



IEEE

VEHICULAR TECHNOLOGY SOCIETY

NEWSLETTER

Vol. 36, No. 2, May 1989

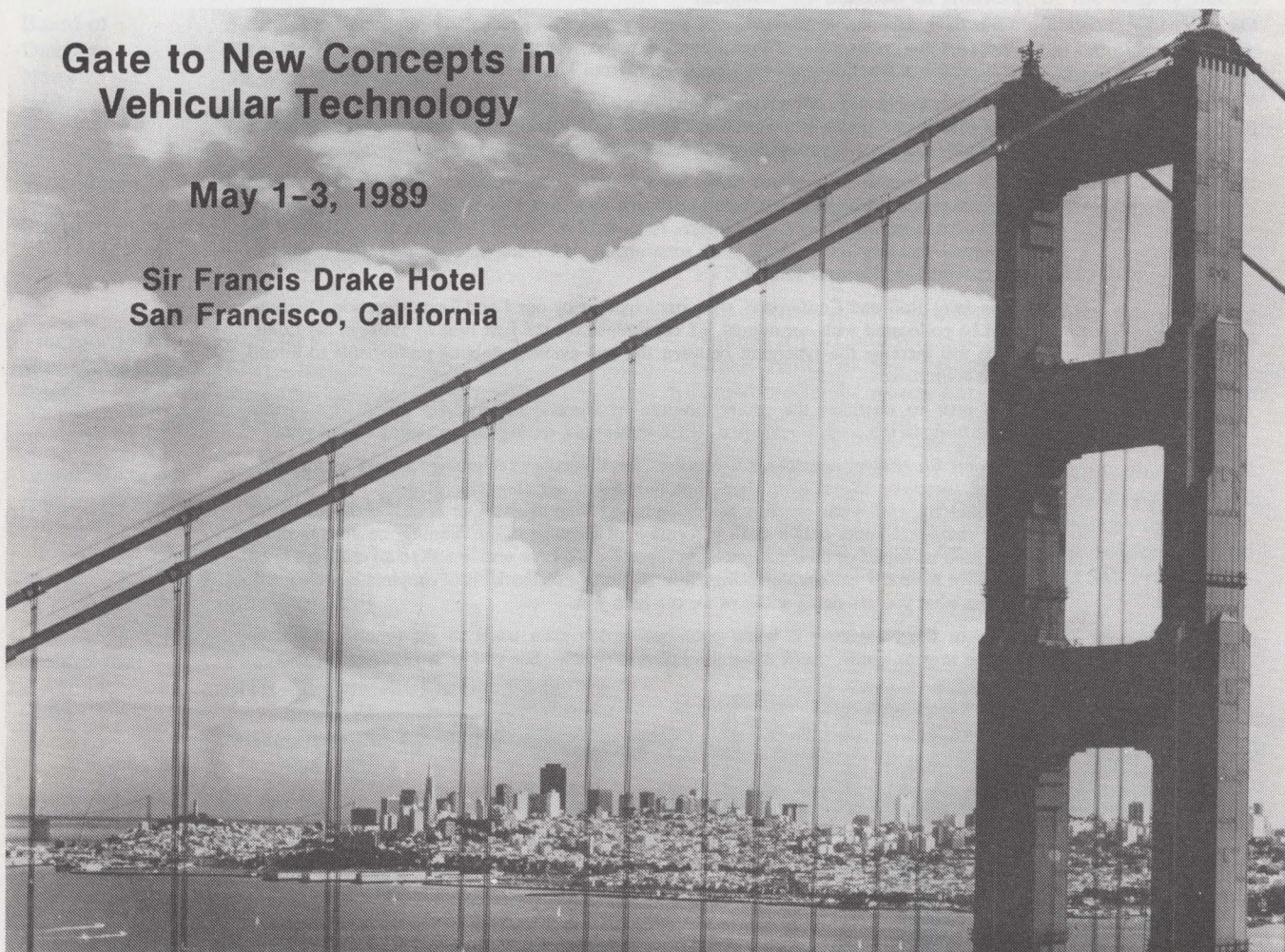
ISSN 0161-7887

Editor: A. Kent Johnson

Gate to New Concepts in Vehicular Technology

May 1-3, 1989

Sir Francis Drake Hotel
San Francisco, California



1588466 SM
 ROGER D MADDEN
 FCC
 ROOM 5202
 2025 M ST NW
 WASHINGTON

06N ****
 HT127

DC 20557

President's Message

George McClure
President
IEEE Vehicular Technology Society

Your Society is working to serve you and the rest of its members, through publications and conferences, by addressing emerging areas of interest, by increasing awareness of our areas of technology among student members, and by building bridges to strengthen relationships with our chapters.

As you will see from the minutes of our latest board meeting, in this issue, initiatives in all these areas are being pursued.

1. Our new publications officers are projecting close to 600 pages in the Transactions for 1990, following a special issue on Vehicular Electronics later this year.
2. Growth in our annual conference is seen by comparing recent conference records with those of ten years ago. The number of pages has more than doubled. This year's conference in San Francisco will have authors from 17 countries presenting papers.
3. Following publication of its report in the February 1988 issue of the Transactions, the Ad hoc Committee on Propagation was elevated to full committee status in VTS. We are currently seeking a chairman for this committee to replace the late Neal Shepherd.
4. Dr. Bob French chairs our new Navigation & Information Systems Committee, recognizing the strong interest in this emerging area. In addition, the vehicle navigation & information system (VNIS) Conference, to be held in Toronto in September, is now a bi-annual meeting under VTS joint sponsorship. Growing interest may make this an annual event in the near future.
5. The Joint Railroad Conference, with participation by our Land Transportation Division, will be co-located with our annual VT conference for the first time in 1991, in St. Louis. This will increase the synergism between the two events, enabling participants to attend both conferences.
6. We plan to continue the recent upsurge in student membership in VT by further advertising in the student magazine, IEEE Potentials, during the upcoming school year.
7. Support for chapter activities is a concern, for Vehicular Technology as well as for other IEEE societies. We want to strengthen our ties to our chapters. Reports from chapters are sketchy, with some chapters not being heard from at all. Our annual competition for best chapter includes only a small percentage of chapters in the running, because most do not send us copies of their L31 meeting reports. We have sent letters to all chapters to be sure we have current chapter officer information. Feedback from chapters is welcomed; tell us what you are doing and how we can help you.

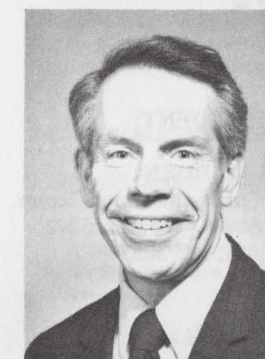
This issue of the Newsletter is being published earlier than usual to get timely conference information in your hands. Look it over and plan to attend. See you in San Francisco!

George F. McClure

Newsletter Staff

EDITOR	A. Kent Johnson Room 4E-324B Bell Laboratories Whippany, NJ 07981 (201) 386-6686
STAFF	
Chapter News Editor	Gaspar Messina 9800 Marguetta Dr. Bethesda, MD 20817 (202) 653-5560
Vehicular Electronics Editor	Dr. William J. Fleming TRW Inc. Vehicle Safety Systems Inc. 4505 W. 26 Mile Road Washington, MI 48094 (313) 781-7394
Board of Directors News Editor	Samuel A. Leslie The Antenna Specialists Co. 99 Woodberry Lane Lynchburg, VA 24502-4453 (804) 385-7800
Washington News Editor	Eric Schimmel Electronic Industries Assoc. 2001 Eye Street, N.W. Washington, D.C. 20004 (202) 457-4990
Transportation Systems Editor	Bob McKnight 8201 - 16th Street, Apt. 1221 Silver Spring, Maryland 20910 (301) 565-0928
Communications Editor	J.R. Cruz University of Oklahoma School of Elec. Engineering 202 West Boyd, Room 219 Norman, Oklahoma 73019 (405) 325-4721
Professional Activities Editor	Frank E. Lord GTE Government Systems Corp. P.O. Box 7188 Mountain View, CA 94039 (415) 966-2602
Canadian Report Editor	William J. Misskey University of Regina Regina, Saskatchewan S4S 0A2 (306) 584-4096

Editor's Notes



A. Kent Johnson
Newsletter Editor

Arthur Goldsmith Elected IEEE Director, Division VI

At the recent Board of Governors meeting (see minutes published elsewhere), Arthur Goldsmith resigned his position as treasurer of the Society due to his election as IEEE Director, Division VI. We are pleased to congratulate Art on his election, but will miss him very much as Society Treasurer. He has been an excellent treasurer and it has been a pleasure working with him. As noted in the minutes, Samuel Leslie will take over as treasurer after many faithful years as Society Secretary. He in turn will be replaced by James Sears. We look forward to working with these men in their new positions.

VTS Conference in San Francisco May 1-3

This edition of the newsletter features the upcoming Annual VTS Conference to be held at the Sir Francis Drake Hotel in San Francisco from May 1-3, 1989. Elsewhere in the newsletter you will find the complete advanced program of the conference and as you will see, the committee has arranged for an outstanding technical program. It is once again clear that there is great interest in cellular technology and land mobile systems from the number of papers being presented in those areas. It should be an exciting conference and we hope you will be able to make it to San Francisco.

IEEE Vehicular Technology Newsletter is published quarterly by the Vehicular Technology Society of The Institute of Electrical and Electronics Engineers, Inc. Headquarters: 345 East 47th Street, New York, NY 10017-2394. \$1.00 per member per year (included in Society fee) for each member of the Vehicular Technology Society. Printed in U.S.A. Second-class postage paid at New York, NY and at additional mailing offices. *Postmaster:* Send address changes to IEEE Vehicular Technology Society Newsletter, IEEE, 445 Hoes Lane, Piscataway, NJ 08854-4150.

*Inputs for newsletter staff editors should be received by newsletter editor at least one week before these dates.

