the continental Europe with highly industrialized population requiring full movement between the country borders. Secondly we see the large transportation network that is built in Europe which covers the Mediterranean basin and these require communication over national limits and the European economic community is particularly interested in favoring a scheme which would allow long distance truckers to be able to keep contact with their home base when they leave, for instance, Antwerp and come all the way to Ankara, going through several national borders and cultural borders.

When one looks at this problem it is impossible to conceive this solution unless we get all the countries which are involved in this to be united upon specifying a system. Secondly, the technologies are here, a satellite could suitably illuminate the whole Mediterranean basin with the possibility of having the receivers in the vehicles, together with high powered transmitters, thus relieving the vehicle of having to have sensitive pointed directional antennas on the roof. There is a requirement here which is obvious to everyone. It is nearly impossible for these trucks to have very large dishes mounted on their roofs much like the Inmarsat equipment. Hence a different approach is needed and the European space agency and others are working on this in Europe. There are similar activities in Canada and the Doc Spectrum and orbit policy directorate has just issued L band frequency allocation for land mobile satellite systems.

This brings me to the last part of my speech and that is the case for an international standardization and the importance of such standardization and the only way through for any possibility of an international mobile telephone system. CCIR has inaugurated a working party called an interim working party 8/13, under the chairmanship of Mr. Mike Callendar from Canada, which has met

## Communications



**J. R. Cruz**  
Communications Editor

### ABSTRACTS

"Error Rate Performance of Narrowband Multilevel CPFSK Signals," N. Ekanayake, and K.J.P. Fonseka, IEE Proc., Vol. 134, Pt. F, No. 2, April 1987.

The paper presents a relatively simple method for analysing the effect of IF filtering on the performance of multilevel FM signals. Using this method, the error rate performance of narrowband FM signals is analyzed for three different detection techniques, namely limiter-discriminator detection, differential detection and coherent detection followed by differential decoding. The symbol error probabilities are computed for a Gaussian IF filter and a

twice and, during the course of the meetings several countries have presented various technical papers with a view to getting some basic agreements brought forward on the spectrum as well as the technology required. As I have pointed out earlier, the technology issue invariably rests on the spectrum issue as these need to be coordinated and thus the CCIR forum is most appropriate to do this. IWP 8/13 have met twice and, indeed, carried out good work in proposing various possible scenarios which, hopefully, would lead to a broad system specification in the near future.

The outcome of this may well result, one day, in an international mobile telephone system which allows people to move freely with their radio equipment, as this is now getting to be an important issue. When such system specifications are to be formulated, it is very important that it takes into account all the above mentioned technical aspects I have touched upon and, also, fully complies with the political requirements of each country. It is almost certain that, without the political backing of each member country involved in this, it would be nearly impossible to see any future for the international mobile telephony.

I have stated here some of my views on the subject and a good deal of views expressed to me by my colleagues around the world who have been able to convince me with their arguments, not mere rhetoric, for which I am thankful.

However, I would submit, ladies and gentlemen, I have barely touched the surface of international mobile telephony and I am aware I have confined myself only to a small segment of the technical and political implications involved in the entire system. Notwithstanding this, I am sure you will be able to continue your thoughts on the subject.

As a concluding remark, may I say that what we know today about international mobile telephony is just a mere handful of sand and the whole beach lies before us unexplored.

Thank you for your attention ladies and gentlemen.

second-order Butterworth IF filter. It is shown that coherent detection and differential decoding yields better performance than limiter-discriminator detection and differential detection, whereas two noncoherent detectors yield approximately identical performance.

"Universal Digital Portable Radio Communications," D.C. Cox, IEEE Proc., Vol. 75, No. 4, April 1987.