Month of Issue	Final Copy to be Rec'd By VTS Editor	Target Mailing Date
August	6-9-89	7-14-89
November	9-15-89	10-13-89
February	12-29-89	1-31-90
May	3-10-90	4-14-90

Society Officers and Board of Governors

SOCIETY OFFICERS

PRESIDENT:	VICE PRESIDENT:
GEORGE F. McCLURE Martin Marietta P.O. Box 5837, MP552 Orlando, FL 32855 (407) 356-3782	ROGER MADDEN Federal Communications Comm. 2025 M St., N.W., Rm. 5202 Washington, DC 20554
SECRETARY:	TREASURER:
JAMES M. SEARS General Electric Mountain View Road Lynchburg, VA 24052 (804) 948-6105 (804) 525-0200 Home	SAMUEL A. LESLIE The Antenna Specialists Co. 99 Woodberry Lane Lynchburg, VA 24502-4453 (804) 385-7800 (804) 525-7589 Home

BOARD OF GOVERNORS

NAME(Term thru)	RESPONSIBILITY
J.R. Cruz(90)	Newsletter (Communications)
Robert E. Fenton(91)	Sr. Past President/Planning
Arthur Goldsmith(90)	Const. & Bylaws Chairman
Leo M. Himmel(89)	Chairman, Education Committee
A. Kent Johnson(89)	Newsletter Editor
Samuel A. Leslie(89)	Society Treasurer
Fred M. Link(89)	National Site Selection
Roger Madden(90)	Vice President
Robert A. Mazzola(91)	Vehicular Electronics Liaison
George F. McClure(91)	President
Samuel McConoughey(89)	Avant Garde/Public Relations
Stuart Meyer(91)	Jr. Past President/Nominations
Evan B. Richards(90)	National Conference Chairman
Jesse E. Russell(91)	Standards Chairman
Raymond C. Trott(90)	Membership Chairman

1988 Paper Prize Award Winners Announced!

All IEEE papers presented at the 1988 ASME/IEEE Joint Railroad Conference were evaluated by a panel of reviewers. Prizes are awarded at the IEEE luncheon each year to the previous year's winners. The following awards presented by Linda Sue Boehmer Wednesday April 26:

1st Prize - \$150.00

R. T Hill, S. Yu *Electromagnetic Interference Calculations in Third-Rail Rapid Transit Railways*

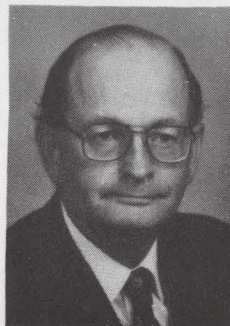
2nd Prize - \$100.00

D. Becker, C. Rackmil & P. Blumberg *Dynamic Solution of a Diesel-Electric Locomotive Propulsion System*

3rd Prize - \$50.00

G. English, C. Schwier *The Technical and Economic Issues of AC Traction in N.A. Freight Locomotives*

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 February 10, 1989 at the Crowne Plaza Hotel in Orlando, Florida. The meeting was called to order at 9:00 AM.

ROLL CALL

The following were in attendance:

Linda Sue Boehmer	88-89 LTD Chairman
# J. R. Cruz	Assoc. Newsletter Editor
# Robert E. Fenton	Sr. Past President/Planning
Robert French	Nav. & Info. Sys. Chairman
# Arthur Goldsmith	Const. & Bylaws Chairman
# Leo M. Himmel, Sr.	Education Committee
# Kent Johnson	Newsletter Editor
W. C. Y. Lee	Publications Chairman
# Sam Leslie	Treasurer
# Fred Link	VTC Site Selection
# Roger Madden	Vice President
# Robert A. Mazzola	Vehicular Elec. Liaison
# George McClure	President
# Sam McConoughey	Avant Garde/Public Relations
# Stu Meyer	Jr. Past Pres./Nominations
Sang Rhee	Transactions Editor
# Evan Richards	Natl. Conf. Chairman
# Jesse Russell	Standards Chairman
Jim Sears	Secretary
Dave Talley	Financial Advisor
# Ray Trott	Membership Chairman
Tony van den Heuvel	Noble Fellowship
Ralph Wyndrum	Division III Director

(# denotes elected Board member)

All fifteen elected board members were present at this meeting. A quorum was thus present.

The president modified the agenda, and after discussion, Tray Trott moved, Evan Richards seconded that the agenda be approved with the corrections as noted. The vote was unanimous in favor.

Also, one correction on page 6 of the October 18, 1988 minutes was made. The word "Vehicle" was deleted from the title of the Navigation and Information Systems chairman. Even Richards thus moved, Fred Link seconded that minutes of the last meeting be approved as corrected. The vote was unanimous in favor.

Sam McConoughey also suggested that the title "Appointed Board Members" be changed to read "Committee Chairmen" in the listing of board appointments.

IEEE DIVISION III DIRECTOR'S REPORT

The Board was honored by the attendance of Ralph Wyndrum, the IEEE Division III Director. Ralph discussed some of the procedures for nominations for higher IEEE offices, and asked the board for inputs on how the administrative processes with Headquarters can be improved. Several members of the board noted that response time for many time-critical items was too slow. Getting calls for papers out in a timely manner was mentioned as one example, where delays of 2 to 3 months after submission have been noted.

SPECIAL NOMINATIONS COMMITTEE REPORT

Art Goldsmith resigned his position as treasurer of the Society, effective December 31, 1988. This was due to his election as Division VI director, and the IEEE bylaws do not allow an IEEE Director to hold an executive position on a Society's board.

Stu Meyer then moved, Bob Fenton seconded that the Board accept Art's resignation with regret, and that Art's services to the Board over the past few years as treasurer is much appreciated.

Stu Meyer then moved, Kent Johnson seconded that the secretary, Sam Leslie, be nominated by acclamation as treasurer of the Society. The vote was unanimous in favor.

Stu Meyer next moved, Fred Link seconded that Jim Sears be appointed as secretary of the Society. The vote was unanimous in favor.

Other appointments were made as follows:

Ray Trott	Membership Chairman
Arthur Goldsmith	Constitution & Bylaws Chairman
Public Relations	
& Avant Garde	Sam McConoughey
Jesse Russell	Standards Chairman
Stu Meyer	Nominations Chairman

TREASURER'S REPORT

Arthur Goldsmith provided a summary of the Society's financials for 1988. Arthur noted that the Society continues with its excellent financial position, even though the financial results for 1988 reflect a deficit. This is strictly due to the bookkeeping procedure used by HQ, in that the \$90K transferred to the Convergence Fellowship fund was entered as an expense. The net worth on a per-member basis for the VTS Society is close to \$85, which compares favorably with a \$65 average for all of the IEEE Societies.

Dave Talley provided his financial advisor's report, and he indicated that he was in close agreement with the results that were discussed. Dave also noted that the board should consider additional means for putting the remainder of the Society's reserves to the best use for the membership.

After board discussion, Arthur Goldsmith moved, Stu Meyer seconded that the president appoint an ad hoc committee to look at the use of the Society's reserves for additional scholarships, awards and other alternative uses. The president then appointed Bob Mazzola, Leo Himmel and Roger Madden to this committee.

Sam McConoughey moved, Ray Trott seconded that the board accept the past treasurer's report. The vote was unanimous in favor.

PUBLICATIONS

Bill Lee reported on the goals of his committee for this year and next. In particular, emphasis is to be placed on special issues of the transactions. Upcoming special issues which are under consideration are:

- Vehicular Electronics (November 89)
- Digital Cellular (Late 89—Early 90)
- Navigation & Information Systems (1990)
- Non-cellular Communications (1990)

The committee estimated that the Transactions budget for 1990 is near the 600 page mark, which is more than double that allocated for 1989. Sam McConoughey moved, Jesse Russell seconded that a 592 page budget be adopted for 1990. The vote was unanimous in favor.

Sang Rhee reported that the reduction of the backlog of reviewed papers is

well underway, and that publication of these papers in the Transactions is getting back on schedule.

Kent Johnson reported that he was moving the deadline up for the next issue of the Newsletter to March 1 in order to get information to the membership in time for the San Francisco VTC.

CONFERENCES AND MEETINGS

1989 VNIS Conference, September 12-14, 1989, Toronto

Evan Richards reported that, per previous board approval, \$3000 (Canadian) seed money has been sent to the Toronto VNIS committee for their conference. A revised budget from this committee has also been received.

Bob French discussed with the board particulars in holding a 1991 VNIS conference, and also explored the feasibility of holding this conference on a yearly basis rather than every other year. Roger Madden also noted that the Transportation workshop that was held after the last two Convergence conferences could also be made a yearly affair, in that it could be held in conjunction with future VNIS conferences during odd years. Roger and Bob French are to explore these thoughts further, and are to report their recommendations to the board at the next meeting.

38th VTC Philadelphia Conference

The board noted that the success of this conference was due in large part to the recent upsurge of interest in digital cellular. Many papers relating to cellular radio issues were given at this conference.

Joint Railroad Conference, April 25-27, 1989, Phila.

Linda Sue Boehmer reported that this conference is being held at the Hershey Hotel in Philadelphia this year. Evan Richards noted that the conference committee requires seed money, and that we are late in responding. Evan then moved, Jesse Russell seconded that \$2000 seed money be provided to the 1989 Joint Railroad Conference committee. The vote was unanimous in favor.

Joint Railroad Conference, 1990

Linda Sue Boehmer reported that this conference will now be held in Chicago in 1990.

Joint Railroad Conference, 1991

Linda Sue Boehmer also reported that things appear on track to hold the 1991 conference in conjunction with the 1991 VTC in St. Louis. Linda Sue noted that there is some concern that the conference may have to be held at a hotel different than that selected for the VTC due to limited VTC hotel space. Linda Sue is to report the progress of this planning at the next board meeting.

38th VTC Philadelphia

Evan Richards reported that the Philadelphia conference committee has closed the books, with a nominal \$20K surplus being returned to the Society.

39th VTC San Francisco Conference (May 1-3, 1989)

Evan Richards reported that, through a misunderstanding, the remainder of seed money originally approved by the board has not been sent to the committee. This was rectified by having the Society President send a letter to IEEE HQ authorizing disbursement of the remaining \$1500 seed money to the San Francisco Conference.

The board noted that the next meeting will be held on the Saturday before the conference at the Francis Drake hotel (2:00 PM). After discussion on when to hold the board dinner, Sam McConoughey moved, Evan Richards moved that the board dinner be held on Wednesday evening following the conference in order to allow the conference committee members and their spouses to attend. The motion passed with 14 in favor, 1 against.

40th VTC Orlando Conference, May 6-9, 1990

George McClure reported on the status for 1990 VTC, to be held at the Holiday Inn Crowne Plaza in Orlando. A call for papers has been prepared, and will be distributed at the San Francisco conference.

Evan Richards moved, Ray Trott seconded that up to \$3000 seed money be approved for use as needed by the Orlando conference committee. The vote was unanimous in favor. The conference chairman is to write a letter to the treasurer to document the Orlando committee's request for the seed money.

41st VTC St. Louis, May 20-22, 1991, Sheraton Westport

Evan Richards reports that the St. Louis committee has prepared a preliminary budget, and that they have selected a theme. Also, Jim Hasse has been named as the publications chairman for this conference. Evan also noted that this conference is to be sponsored jointly by the IEEE St. Louis section and VTS on a 50/50 basis.

42nd VTC Denver Conference (1992)

There has been no activity in regard to this conference since the last board meeting.

1993 VTC Conference

Fred Link reported that he has had little luck in finding a location in the Northeast for the 1993 VTC, but that he and Ray Trott will give it another try. He mentioned the possibility of holding this conference in Canada, possibly Toronto, if the Boston area did not pan out. Furthermore, the possibility of holding the 1993 VTC conference jointly with the 1993 VNIS conference was discussed.

Bob Fenton also reported to the board that there was European interest in holding a VTC in Europe. After discussion, the board directed to Bob to relay that the idea of an overseas conference is under consideration.

Convergence '88

Bob Mazzola reported that the official paid attendance for this conference was 1306, and that over 3000 in total had attended. This is the best attendance record ever, with the return of surplus funds to the IEEE Southeastern Michigan Section and the Society anticipated at being around the \$80K to 100K mark. He also noted that international participation was up greatly over past conferences, being around the 30% mark.

Dates have been set for the upcoming Convergence Conferences, as follows:

October 12-17, 1990
October 17-22, 1992

1988 VTS/IES Convergence Workshop

Roger Madden reported that there were 63 registered attendees at this workshop, and that it should be financially successful. He did report that a misunderstanding by the hotel resulted in the workshop report being given away to the Convergence attendees rather than to the paid registrants of the workshop. After discussion, Roger is to follow through on the most reasonable method in getting additional copies of the workshop report to the paid registrants.

Evan Richards requested that Roger get a copy of the workshop report to Giorgio Rizzoni, associate transactions editor, vehicular electronics, as quickly as possible.

Also, Roger is to explore the possibility of holding the workshop annually, and to report to the board at the next meeting.

Scandinavian Distinguished Speaker Tour

Bob Fenton reported that this has become a dead issue, in that the original tour was canceled due to insufficient interest.

WIN Workshop, June 15-16, 1989, Rutgers University

A written report from David Goodman indicated that this workshop will be held at the Sheraton Regal Inn in Piscataway, New Jersey. Those who are interested should contact Charles Rouse at Rutgers University at (201) 932-5241.

COMMITTEE REPORTSLand Transportation

Linda Sue Boehmer reported that the membership mailing list for land transportation interests has been narrowed to around 500 members, thus minimizing mailing costs over past years.

A letter has been sent to all land transportation interests explaining the error in the VTS membership brochure, and also inviting those who have not done so to join VTS.

Also, a question arose on jointly sponsoring a conference with an organization which has lobbying status. Art Goldsmith is to check with headquarters and report to the board at the next meeting.

Constitution and Bylaws

Roger reported that he will be sending an ASCII file of the revised constitution to headquarters shortly, and that the membership should be receiving a copy for approval within the next couple of months.

Roger also noted that the board will next need to revise the Society's bylaws, after approval of the constitution by the membership is achieved. Sam McConoughey noted that part of this revision is to include the concept of three vice presidents to represent the three domains of the Society, as proposed by Bob Fenton some time ago.

Membership Report

Jim Sears reported that active membership as of year-end 1988 now stands at 2804, up by 172 over 1987. Of this number, 262 are student members (up from 207 in 1987). Dave Talley noted that there were discrepancies between the monthly membership report that Jim Sears has been receiving and the membership numbers which are furnished from headquarters as a part of the Society budget.

Ray Trott reported that he has had favorable responses from the publishers of Mobile Radio Technology and Industrial Communications in publicizing the availability of associate memberships in IEEE and the Society.

The president assigned Ray Trott and Jim Sears the task of wrapping up the membership brochure, including rates for associate membership and a more descriptive narrative of the three major domains of the Society.

After noting the increase in student membership in the Society, the board discussed the possibility of again advertising in IEEE Potentials. Roger Madden moved, Ray Trott seconded that up to \$2000 be provided for advertising in the IEEE Potentials magazine, starting with the 1989/1990 school year. The vote was unanimous in favor. Ray Trott is to follow this by arranging to provide an updated version of the past ads. The updating is to provide the recent wording on the description of the three domains, and is to include a form to aid in student members applying for membership. Camera-ready copy is to be supplied to IEEE Potentials in time for full publication.

Publicity

No report was available for this meeting.

CCIP Representative

There has been no activity since the last meeting.

USAB Engineering R&D

Arthur Goldsmith reported that TAB no longer is providing representation on this committee, but that the IEEE Societies continue to be free to provide representatives.

Arthur Goldsmith reported that, due to his recent election as Division VI Director, he will no longer be able to serve as the Society's representative to this committee.

The president noted in his report that several other technology committees are currently in effect, and that volunteer representatives from the Society are being solicited. The following are in addition to the Engineering R&D and CCIP committees:

Aerospace R&D
Defense R&D
Energy
Health Care Engineering Policy
Man and Radiation (COMAR)

Noble Fellowship

Tony van den Heuvel reported that the 1988 recipient of the Dan Noble award, Mr. Polikaitis, has successfully completed his first semester of graduate courses at IIT. Requests for nominations for next year's award was mailed to the IEEE accredited Universities last December, with the deadline for replies being set for March 31, 1989. This will create a tight schedule if the award is to be made at the upcoming San Francisco conference.

Transportation Electronics Fellowship

Bob Fenton indicated that it is too late in the school year to get replies in time to award this fellowship for the academic 1989-1990 school year. He suggests that the application forms be mailed out in time for the engineering school organizations to distribute to the students during the fall term. This would provide adequate time for the students to respond by March 1990. At present, he has addresses of approximately 250 university engineering departments in the U.S. and Canada to forward the announcement for this fellowship.

The board raised the question as to whether the mailing should include foreign schools, due to the international nature of IEEE and due to the increasingly significant percentage of foreign participation at the Convergence conferences. After discussion, Arthur Goldsmith moved, Roger Madden seconded that the Noble and the Convergence committees are to recommend to the board at the next meeting a uniform policy regarding the advertising and awarding of these two fellowships. The vote was unanimous in favor.

Chapter Activities

A written report from Gaspar Messina indicates that, based on submitted L31 forms, the chapter participation ranking is as follows:

1. San Francisco Bay Area
2. Toronto
3. Montreal
4. Orlando

He indicated that there are chapters that had significant activity in 1988, but they did not submit the L31 forms in order to obtain credit in the IEEE organization.

Stu Meyer reported that the Washington, D.C. chapter is being reactivated, with John Dettra volunteering as the chapter chairman. The board noted that the Land Transportation section of the Society is very active in their chapter meetings in the Washington area.

Per the board's direction at the last meeting, the past secretary has obtained copies of the October, 1988 Regional IEEE Organizations for all ten regions. The names of chapter chairmen have been updated from these reports, and subsequently a letter has been sent to all chapter chairmen on record requesting that they update the mailing address information for their chapters. Several replies have been received, and the board's mailing list has been updated accordingly. This will be repeated at the end of each year to keep the mailing list current.

Standards

Jesse Russell stated that he expects a significant increase in standards activity over the next couple of years, due in large part to the recent high level of activity in the digital cellular area.

Awards

Sam McConoughey, Stu Meyer, and John Galanti (paper of the year chairman) are to prepare awards for presentation at the San Francisco conference. A new award for the "Propagation Paper of the Year" is to be made in honor of Neal Shepherd.

Linda Sue Boehmer indicated that there will also be land transportation awards presented at the Philadelphia JRC on April 26.

Fellows Report

A written report from Al Isberg indicates that two highly qualified VTS members were evaluated by the VTS Fellows committee in 1988. Al further indicated that the success of a candidate being awarded Fellow status depended on whether he was extraordinarily qualified or just highly qualified.

Al noted that the IEEE Fellow Committee that the Society's Fellows chairman and Fellows evaluation committees serve not more than three years. Based on this requirement, Al is resigning his position as Chairman of the Fellows program, and is assuming the position titled "Chairman of the Fellow Candidate Search Committee".

The board noted that members of the Fellows committee must be of Fellows grade, and that they cannot be elected members of the board. The board is thus searching for a new Fellows committee chairman.

Educational Activities

There was no report available from this committee.

OLD BUSINESS

The president indicated that the requirements for Society life membership has been eased. The requirement for Life Member status in IEEE remains as before: age plus number of years membership in IEEE/AIEE/IRE equals 100.

Previously, Society Life Member status required 5 year's membership in the Society immediately prior to attaining IEEE Life Member status. This has been modified to allow years of membership in the Society after attaining Life Member status in IEEE to apply toward Society life member status.

Sam McConoughey noted that the ad hoc propagation committee has been elevated to full committee status at a previous board meeting, and that a chairman is still needed.

Per direction from the board at the last meeting, George McClure provided written job descriptions for the two positions of Publications Committee Chairman and Transactions Editor.

NEW BUSINESS

Bob French discussed with the board on the feasibility of holding future VNIS conferences. In particular, Bob French is to check with the Toronto chapter to see if they would be willing to host the conference again in 1991. Questions remain on continuing financial support from the Canadian Governmental entities for future conferences.