Providing voice and data communications to people away from their wireline telephones has become a major communication frontier. This frontier is being penetrated by evolving approaches to portable communications, e.g., cordless telephones, mobile radiotelephone, and radio paging. However, these approaches have many limitations; none can provide universal portable communications services. This paper discusses limitations of the evolving approaches and considers objectives and approaches for providing more universal digital portable communications as an integrated part of telephone exchange networks. These more universal communications could be accomplished by using demand-assigned radio links for the last thousand feet or so of telephone loops and sharing the remainder of the fixed distribution facilities. Fixed radio ports as integrated parts of telephone distribution networks could be placed throughout service regions. Efficient use of the radio spectrum could be insured by the planned reuse of

radio frequencies throughout the regions. The severe multipath radio propagation environment within and around buildings that strongly influences the design of portable communications systems is described in the paper. System configurations and radio link techniques, that can provide reliable communications in the multipath environment, are discussed. Radio system calculations are illustrated for radio ports with 30-ft high antennas in residential areas. The calculations indicate that radio link availability would be greater than 99 percent for 2000-ft port separations and 5-mW portable transmitters. Reuse of frequencies would require dividing the allocated frequency band into segments for use at adjacent ports. Calculations suggest that link availability in the cochannel interference environment would be greater than 99 percent, if 25 to 35 segments were used in residential areas.

**"Mean-Square Crosstalk in Tamed Frequency Modulation,"** M. Gavish, and I. Kalet, IEEE Trans. Comm., Vol. COM-35, No. 4, April 1987.

An analytical expression for evaluating the mean-square crosstalk between adjacent channels in coherent tamed frequency modulation (TFM) systems is presented. Numerical results are obtained and compared to previous crosstalk results for minimum shift keying (MSK); the substantial superiority of TFM is confirmed. An equivalent white Gaussian noise model for crosstalk is included and used to estimate performance degradation as a function of frequency separation between channels. The crosstalk results are also used to show that TFM is about 0.9 dB more sensitive to tone jamming than MSK.

**"New Universal All-Digital CPM Modulator,"** A Kopta, S. Budisin, and V. Jovanovic, IEEE Trans. Comm., Vol. COM-35, No. 4, April 1987.

In this paper a new modulator for a broad class of continuous phase modulations (CPM) is proposed that is more flexible and less complex than conventional quadrature modulators, while achieving the same or better performance. Being all-digital it is more suitable for one-chip VLSI implementation. Some design parameters are also discussed and experimental results are presented.

**"Optimization of Generalized Tamed Frequency Modulation Bit Error Rate Performance Subject to a Bandwidth Constraint,"** S. Laufer, and I. Kalet, IEEE Trans. Comm., Vol. COM-35, No. 5, May 1987.

This paper deals with the optimization of coherent generalized tamed frequency modulation (GTFM). The optimization is carried out over certain parameters of the modulation scheme to give the best BER (bit error rate) performance, subject to a

bandwidth constraint. The optimization is done by an algorithm which uses the upper bound on the squared Euclidean distance as a metric of the BER performance and the power spectra at a certain frequency as a metric of the bandwidth. It is concluded that when the modulation index is not restricted to 0.5, a theoretic improvement of 1.9 dB over the BER performance of GTFM is achievable, with equal bandwidths as a basis of comparison.

**"Adaptive Diversity Reception Over a Slow Nonselective Fading Channel,"** P.Y. Kam, IEEE Trans. Comm., Vol. COM-35, No. 5, May 1987.

We extend some previous results on adaptive receivers with memory for slow nonselective Rayleigh fading channels in the case of diversity reception. The Bayes receiver in this case is shown to be a generalized maximal ratio combiner. Error probability performance is obtained for antipodal signals such as BPSK. A simple performance upper bound is also derived. Numerical performance results are presented for the particular case of a Markov channel model.

**"Measurement, Characterization and Modeling of Indoor 800/900 MHz Radio Channels for Digital Communications,"** R.J.C. Bultitude, IEEE Comm. Mag., Vol. 25, No. 6, June 1987.

This article reports continuous wave (CW) propagation experiments that were conducted at 910 MHz in order to determine the characteristics of indoor radio channels between fixed terminals. The measurement system and experimental procedures are described and analysis results are presented. Discussions regarding the physical interpretation of the results and their application are also included.

**"Multipath Time Delay Spread in the Digital Portable Radio Environment,"** D.M.J. Devasirvatham, IEEE Comm. Mag., Vol. 25, No. 6, June 1987.

Radio propagation in the digital portable communications environment is examined in this article. Time delay spread measurements are introduced and discussed in detail.

**"Cellular Access Digital Network (CADN): Wireless Access to Networks of the Future,"** E.S.K. Chien, D.J. Goodman, and J.E. Russel, Sr., IEEE Comm. Mag., Vol. 25, No. 6, June 1987.