NEXT MEETING

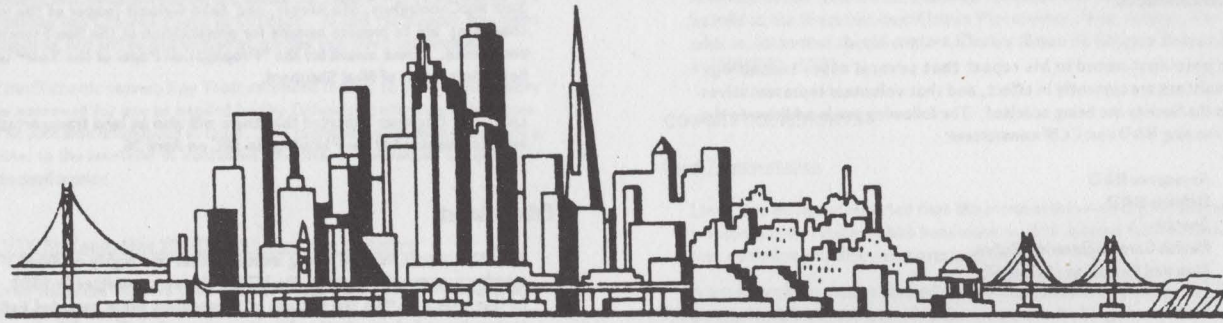
The next board meeting is scheduled for 2:00 PM Saturday, April 29, 1989 at the Sir Francis Drake hotel in San Francisco.

ADJOURNMENT

The meeting was adjourned at 4:06 PM.

Respectfully submitted,

Sam Leslie



1989 CONFERENCE SCHEDULE

<p>Saturday, April 29</p> <p>Sunday, April 30</p> <p>Monday, May 1</p> <p>Tuesday, May 2</p> <p>Wednesday, May 3</p>	<p>Registration Desk Open 5:00 p.m. - 9:00 p.m.</p> <p>Sonoma County Tour Buses Leave: 9:00 a.m. Buses Return: 4:00 p.m.</p> <p>S.F. Bay Area VTS Chapter Reception 6:00 p.m. - 7:00 p.m. Registration Desk Open 4:00 p.m. - 9:00 p.m.</p> <p>Technical Speaker Breakfast Meeting 7:30 a.m. Six Technical Sessions 9:00 a.m. - Noon Kickoff Lunch 12:15 p.m. - 1:45 p.m. Six Technical Sessions 2:00 p.m. - 5:00 p.m. Evening Panel Discussion 7:00 p.m. - 9:00 p.m. Registration Desk Open 8:00 a.m. - 4:00 p.m.</p> <p>Technical Speaker Breakfast Meeting 7:30 a.m. Six Technical Sessions 9:00 a.m. - Noon Awards Luncheon 12:15 p.m. - 1:45 p.m. Six Technical Sessions 2:00 p.m. - 5:00 p.m. Evening Panel Discussion 7:00 p.m. - 9:00 p.m. Registration Desk Open 8:00 a.m. - 4:00 p.m.</p> <p>Technical Speaker Breakfast Meeting 7:30 a.m. Four Technical Sessions 9:00 a.m. - Noon Student-Faculty Luncheon 12:15 p.m. Student-Faculty Program 1:00 p.m. - 4:00 p.m. Board of Governor's Meeting 2:00 p.m. - 6:00 p.m. Registration Desk Open 8:00 a.m. - Noon</p>
---	--

Session S1 Paper:	CELLULAR SYSTEM DESIGN I Leader: Keith Kaczmarek, GTE Mobinet, Houston TX 77090	0900 Monday May 1 Franciscan Room (180)
1.1	Follow-Me Roaming Communications Keith Kaczmarek, GTE Mobinet, Houston TX 77090	
1.2	Channel Interleaving in a Narrow Band FM Cellular Mobile Communications System Teruya Fujii, NTT, Mobile Communications Division, Kanagawa-ken, 238 Japan	
1.3	Evaluate Digital Cellular Systems William C.Y. Lee, PacTel Cellular, Irvine CA 92714	
1.4	Directed Retry and Measurements in a Cellular Mobile Telephone Network in Operation Lotta Ahlberg, Ericsson Radio Systems, S-163 80 Stockholm, Sweden	
1.5	A High Efficiency 835 MHz Linear Power Amplifier for Digital Cellular Telephony M.J. Koch, Reed Fisher, AT&T Bell Labs, Whippany NJ 07981	
Session S2 Paper:	LAND MOBILE SYSTEMS I Leader: Wrex Beaman	0900 Monday May 1 Monterey Room (120)
2.1	Vary Low Bit-Rate Store-and-Forward Transmission Scheme as a Means of Multiplexing Recognizable Speech Dispatch Systems in Very Small Bandwidths R.C.V. Macario, Dept. of Electrical Electronic Engineering, Univ. College of Swansea, U.K.	
2.2	MDT - New Designs, Architecture and Latest Advances B.N. Bailey, W.R. Flores, Coded Communications Corp., Carlsbad CA 92009	
2.3	Data Communications Over Private Land Mobile Radio Systems Georges de Brito, Centre National de Etudes, des Telecommunications, Les Moulineaux, Fr.	
2.4	Traffic Management and Travel Assistance Systems Integrated into Existing Networks Wolfgang Kremer, Frank Reichert, Lehrstuhl f. Informatik IV, University of Aachen, FRG	
2.5	DATAMOVIL: A Practical Implementation of TRADAMO Mobile Data Transmission Protocol Jaime Bustillo, Paulino Gonzales, Javier Jaquotot, Alvaro Larrazza; Telettra Espanola, SA; Madrid, Spain	
2.6	Projecting the Technological Evolution of Private Land-Mobile Radio Corwin D. Moore Jr., Personal Radio Steering Group Inc., Ann Arbor MI 48106	
Session S3 Paper:	EQUIPMENT I Leader: Tom Ulbrick	0900 Monday May 1 Renaissance Room (150)
3.1	Digital Cellular System with Linear Modulation Shigeru Ono, Noriaki Kondoh, Yoshihito Shimazaki; Digital Communications Laboratory, OKI Electric Industry Co. Ltd, Tokyo 108, Japan	
3.2	Diversity Antennas for Portable Telephone Kouchi Tsunekawa, Room 908C, NTT Radio Comm. Systems Lab., Kanagawa-ken, Japan	
3.3	Direct Conversion Transceiver Design for Compact Low Cost Portable Mobile Radio Terminals D. Haimes, A. Bateman; Communications Research Centre, Department of Electrical and Electronic Engineering, University of Bristol, BS8 1TR United Kingdom	
3.4	The Design of a Mobile Radio Receiver Using a Direct Conversion Architecture Ms. Polly Estabrook, Jet Propulsion Lab., Calif. Institute of Technology, Pasadena CA Dr. Bruce B. Lusignan, Commun. Satellite Planning Center, Stanford Univ., Stanford CA	
3.5	Phase Locked Transparent Tone-in-Band - An Analysis James K. Cavers, School of Engineering Science, Simon Fraser University, Burnaby BC	
Session S4 Paper:	MODULATION AND DEMODULATION I - CPM Leader: Charijos Rypinski	Monday 0900 May 1 Tudor Room A & B (100)
4.1	On Optimal Detection of Non-Coherent Trellis Coded Continuous Phase Modulation Signals: Discriminator Detection D. Makrakis, Kamilo Feher; Faculty of Engineering, University of Ottawa, Ontario K1N 6N5	
4.2	Noncoherent Detection of P1/4-Shift QPSK Systems in an CCI-AWGN Combined Interference Environment Chia-Liang Liu, Dr. Kamilo Feher; Department of Electrical and Computer Engineering, University of California at Davis, CA 95616.	
4.3	Trellis Coded Differentially Coherent QAM: A New Bandwidth and Power Efficient Scheme D. Makrakis, P. Mathiopoulos; Faculty of Engineering, University of Ottawa Ontario	
4.4	A Noise Estimation Receiver for Trellis Coded Continuous Phase Modulation Signals in a Fading Channel D. Makrakis, P. Mathiopoulos; Faculty of Engineering, University of Ottawa, Ontario	
4.5	Hybrid Trellis-Coded 8/4-PSK Modulation Systems Carl-Erik Sundberg, AT&T Bell Laboratories, Murray Hill NJ 07974. J. Hagenauer, DFVLR, D-8031 Oberpfaffenhofen, West Germany	
4.6	Differential Detection of Partial Response Continuous Phase Modulation with Index 0.5 Ghassan Kwas Kaleb, Ecole Nationale Supérieure des Telecom.; Paris, France	
Session S5 Paper:	SYSTEM ANALYSIS I - HANDOVER Leader:	0900 Monday May 1 Carmel Room (80)
5.1	Handover Control Issues in Cellular and Microcellular Systems Kevin Bye, I.C. Symington, R.J. Warburton, A. Baran; Research & Technology, British Telecom Research Laboratories, Martlesham Heath, Ipswich, IP5 7RE United Kingdom.	
5.2	Comparison of Different Hand-Over Strategies for High Capacity Cellular Mobile Radio Systems M. Frullone, et al; Fondazione Ugo Bordoni, Bologna, Italy.	

5.3	Cellular Modules and Hand-Off Criteria Eduardo Alonso Frech, 28028 Madrid, Spain	
5.4	LOSI - A Simulator for Locating and Handoff Algorithms in Cellular Mobile Telephone Systems Monica Makebrink, Per Israelsson; Ericsson Radio Systems, S-163 80 Stockholm, Sweden	
5.5	A Portable Telephone System Design - Some Methods for Setting Up a Call in a Car Sadao Ito, Iwatsu Electric Co., Ltd., Tokyo, 168 Japan	
Session S6 Paper:	SYSTEM ANALYSIS III Leader:	0900 Monday May 1 Cypress Room (75)
6.1	Intermodulation Product Statistics in Multi-Carrier Radio Systems Tianxian Yang, Kamilo Feher; University of California at Davis, CA 95616	
6.2	System Design Issues in Terrestrial Aeronautical Public Correspondence Systems J.W. Ketchum, M.Y. Margalit; GTE Laboratories Inc., Waltham MA 02254	
6.3	Application of Bit Error Rate Monitoring to Differential Detection of MSK, QPSK, OQPSK And DuoMSK Signals Michel Lacours, Koffi Delfly; Electrical Engineering Dept., Laval University, Quebec G1K 7P4	
6.4	Statistical Model of Line of Sight Factory Channels Parviz Yegani, Purdue Univ., W. Lafayette IN 47907	
6.5	MONET - A Simulation System for Mobile Communication Networks Wolfgang Kremer, Frank Reichert; Lehrstuhl f. Informatik IV, University of Aachen, FRG	
6.6	Computer Investigation of the Telephone-Traffic Capacity for Cellular Mobile Radio Systems Saad Haj Bakry, Mohammad Samarkandy; College of Eng., King Saud Univ., Saudi Arabia	
Session S7 Paper:	CELLULAR SYSTEM DESIGN II Leader:	1400 Monday May 1 Franciscan Room (180)
7.1	Comparison of Spectrum Efficiency Between FDMS and TDMA in Digital Cellular William C.Y. Lee, PacTel Cellular, 2355 Main Street, Irvine CA 92714	
7.2	Architecture and Implementation of an Efficient and Robust TDMA Frame Structure for Digital Portable Communications Nelson K. Sollenberger, Justin C-I Chuang, L.F. Chang, S. Ariyavitakul, H.W. Arnold; Bell Communications Research, Red Bank NJ 07701	
7.3	Signaling and Data Transmission in a Digital Cellular System Joseph A. Tarallo, George I. Zysman; AT&T Bell Laboratories, Whippany NJ 07981-0903	
7.4	Performance of a Digital Cellular Experimental Test Bed Krister Raith, Gustav Larsson, Bo Hedberg, Ragnar Kahre; Ericsson Radio Systems, Stockholm, Sweden	
7.5	Strategies for Handover and Dynamic Channel Allocation in Micro-cellular Mobile Radio Systems Reiner Beck, Herbert Panzer; Phillips Kommunikations Industrie AG, Nurnberg, FRG	
7.6	Properties of a TDMA Pico Cellular Office Communications System Dag Akerberg, Ericsson Radio Systems AB, S-164 80, Stockholm, Sweden	
Session S8 Paper:	LAND MOBILE SYSTEMS II Leader:	1400 Monday May 1 Monterey Room (120)
8.1	Driver Guidance - An Enhancement or a Requirement in Automatic Vehicle Location (AVL) Systems? Wrex W. Beaman, ETAK, Menlo Park CA 94025	
8.2	Digital Data Requirements for an EMS Vehicle Tracking and Dispatch System Ken Milnes, Peter Ruddock; ETAK Inc., Menlo Park CA 94025	
8.3	Experience With Double-Side Band Suppressed Carrier Radio Systems R.C.V. Macario, Dept. of Electrical Electronic Eng., Univ. College of Swansea, U.K.	
8.4	Optimum Pre-emphasis for FM Transmission with Frequency-Domain Voice Scrambling Yoshihiko Akaiwa, Eiji Okamoto, Yukituna Furuya; Department of Computer Science and Electronics, Kyushu Institute of Technology, Iizuka-city, 820 Japan	
8.5	Microprocessors in the Car and on the Desk - Have They Been Tested for RF Interception or Radio Frequency Susceptibility? Al Markwardt, Richardson TX 75080	
8.6	Speech Enhancement in the Communication Between Vehicles O. Abdel Alim, M.A. Mokhtar, M.A. Ezz-El-Arab; Faculty of Eng., Alexandria Univ., Egypt	
Session S9 Paper:	EQUIPMENT II Leader:	1400 Monday May 1 Renaissance Room (150)
9.1	Frequency Stabilizing Method by Slip-Controlled PLL Y. Notsu, Kazuo Yamashita; Japan Radio Co., Ltd. (Nihon Musen K.K.), Tokyo Japan	
9.2	Radio Channel Design for FDMA Digital Mobile Radio System Fumiyuki Adachi, Masato Mori, Tetsuo Ooi, NTT Radio Communication Systems Laboratory, Kanagawa-Ken, 238-03 Japan	
9.3	Hands-Free Mobile Telephone using the Echo Canceller Ryoichi Miyamoto, Yoshio Itoh, Yoshikazu Nakano, Yoshio Sakata; Digital Communications Labs or (*) Electronic Devices Group, OKI Electric Industry Co. Ltd., Tokyo, Japan	
9.4	A New Mobile Subscriber Set for High-Capacity Land Mobile Communication System Isao Shimizu, K. Kobayashi, K. Nageta, S. Yuki; System Development Department, Mobile Communications Division, NTT, Kanagawa-ken, 238 Japan	
9.5	Supervision and Control in Cellular Systems Mitoshi Hirokane, Kenji Imamura, Tamon Mitsushiki; NTT, Kanagawa-ken, 238 Japan	

9.6	"STAR" - A 70s Signaling Format for the 90s B.N. Bailey, W.R. Flores; Coded Communications Corp., Carlsbad CA 92009	
Session S10 Paper:	MODULATION AND DEMODULATION II Leader: 1400 Monday May 1 Tudor Room A & B (100)	
10.1	BER Improvement of PRCPM in Mobile Radio Channels With Discriminator Detection Using Decision Feedback Equalization Said M. Einoubi, El-Sayed Yousef, Hany Badr; Dept. of Elec. Eng., Univ. of Alexandria, Egypt	
10.2	Data Detection and Timing Recovery for a Noncoherent Discriminator- Based Continuous Phase Modulation Receiver M.S. El-Tanany, H.P. Stern, S.A. Mahmoud; Electrocom Automation Inc., Arlington TX	
10.3	Transparent Tone-in-Band (TTIB) Aided QPSK and GMSK Modem Systems Patrick S.K. Leung, Kamilo Feher; University of California at Davis, CA 95616	
10.4	PMP: A New Digital FM Scheme with Optimized Noncoherent Detectability and Inherent Insensitivity to Fading Armin Witteben, Technische Hochschule Darmstadt, Institut f. Ubertragungstechnik, FRG	
10.5	Tone Diversity Coding for Mobile Communications John W. Ketchum, GTE Laboratories, Inc., Waltham MA 02254 Y.S. Leung, S.G. Wilson, Univ. of Virginia, Charlottesville VA 22901	
10.6	Adaptive ML Neural Network Based Receiver for Q2 PSK Modulated Data- Transmission Systems S. Feiz, S.S. Soliman, J.D. Provenca; Southern Methodist University, Dallas TX 75275	
Session S11 Paper:	SYSTEM ANALYSIS II - PROTOCOL Leader: 1400 Monday May 1 Carnel Room (80)	
11.1	Multisite Throughput of a Mobile Digital Radio Link Part II, The Downlink Channel C.M. Chang, Mobile Comm. Research Gp., Electrocom Automation Inc., Arlington TX	
11.2	Performance Aspects of Two-Way Transmission in Portable Radio Systems Richard C. Bernhardt, Bell Communications Research, Radio Research Div., Red Bank, NJ	
11.3	BCMA: Back-log Controlled Multiple Access A. Eizenhofer, K. Kirschner, G. von Harten; Philips Kommunikations Industrie, FRG	
11.4	Factors Affecting the Bandwidth Efficiency of Packet Reservation Multiple Access David J. Goodman, Dept. of Elec. and Computer Eng., Rutgers University, Piscataway NJ	
11.5	Performance Analysis of an Integrated Voice/Data Mobile Radio System H.P. Stern, C.M. Chang; Electrocom Automation Inc., Arlington TX 76005	
11.6	Analysis of System Performance in High-Capacity Mobile Radio Ramjee Prasad, Adriaan Kegel, Jens C. Ambak; Delft University of Technology, 2600 GA Delft, The Netherlands	
Session S12 Paper:	SYSTEM ANALYSIS IV - CHANNEL CODING Leader: 1400 Monday May 1 Cypress Room (75)	
12.1	Data Communications Protocol in Digital Mobile Telecommunications Network Takuro Sato, Manabu Kawaba, Toshio Kato, Atsushi Fukasawa; Digital Communications Laboratories, OKI Electric Industry Co., Ltd., Tokyo 108, Japan	
12.2	Coding Methods for Portable Radio Rajeev Krishnamurthi, S.C. Gupta; Elec. Eng. Dept., Southern Methodist Univ., Dallas TX	
12.3	An Analysis of Convolutional Coding for Land Mobile Channels Francois Gagnon, David Haccoun; Department of Electricity, Ecole Polytechnique, Campus de l'Universite de Montreal, Quebec H3C 3A7 Cyril Leung, University of British Columbia, Vancouver, British Columbia V6T 1W5	
12.4	Performance Analysis of Non-Orthogonal MFSK System with Unequal Subchannel Statistics Guillermo E. Atkin, H.P. Corrales; Illinois Institute of Technology, Chicago IL 60616	
12.5	An Efficient ARQ System for Mobile Communications S. Kallel, C. Leung; Department of Electrical Engineering, University of British Columbia, Vancouver, British Columbia V6T 1W5	
Session S13 Paper:	EVOLVING RADIO SYSTEM STANDARDS Leader: Chandos Rypinski 0900 Tuesday May 2 Franciscan Room (180)	
13.1	System Design Concept for FDMA Digital Mobile Radio System Kota Kinoshita, Nobuo Nakajima, Minoru Kuramoto, Masayuki Sakimoto; Project Team 2 (919C-2), NTT Radio Communication Systems Laboratory, Kanagawa-ken, 238-03 Japan	
13.2	Radio Transmission Interface of the Digital pan-European Mobile System Alain Maloberti, Centre National de Etudes, des Telecommunications, MOULINEAU, France	
13.3	DECT-Digital European Cordless Telecommunications Heinz Ochsner, ECTEL/TCS Radio Study Group, ASCOM Autophon AG, Switzerland	
13.4	International Standards for Personal Communications Michael Callendar, British Columbia Telephone Company, Burnaby BC V5H 3Z7	
13.5	Signalling Protocol Architecture for Digital Mobile System Shigehisa Suzuki, Takano Utano, Kimitoshi Funakawa, Akahisa Nakajima; NTT Radio Communication Systems Laboratory, Kanagawa-ken 238-03 Japan	
Session S14 Paper:	LAND MOBILE SYSTEMS III GUIDED RADIO SYSTEMS Leader: Al Isberg 0900 Tuesday May 2 Monterey Room (120)	
14.1	A Radio Communications System for the English Channel Tunnel Harold K. Sohner, Michael A. Morgan; Andrew Communication Systems, Richardson TX	
14.2	Radio in the London Underground D.J.R. Martin, Martin, Davis & Partners; Leatherhead, KT23 4RP United Kingdom R. Sharp, London Underground, Ltd., London U.K.	