This article examines the Cellular Access Digital Network (CADN), a wireless access network, which merges the wireless transmission and user location capability of cellular systems with the signaling and network control features of ISDN.

**"Spread Spectrum for Indoor Digital Radio,"**

M. Kavehrad, and P.J. McLane, IEEE Comm. Mag., Vol. 25, No. 6, June 1987.

Spread spectrum modulation is universally accepted in the hostile communication environments that occur in military applications. In consumer applications, spread spectrum is not widely accepted, in spite of recent FCC encouragements and rulings. We present a commercial application of direct sequence, spread spectrum modulation. This involves indoor digital radio for office, factory or laboratory based wireless PBX applications. Experimental results, as well as a discussion of the advantages of spread spectrum in harsh indoor, multipath environments, are included. Some sample calculations of multipath outage and a short description of a frequency

hopping system complete the article.

**"Multiple Access Communications Network,"** V.O.K. Li, IEEE Comm. Mag., Vol. 25, No. 6, June 1987.

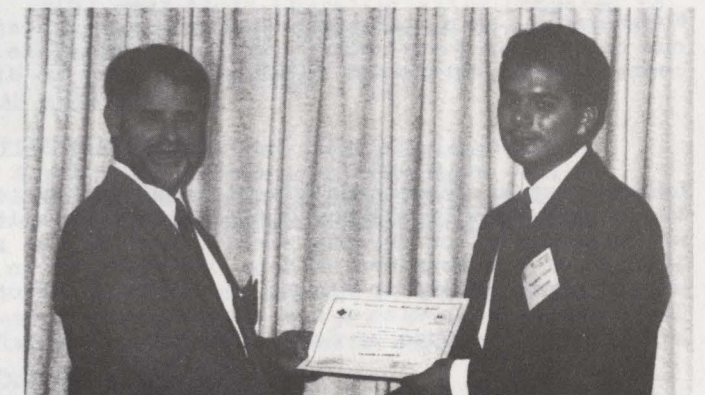
This article is an introduction to multiple access communications networks in which the terminals share common communications channels. Multiple access networks included satellite networks, local area networks, and packet radio networks. Various multiple access protocols will be described. We shall also describe how some of these protocols are used in different multiple access networks.

#### DAN NOBLE AWARD

The recipient of the 1987 Dan Noble Fellowship award is Mr. Theodore (Ted) Stoner. The award of \$5,000 for one year is jointly funded by Motorola Inc. and the Vehicular Technology Society of the IEEE, and is made in honor of the memory of Dan Noble who was a pioneer and innovator in land mobile technology.

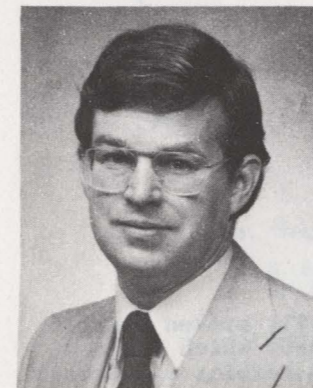
The winner each year is selected on the basis of outstanding academic achievement, social responsibility and pursuit of graduate work in the field of Electrical Engineering.

Mr. Stoner is a graduate of the University of Dayton where he obtained a Bachelor's degree in electrical engineering, and plans to attend Purdue University to pursue a Master's degree in radio communications.



Mr. Ted Stoner (center), the recipient of the 1987 Dan Noble Fellowship award, is shown with Dr. Tony Van Den Heuvel (left) representing the Noble Fellowship Committee and Mr. Chuck Lynk (right) of Motorola.

## Vehicular Electronics



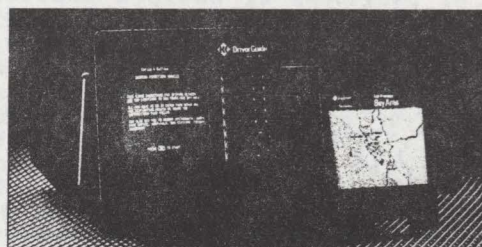
**Bill Fleming**  
Vehicular Electronics Editor

#### DRIVERGUIDE AND TRIMBLE-GPS NAVIGATION SYSTEMS

Unlike most present-day navigation systems, that display one's vehicle location on a video screen map, a new unit from Karlin & Collins of Sunnyvale, CA, also prints out navigation directions. The directions tell drivers where to turn, what landmarks to look for, and how long the trip should take. Potential problems such as one-way streets and left-turn restrictions are noted. Road speed limits and a complete listing of street addresses are also included [1].