19.2	OFB (on frequency repeater) Applications as Fade Filler V.S. Kaunismaa, Kaval Electronics Inc., Markham, Ontario	
19.3	Application Engineering Considerations for Cellular Repeaters Barry J. Loff, Peninsula Engineering Group, Inc., San Carlos CA 94070	
19.4	Extending a Rural Service With a Remotely Controlled 100 Watt Cellular Enhancer in Tandem With Another Cellular Enhancer Feris Howat, Mobile Communications Inc., Pearl River NY 10965	
19.5	Performance Tests of a Low Power Enhancer in a Parking Garage R.A. Isberg, P.E.; 1215 Henry St., Berkeley CA 94709 William C.Y. Lee, PacTel Cellular, 2355 Main St., Irvine CA 92714	
19.6	A High-Capacity Assignment Method for Cellular Telephone Systems Ray W. Nettleton, Stanford Telecommunications Inc., Seabrook MD 20706	
Session S20 Paper:	SATELLITE MOBILE SYSTEMS I Leader: 1400 Tuesday May 2 Monterey Room (120)	
20.1	Look Angle Contours of Small Transportable Satellite Earth Stations for Arab Gulf Countries Mohammad K. Samarkandi, Saad H. Bakry, Ali A. Nasser; Audio & Video Distribution Center, King Saud University, Riyadh 11451, Saudi Arabia	
20.2	Propagation Characteristics in Land Mobile Satellite Systems Makoto Yoshikawa, Masahiro Kagohara; NTT Radio Communications Sys. Labs., Japan	
20.3	Compatibility Between GSM and Satellite Systems Antonio Arcidiacono, European Space Agency, Paris, France CEDEX 15	
20.4	MSAT: Mobile Communications Through North America Gary K. Noreen, Transit Communications, Inc., Pasadena CA 91109	
20.5	An Operational Review and Networking of Satellite Communications for the Ontario Air Ambulance Service C. Vinodrai, Ministry of Government Services, Toronto, Ontario M5H 3B7	
Session S21 Paper:	PROPAGATION Leader: 1400 Tuesday May 2 Renaissance Room (150)	
21.1	Experimental Investigation of 1.5 GHz, 2.3 GHz, and 2.6 GHz Band Land Mobile Radio Propagation in Urban and Rural Area Eimatsu Moriyama, Tsukasa Iwama, Taji Saruwatari; Communications Research Laboratory, Ministry of Posts and Telecommunications 2-1, Tokyo, 184 Japan	
21.2	Street-Level Radio Propagation Measurements at Microwave Frequencies for Microcellular Mobile and Personal Communications A.J. Rustako Jr., N. Armitay, G.J. Owens, R.S. Roman; AT&T Bell Laboratories; Holmdel NJ	
21.3	900 MHz Indoor/Outdoor Propagation Investigations Via Bit Error Structure Measurements Christian Gutzeit, Research Institute of the Deutsche Bundespost at the Fern meldetechnisches Zentralamt, D-1000 Berlin 42, West Germany	
21.4	Frequency Common Use between Indoor and Urban Cellular Radio - Reserach on Frequency Channels Doubly Reused Cellular System Yasuaki Kinoshita, Shinya Ohnuki, Mitsuyasu Ogawa; Central Res. Lab., Hitachi Ltd., Japan	
21.5	Radio Transmission in NTT High-Capacity Land Mobile Communications Systems Akira Hiroike, Teruya Fuji, Izumi Horikawa; NTT, Kanagawa-ken, 238 Japan	
21.6	Computer-Aided Design of Special Purpose Systems A.H. Aboulgaseem, B.B. Lusignea; CSPD, Stanford University, Stanford CA 94309	
Session S22 Paper:	MODULATION, PROPAGATION AND FADING IV Leader: Frank Thatcher 1400 Tuesday May 2 Tudor Room A & B (100)	
22.1	Evaluation of Overall Outage Probability in Cellular Systems Valerio Palestini, CSELT (Centro Studi e Laboratori Telecom. Sp.a.); Torino, Italy	
22.2	Performance of GTFM in a Frequency Selective Rayleigh Fading Channel Conor O'Donoghue, C.J. Burkle; Department of Electronics, N.I.H.E., Limerick, Ireland	
22.3	Modeling and Simulation of the Propagation Characteristics of the 900 MHz Narrowband TDMA CEPT/GMS Mobile Radio Giovanna D'Arta, L. Stola, V. Zingarelli; CSELT, I 10148 Torino, Italy	
22.4	Rayleigh Fading Compensation Method for 16 QAM in Digital Land Mobile Radio Channels Seichi Sempel, Communications Research Laboratory, MPT 2-1, Tokyo 184, Japan	
22.5	Performance of a Complexity Reduced CELP Speech Coder Under Mobile Radio Channel Fading Conditions S.A. Mahmoud, W. LeBlanc, S. Hanna; Carleton University, Ottawa, Ontario K1S 5B6	
22.6	Design and Implementation of a Channel Simulator for Wideband Mobile Radio Transmission Francois Marceau, Michel Lecours, Elec. Eng. Dept., Laval University, Quebec G1K 7P4	
Session S23 Paper:	CONVERGENCE PAPERS I Leader: Dr. Robert Fenton 1400 Tuesday May 2 Carnel Room (80)	
23.1	Next Step of Automotive Electronic Control Shigeo Aono, General Mgr., Electronics Lab., Nissan Motor Company, Japan	
23.2	The Systems Design Approach (Better Late Than Not at All) Joseph Gormley and James J. Paulsen, Ford Motor Company, Dearborn MI 48121	
23.3	Power Train Sensors and Actuators - Driving Toward Optimized Vehicle Performance Joseph Giachino, Ford Motor Company	
23.4	Cummings Electronic Engine Control Ronald B. Lennon, Cummins Electronics Company, Columbus IN 47201	
23.5	Trends in Digital Signal Processing in Automotive Dr. Kum-Shan-Lin, Texas Instruments, Houston TX 77251	

23.6	Integrated Vehicle Control Roger D. Fruachin, GM Research Labs., Warren MI	
Session S24 Paper:	RAIL TRANSPORTATION II Leader: Michael Long 1400 Tuesday May 2 Cypress Room	
24.1	Transportation Technology Advances with Work Order Management Systems Gideon Ben-Yaacov, Corp. Consultant, Automated Monitoring & Control Inter., Omaha NE	
24.2	Feasibility of Robotic Cleaning of the Undersides of Toronto's Subway Cars W. Wiercianski, Ministry of Transportation of Ontario, Downsview, Ontario M3M 1J8	
24.3	Inductive Loop System Equivalent Circuit Model Milton K. Mills, Federal Highway Administration, Traffic Systems Division, McLean VA	
Session S25 Paper:	CELLULAR SYSTEM DESIGN IV Leader: 0900 Wednesday May 3 Franciscan Room (180)	
25.1	Multi-Beam Adaptive Base Station Antennas for Cellular Land Mobile Radio Systems Dr. M.A. Beach, S.C. Swales, Dr. D.J. Edwards, J.P. McGeehan; Communications Research Centre, Department of Electrical and Electronic Engineering, University of Bristol, U.K.	
25.2	900 MHz Trunked Radio Systems Fertile Hybrid Combining for Close-Spaced Transmitters Robert C. Shapiro, Decibel Products Inc., Dallas TX 75356	
25.3	Cellular Rural Statistical Area (RSA) Transmit and Receive Combining Robert C. Shapiro, Decibel Products Inc., Dallas TX 75356	
25.4	Effective Antenna Site Management Phil Deitwo, Tower Technology Corporation, Jacksonville FL 32216	
25.5	Site Management and Interference Control Jay Watson, Telecommunications Properties, Concord CA 94520	
Session S26 Paper:	SATELLITE MOBILE SYSTEMS II Leader: 0900 Wednesday May 3 Monterey Room (120)	
26.1	Novel Antenna Tracking Mechanism for Land Mobile Satellite Terminals Gary Hawkins, Dr. D.J. Edwards; University of Bristol, BS8 1TR United Kingdom	
26.2	Tracking Receiver Design for the Electronic Beam Squint Tracking System in the Mobile Environment P.B. Kennington, Dr. D.J. Edwards; University of Bristol, BS8 1TR United Kingdom	
26.3	An Adaptive Antenna Array for Land Mobile Satellite Communications S.C. Swales, Dr. M.A. Beach, Dr. D.J. Edwards, Dr. A. Bateman; Communications Research Centre, Department of Electrical and Electronic Engineering, University of Bristol, U.K.	
26.4	Mobile Satellite Vehicle Antennas; Noise Temperature and Mobile Receiver G/T Ms. Polly Estabrook, Dr. William Rafferty; Jet Propulsion Laboratory, Pasadena CA 91109	
26.5	Vehicle Antenna for Land Mobile Satellite Communications; A Diversity System Approach Fraser M. Clayton, Dr. N.A. McDonald; Glen Waverley 3150, Victoria, Australia	
26.6	Adaptive Crosspolar Cancellor for Polarization Diversity and Frequency Reuse Systems Moshe Y. Margalit, Telecommunications Research Lab., GTE Labs Inc., Waltham MA 02254	
Session S27 Paper:	SPREAD SPECTRUM AND MODULATION Leader: 0900 Wednesday May 3 Tudor Room A & B (100)	
27.1	Comparison of Asynchronous CDMA and NPCDMA for an Indoor Data Network C. Sandeep, S.C. Gupta; Southern Methodist University, Dallas TX 75275	
27.2	Direct Sequence Spread Spectrum Parallel Acquisition in Fading Mobile Channel E. Sourour, S.C. Gupta; Southern Methodist University, Dallas TX 75275	
27.3	A New Spread-Spectrum Based Technique for Synchronization of Digital Mobile Communications Systems Thomas P. Holden, Dr. Kamilo Feher; University of California at Davis, CA 95616	
27.4	A Dedicated Mobile Communication System with No Base Station Using Frequency Hopping Spread Spectrum Multiple Access G. Madhusudhana Rao, Andhra University, Visakhapatnam 530 003, India	
Session S28 Paper:	HIGHWAY/VEHICLE DATA LINKS Leader: 0900 Wednesday May 3 Carnel Room (80)	
28.1	Simulation of a New R-ALOHA Like Protocol for Mobile Packet Communication Dirk Hubner, Andreas Mann, Johannes Ruckart; Lehrstuhl f. Informatik IV, FRG	
28.2	Information Distribution for Network Management in a Multi-Hop Mobile Packet-Radio Network V. Brass, B. Walke; Fern University of Hagen, West Germany	
28.3	Definition and Evaluation of an Integrated Multiple Access Protocol for Inter-Vehicle Communication T. Hellmich, B. Walke; Fern University of Hagen, West Germany	
28.4	On Throughput and Delay in S-ALOHA Multi-Hop Networks C. Gotthardt, Fern University of Hagen, West Germany	
28.5	The Impact of Fast Fading on ALOHA System in the Mobile Radio Environment Asrar U. Shelkh, Yu-Dong Yao, Ziaoping Wu; Carleton University, Ottawa K1S 5B6	
28.6	The Near-Far Effects on Slotted-Aloha Channels With Shadowing and Capture Jean-Paul M.G. Linnartz, Ramjee Prasad; Delft Univ. of Technology, The Netherlands	