The system's information databases, each covering a large region such as the six-county San Francisco Bay area, are contained in memory chips attached to interchangeable cards. The unit is scheduled to sell for about \$1000, and may appear as an original-equipment option on 1990-model year Ford Motor vehicles [1].

Driverguide gives step-by-step directions between any two points in its area of coverage.



Karlin & Collins Driverguide System

```

--FROM HOLIDAY INN AT 22900 MICHIGAN AV TO PEACOCK
RESTAURANT AT 4045 MAPLE ST --
--ABOUT 5.3 MILES, 10 MINUTES--

* PROCEED W ON MICHIGAN (US-12) AV
* DRIVE 0.1 MILES ON MICHIGAN (US-12) TO A
  TURN-AROUND
* MAKE A U-TURN AS SOON AS POSSIBLE

* DRIVE 4.8 MILES ON MICHIGAN (US-12) TO MAPLE ST
* TURN RIGHT ONTO MAPLE

* DRIVE 0.3 MILES ON MAPLE TO 4045 MAPLE ST
    
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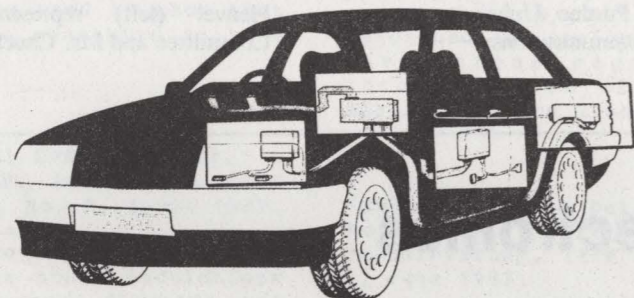
Driverguide System Sample Printout

In a related development, Trimble Navigation of Sunnyvale, CA, has made a compact "Kleenix" box-size (9.5"x 5"x 2", weighing 2.5 lbs.) GPS (Global Positioning Satellite) receiver for automotive application [2]. Trimble says that automotive-volume production would bring the GPS receiver's price down to \$200 from its current \$5000-to-\$13,000 price range.

Furthermore, when a ground-based reference receiver and time integration methods are used; one-centimeter positioning accuracy is possible. This will make possible, for example, exact control of an earthmover blade angle so as to dig out absolutely level grades [2].

ALTERNATIVE TO MULTIPLEX WIRING

Lucas Group has developed a vehicle wiring system called Starnet that offers similar advantages to multiplexing without its complexity [3]. Starnet is a remote switching concept where separate low-current wires (about 150 mA per wire) are used for each control circuit instead of a communication data bus employed in multiplexing. Local switching is handled by either micro-relays or "smart" power semiconductors. Flat-wire ribbon connections interface low-current wires with a high-current bus line. It is noted that similar systems have been previously developed by Jaguar [4] and General Motors [5].

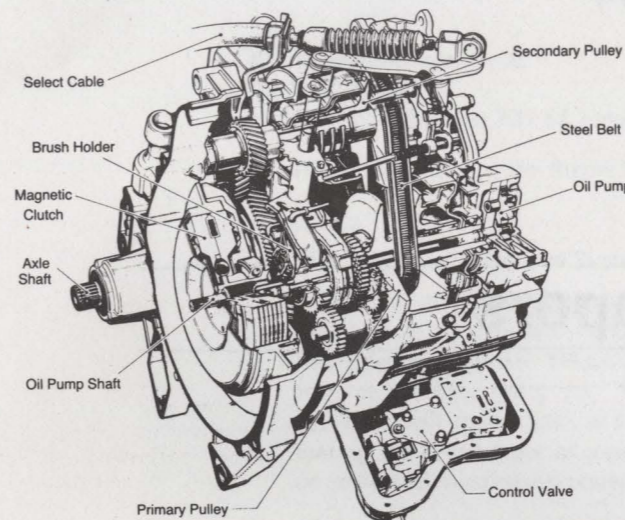


Lucas Starnet Electrical Switching Control System

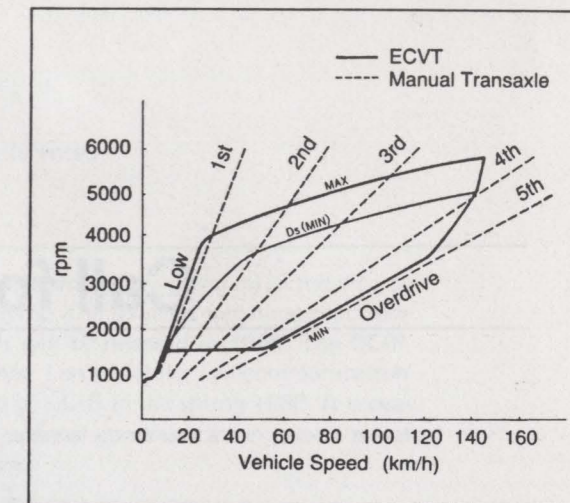
SUBARU ELECTRICALLY SHIFTED CVT

The Van Doorne continuously variable transmission (CVT) steel belt has finally proven durable for production release. The CVT, all except the steel belt, is made by Subaru, which has now added an electronically controlled magnetic clutch [6]. The magnetic clutch permits electronic control of the Subaru CVT powertrain.

An eight-bit 4K microprocessor collects the following input signals: engine speed, vehicle speed, accelerator position, CVT mode selection, and on/off status of the engine choke and the air conditioner. The CVT features include selectability of various operating modes, such as: normal high-economy shifting and higher-performance shifting (engine maintained above 3000 rpm). Fuel economy of the electric/automatic CVT vehicle is said to be six percent better than the same vehicle equipped with a five-speed manual transmission [6].



Subaru Electrically Shifted CVT (ECVT)

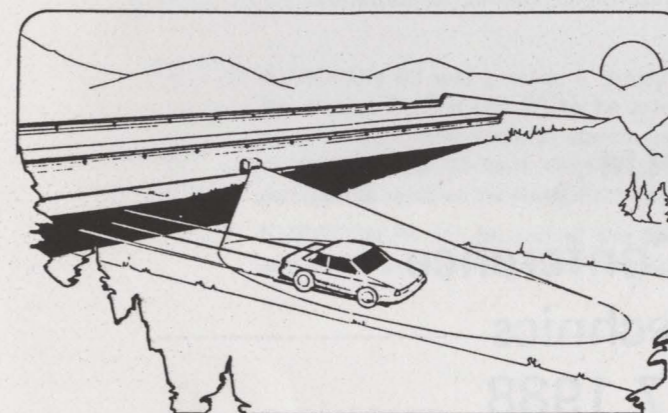


ECVT Gear Shift Characteristics Compared to Those of a Five-Speed Manual Transmission

NEW VEHICULAR ANTENNAS

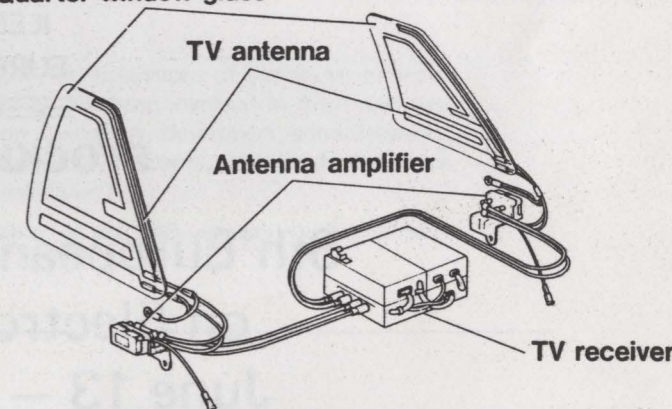
Two papers were presented at this spring's IEEE/VTS Conference that both provided useful information on new types of vehicular antennas. A passive, radiometric, microwave vehicle antenna was described by Garceau et al [7] of the Quebec Center of Industrial Research. The antenna is not used to emit microwaves, but rather, detects thermally radiated microwave energy associated with presence of vehicles.

In another paper, Toriyama et al of Toyota Motor reported on development of a hidden UHF/VHF dual-band, printed-line antenna system. Two antenna line patterns are printed onto rear quarter windows of vehicles and excellent experiment-based design results were presented [8].



Passive Microwave Sensor Detecting Presence of Vehicle

Quarter window glass



UHF/VHF Dual-Band TV Antenna System Developed at Toyota Motor

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8. H. Toriyama, "Development of Printed-On Glass TV Antenna System for Car," 37th IEEE Vehicular Technology Conference, Tampa, FA, June 1-3, 1987, Conference Proceedings, pp. 334-342.

# Call for Papers



**EUROCON  
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## AREA COMMUNICATIONS

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## INVITATION

We invite contributions to  
**EUROCON 88**  
in Stockholm, Sweden 13–17 June 1988.

**Area Communication** is the theme for this conference.

It includes:

– **Digital Mobile Telephone Systems**

Interesting and important studies and developments are going on in the area of mobile and portable radio telephone systems. The detailed specification of the Pan European Mobile Telephone System will be released in 1988. The CCIR Interim Working Party on "Future Public Land Mobile Telecommunication Systems" will report back to study group of CCIR in the spring 1988. It is evaluating the possibilities of a world-wide personal communication system based on small and inexpensive pocket telephones.

– **Communication Networks**