IEEE/ASME JOINT RAILROAD CONFERENCE
April 26 & 27, 1989
Hershey Hotel
Philadelphia, PA

SESSION 1: ELECTRIFICATION AND MOTIVE POWER

US Railway Freight Electrification, Does It Have a Future? (Presentation Only)
 E T Harley, LTK Engineering Services, Phila, PA

AC Drive Technology for Locomotives
 R. Wagner, Siemens AG, Erlangen, W. Germany

AC Three-Phase Power Transmission System for Amtrak's New F69 PH-AC Locomotives
 J.W. Fischer, Siemens AG, Erlangen, W. Germany

Development of a Dual Mode Locomotive
 C.M. Smith, Louis T. Klauder & Assoc, Philadelphia, PA
 D.E. Comer, Metro North Commuter Railroad, New York, NY

Traction Power Supply at German Federal Railway's 400KM/Hr runs
 W. Harprecht, German Federal Railway, Frankfurt, W. Germany
 R. Seifert, German Federal Railway, Munich, W. Germany
 F. Kiebling, Siemens AG, Erlangen, W. Germany

SESSION 2: SYSTEM DESIGN

Safety and Productivity Improvement of Railroad Operations by Advanced Train control systems
 R.D. Burns, Rockwell International Corp., Cedar Rapids, IA
 R.B. Turner, ACEX Technologies, Inc., Los Angeles, CA

Development and Validation of General Purpose Railroad Vehicle Dynamics Simulation (NUCARS)
 F.B. Blader, Transangle, Concord, MA
 J.A. Elkins & N.G. Wilson, Transportation Test Center, Pueblo, CO
 P.E. Klauser, AAR, Chicago, IL

Applications and Economic Justification of On Board Locomotive Computers
 D.M. Fishman, AITECH Systems Ltd., Herzliia, B, Israel

A PC Based Voice Data Entry System (Presentation Only)
 M. Saeger, Trailer Train Co., Chicago, IL

Use of On-Frequency-Radio (OFR™) Repeater and Distributed Antenna Systems to Solve Railroad Mobile Coverage Problems
 V.S. Kaunismaa, KAVAL Electronics, Inc., Don Mills, Ontario

SESSION 3: TRACK AND TRUCK CONSIDERATIONS

Railway Track Admittance, Earth-Leakage and Track Circuit Operation
 R.J. Hill & D.C. Carpenter, University of Bath, School of Electrical Engineering, Bath, England

Three Piece Truck Cross Bracing: How It Works and What It Does
 R.E. Smith, UTDC, Kingston, Ontario, Canada
 R.J. Anderson, Queens University, Kingston, Ontario, Canada

RailTec System - Extending the Life of Bolted Rail
 D. Archambeau, Fatigue Technology, Inc., Seattle, WA

Theoretical and Experimental Determination of Heat Flow into a Wheel Due to Bearing Overheating
 G.F. Carpenter, M.W. Joerms, K.L. Hawthorne, D.H. Stene & W.C. Sneed
 AAR, Chicago, IL

The Effect of Magnetic Saturation, Hysteresis and Eddy Currents on Rail Track Impedance
 D.C. Carpenter, R.J. Hill, University of Bath, School of Electrical Engineering, Bath, England

SESSION 4 MAINTENANCE AND OPERATIONS

CP Rail Freight Truck Component Refurbishing Facility
 W.W. Peterman & S. Bilgin, CP Rail, Montreal, Quebec, Canada

Transportation Technology Advances with Work Order Management Systems
 G. Ben-Yaacov, Automated Monitoring and Control International, Omaha, NE

Implementation of Freight Car Planned Maintenance of CP Rail
 J. Runeckles & L.C. Macorin, CP Rail, Montreal, Quebec, Canada

SCAN: A Decision Support System for Railroad Scheduling
 D. Jovanovic, P.T. Harker, University of Pennsylvania, Phila., PA

FIELD TRIP 3:00 - 5:30 pm TUESDAY
 Tour of Amtrak's Northeast Corridor Control Center

RECEPTION AND LUNCHEON SPONSORED BY IEEE WEDNESDAY Speaker: James A. Early, Assistant Chief Engineer - Communication, Signal, and Electric Traction - Amtrak

CONFERENCE RECEPTION AND DINNER WEDNESDAY EVENING Speaker: Louis J. Gambaccini, General Manager, Southeastern Pennsylvania Transportation Authority

RECEPTION AND LUNCHEON SPONSORED BY ASME THURSDAY Speaker: Dr. John M. Samuels, Assistant Vice President, Industrial Engineering, Conrail

Chapter News



Gaspar Messina
 Chapter News Editor

Meetings

Philadelphia (Joint VTS/Land Transportation Division)

Subject: Vital Microprocessors For Railroad Signaling
By: Mr. James P. Miccolis
 Conrail, Room 1203
 15N. 32nd Street
 Philadelphia, Pennsylvania 19100
Held: February 16, 1989
Attendance: 51 (32 guests)

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

Transportation Systems



Bob McKnight
 Transportation Systems Editor

Satellites, Data Links, and Computers

Give Real-time Control to Vehicles

Optimum efficient management of land vehicles is a reality through the use of computers, high speed data links, radio transceivers and satellites operating in geostationary orbits over the earth. Now it is possible to pinpoint locations of trains, trucks, emergency vehicles such as fire trucks, ambulances and police cars, and even off-highway vehicles.

Two such vehicle management and location systems have been developed by Railstar Control Technology, Inc. One developed for the railroad industry is known as a Train Management System while the other called Scantrak is for vehicle monitoring and control.

Both systems are essentially the same in that they contain a user unit which may include a data entry unit, the vehicle radio transmitter, the geostationary satellite that relays the signals from the vehicles to an earth station on the ground. This ground station, known as Railstar Central contains the radio receiving equipment and the computer complex that takes the received signals, decodes them and develops various types of reports for the user. At Railstar Central is a computer complex that develops a myriad of reports, charts, graphs, trends and statistical and operating data for the vehicle owner or transportation carrier. Such computer generated reports and data are transmitted over commercial communications carriers or other communications channels as the transportation company and Railstar may decide.

Real-time Control Capability

A major factor in the success of these systems is the automatic transmission of data from the vehicle on a periodic basis, once every minute or once every hour and as often as transportation company desires. Thus real-time control is possible.

In addition to vehicle identity and other information such as "health" of the vehicle (locomotive fuel capacity, etc., and commodity status such as temperature of a liquid or pressure of a gas), the periodic transmission from the vehicle provides a monitoring of vehicle movement and updates on the conditions at the vehicle.

At present, location is provided by a combination of transmission to the satellite of Loran C navigational data along with vehicle identity. When more geostationary satellites are in service, location can be obtained by the triangulation method using two or more satellites.

Two satellites are now in geostationary orbits over the earth: the GTE Spacenet III/Geostar R01 and the GTE G-Star III/Geostar R02, which was orbited late last year.

Transmission to the satellites is at 1.6 GHz. The satellites have repeaters with full internal redundancy. They convert the received signals from the vehicles and retransmit them to Railstar Central receiving equipment. All retransmitted messages are received from the satellites through large, specially designed antennas and high sensitivity radio receivers tuned to the downlink signals. The signals are demodulated and processed in the multi-stage and redundant computer complex at Railstar Central. The spread spectrum encoding is stripped away, the address of the sender is identified and the message is converted to usable information. Railstar Central integrates all received information into the complete management data base and forwards data as required through any selected commercial link to the transportation company's control and management centers.

Many Opportunities for Better Rail Control
 For railroads, the system concept is

centered on sensing, by automatic means, a myriad of contributing factors such as train location, locomotive health, etc., and transmitting them to the central data base in real time. Accumulation of extensive information across the entire spectrum of operation will allow a high level of pre-programmed decision making to optimize ongoing operations on a continuous basis.

Once accumulated, the same data, reprocessed can also provide automatic daily or extended-period performance reporting and such supplements as locomotive availability, failure analysis, recommended maintenance cycles, etc.