Digital Mobile Networks, Local Area Networks (LAN) and Integrated Services Digital Networks (ISDN) are rapidly developing and their interworking is of primary importance.

– **Digital Signal Processing (DSP) and Advanced Radio Concepts (ARC)**

The Digital Mobile Radio Systems and the Communication Networks have placed new and exciting needs of research and development in DSP and ARC. Modulation techniques, speech coding, modem design and implementation are examples of areas of interest for this conference.

– **Standardization**

Good standards are vital for successful development of production and implementation of communication systems.

EUROCON 88 will provide a timely forum for discussions of the above subjects. We expect EUROCON 88 to be attended by all those involved in this important area of the future society: communication specialists, developers, administrators, researchers and teachers are invited to exchange concepts, ideas and experience during this week in the beautiful city of Stockholm.

EUROCON 88 will be part of the celebration of the 100 year anniversary of SER and the 25 year anniversary of Region 8 of IEEE.

### REPLY CARD

Reply card to be sent back before March 15, 1987 to:  
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Please send me further information about the Conference.

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Abstracts of proposed papers (1 page) should be addressed in 4 copies, in English before August 1, 1987 to the conference secretariat (address see below).

The authors whose papers are accepted will be informed by October 15, 1987. The full text in English of the accepted papers should be submitted before March 1, 1988.

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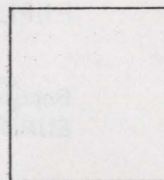
The official language will be English and all abstracts and papers should be in English. Sessions will be conducted in English without interpretation.

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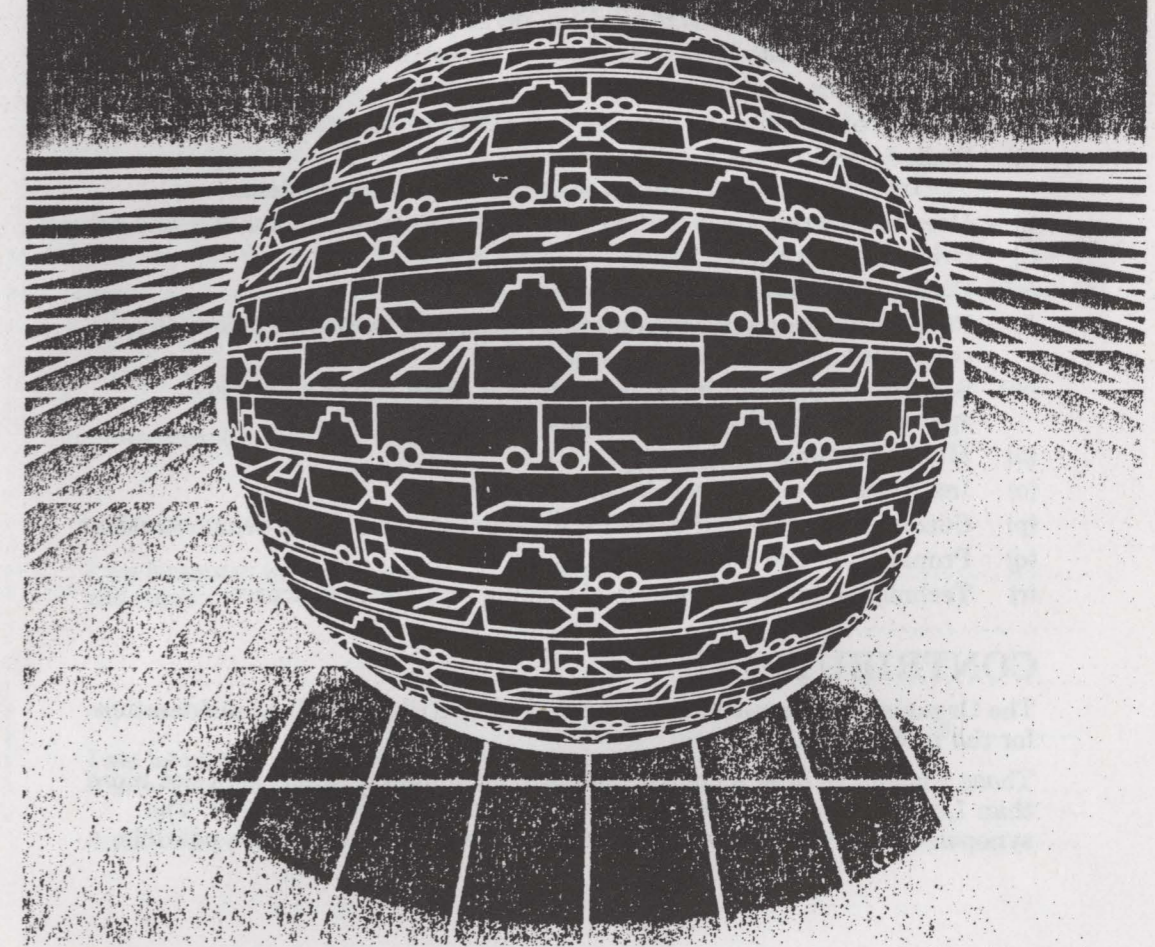
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## Fourth International Conference on Satellite Systems for Mobile Communications & Navigation

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**AIM**

The Conference aims to provide an international forum to review the current state of development and application of satellite systems for aeronautical, maritime, land mobile and personal communications and navigation via satellites. This will include considerations of the space segment, earth segment, propagation and spectrum utilisation.

**SCOPE**

Relevant topics will include:

- (a) User requirements:  
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- (b) Maritime mobile satellite service:  
Space segment, technical description of systems; services.  
Future developments — ship earth station technology
- (c) Aeronautical mobile satellite service:  
Operational requirements: air traffic control, aircraft fleet management, public correspondence.  
Implementation of systems: space segments, technical description of systems; experiments, trials and services
- (d) Land mobile satellite service:  
Synergy with cellular services; personal communications and paging
- (e) Integration of satellite systems with terrestrial networks
- (f) Multi-service satellites
- (g) The use of satellites in distress and safety systems
- (h) Radiodetermination satellite services:  
Integration of navigation with communication systems
- (i) User considerations including reliability, integrity, availability and privacy
- (j) Orbit configuration
- (k) Coding and modulation techniques
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- (m) Satellite technology including antennas, high power amplifiers, spacecraft reliability and on-board processing
- (n) Mobile terminal equipment
- (o) Institutional and economic considerations
- (p) Current and projected systems, experiments, trials and demonstrations
- (q) Propagation and EMC
- (r) Techniques for multiplexing, signalling and multiple access

**CONTRIBUTIONS**

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

Those wishing to offer a contribution should submit a synopsis of not more than 1,000 words to the Secretariat on, or before 26 October 1987. The synopsis should include the main points of the paper and, where possible,

indicate where the emphasis will be placed. Authors whose synopses are selected will be requested to provide full typescripts of not more than 4,000 words of text, or less if illustrations are included, for assessment by 15 April 1988.

The synopsis should be marked with the appropriate letter indicating to which subject area of the scope the synopsis applies. If it is appropriate to more than one topic, all relevant designations should be marked.

**DEADLINES**

Intending authors should note the following deadline dates:

- Receipt of synopses 26 October 1987
- Notification of provisional acceptance of synopses late November 1987
- Receipt of full text for final review 15 April 1988

**WORKING LANGUAGE**

The working language of the Conference is English which will be used in all printed material, presentations and discussion. Simultaneous interpretation will not be provided.

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It is planned to organise an exhibition in association with the Conference. Please complete the attached form if you wish to receive further details.

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with the co-operation of

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