For transportation departments, the system will display position and other data to provide the dispatcher with timely and accurate information on the whereabouts of all trains. With this information at his fingertips, the dispatcher can plan and provide for better train meeting arrangements and maximize working times for each train as well as for maintenance personnel involved.

For mechanical departments of railroads, the system will provide monitoring of locomotive performance in dynamic state- when pulling tonnage trains. Some of the helpful functions the system can provide include:

- Determine specific performance of trailing units while moving in consists.
- Provide advance information on specific causes of lack of performance under dynamic conditions.
- Provide a means to advise on board personnel of actions which should be taken. (Railroad will use its existing VHF two-way radio system.)
- Have enroute failures analyzed to plan for optimization of temporary as well as heavier repairs.
- Provide a data base for maintenance planning purposes.

Locomotive automatic reporting could include the following:

- *Alarms- Over threshold, trend analysis.
- *Tattletale- Over speed.
- *Usage data- Mileage, hours, amp-hours.
- *Detail on demand- Event reconstruction.
- *Parameters- unit identification, isolated/online, throttle and reverser position, speed, ammeter (loading), brake pipe pressure, brake cylinder pressure, engine temperature, ground relay, wheel slip and dynamic brake performance.

For engineering, there are advantages of this satellite-communications system. Non-shunting vehicles, such as maintenance of way work equipment, rail-detector cars, etc. or high-rail vehicles, could be fitted with a Railstar transceivers to send data on identity, location, etc. Thus such vehicles could be fitted into the operational plan of the railroad along with the train movement data base to improve the efficiency and safety of the operation of this type of equipment.

Also, the operators of such vehicles could instantly transmit notice of unusual conditions noted along the right of way. Such advisories could be entered directly into the control systems so that requirements for precaution would immediately be available to the dispatcher.

It is to be noted that a data entry unit can be used with the vehicle transceiver for inputting local information for transmission via satellite to Railstar Central and ultimately to the railroad's control center.

The train management system is being tested by Guilford Transportation Industries (Boston & Maine, Delaware & Hudson and Maine Central Railroads) and by Amtrak. Amtrak has equipped a locomotive and is considering equipping cafe cars. Using cafe cars as an onboard terminal, a conductor would input data via a keyboard or encoded tickets taken from passengers to provide immediate information as to proper passenger loading. Often passengers will overbook on Amtrak trains and not show at the boarding station. Hence on reserved trains it is not uncommon for the ticket agent to have information that a train is "sold out" between two stations only to have vacant seats on the train between these points because there is at present no fast enough means for the conductor to let the agents or reservation system know what seats are actually filled on the train.

Vehicle Monitoring- A Trucker's Delight

Scantrak, the satellite tracking and communications system can do for trucks or motor vehicles what the Train Management System does for railroads. As with the other, each vehicle would be equipped with a Railstar transceiver and a data entry unit for entering specific detailed data about the vehicle and its load.

Several management control opportunities exist:

- Monitor any vehicle nationwide from a management control center in real time.
 - Detect and advise if a vehicle is not moving in accordance with schedule or is "out of route".
 - Report virtually any vehicle or commodity health parameter providing recognition of incipient problems.
 - Report automatically when predetermined loading parameter thresholds are transgressed on any vehicle.
 - Provide savings and other benefits from failure avoidance.
 - Continuous record of vehicle movement and commodity physical parameters.
 - Develop performance histories by commodity, carrier and shipper.
 - Provide data for development of more effective need-based maintenance programs.
 - Provide data for development of more effective shipping criteria.
 - Detect unauthorized or accidental unloading in addition to recoding of loading/unloading authorization.
- Such information gathering, recording and dissemination would be most useful in cases of emergencies involving hazardous material transportation.

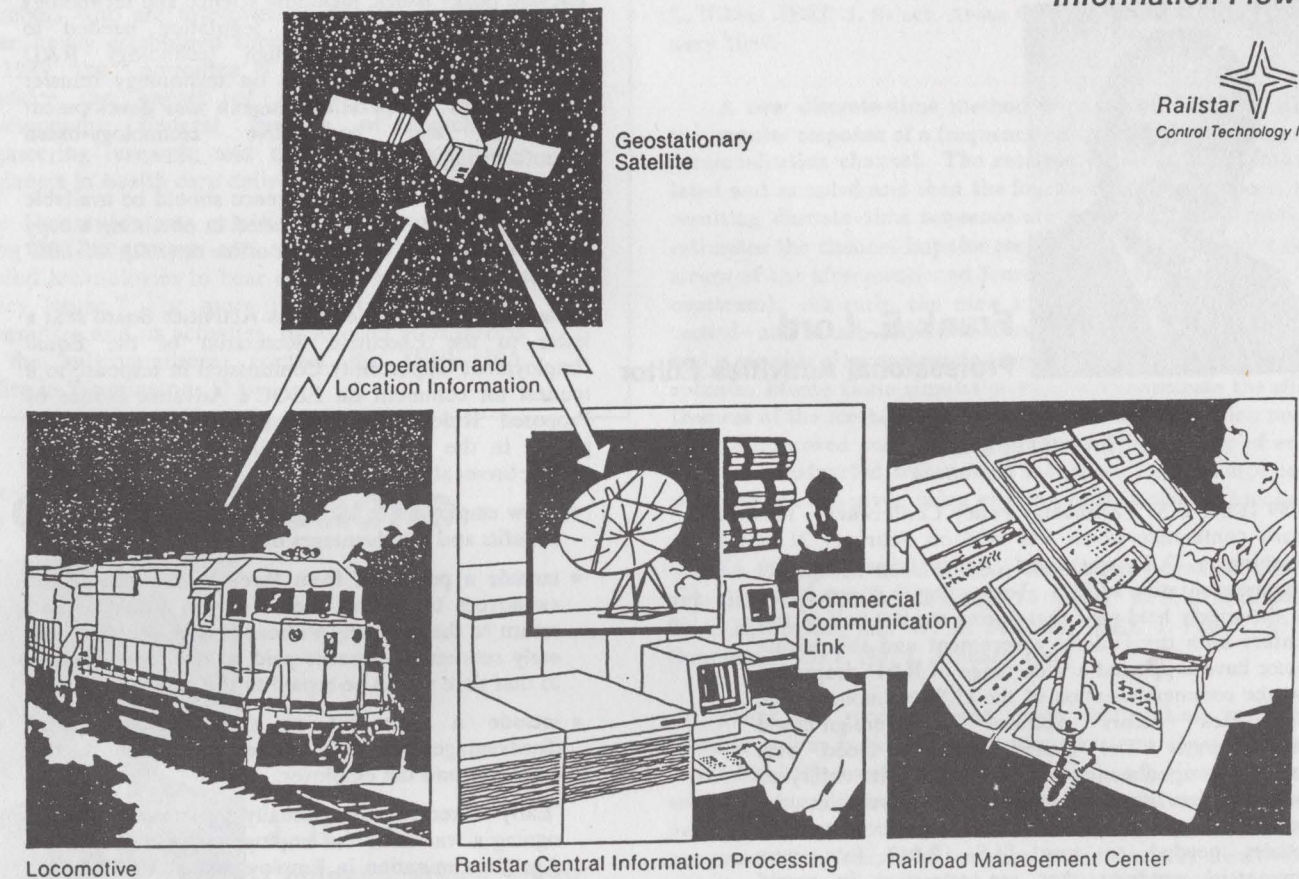
It is understood that several federal government agencies are interested and have conducted tests using the Scantrak system for tracking special shipments.

Future- two-way transmission via satellite

With several geostationary satellites in orbit, it is recognized that a valuable addition to the present system is to provide two-way transmission between vehicles and ground station control centers.

This is being explored by several interested parties including governmental agencies that have the need to keep track of special shipments.

Railstar Management System Information Flow



Railroad tank car has Railstar transmitter (see arrow) which can send data on identity, valve positions, temperature and pressure of contents. This transmitter is solar powered but units on trucks could be powered from the truck's power generation system.

Professional Activities



Frank E. Lord
Professional Activities Editor

RECENT HAPPENINGS

1989 IEEE U.S. Technology Policy Conference-- This year's conference which was held on February 21 in Washington D.C. was titled "Policy Imperatives for Commercialization of U.S. Technology." It was based on the widely held view that during the last half of this century both the Federal government and the private sector have supported a wide range of R&D programs, but the commercialization of the U.S. technology base too often occurs overseas by foreign-based manufacturers. The United States is faced with numerous impediments that are limiting its ability to commercialize its technology competitively in the global marketplace. The Conference explored specific policies needed to turn U.S. R&D into new commercial products that are attractive in world markets. The conference consisted of four panels that each addressed a major imperative.

On "Imperatives for Engineering Education" the panel recommended specific engineering education-related policies that might contribute to solving the U.S. lag in the technological marketplace. It addressed the full U.S. educational spectrum, examined what we should adopt from other countries' experiences, and discussed how to provide career paths for the U.S. engineer that are commercially viable yet professionally rewarding in a dynamic, competitive technological world.

The panel on "Imperatives for Technological Innovation" took the position that the commercialization of U.S. technology is desirable from national and professional points of view and that one way to make technological innovation commercially available is through consortiums. The panel then presented examples of consortiums, including how one is organized, how existing ones have been working, the pros and cons as based on experience, and what is needed to make them successful.

A panel on "Imperatives for International Competitiveness" explored the link between a low U.S. economic growth rate and a corresponding slide in performance by U.S. companies in international competition.

It then focused on the national effort required for more effective use of existing and emerging technology as an essential element to achieve a competitive turnaround.

The last panel on "Imperatives for Effective Utilization of Science and Technology" focused on several factors

that affect productive utilization of science and technology. The panel considered a number of relevant policy issues, including science and technology in the new administration, legislation needed to increase competitiveness, high technology R&D priorities, increased emphasis on technology transfer and exchange, cooperative research and development programs, and competitive technology-based manufacturing capability.

The proceedings of this conference should be available the first of June. Those interested in obtaining a copy should contact the Washington office at (202) 785-0017 for details.

Retirement-- The United States Activities Board sent a letter to the Executive Secretariat of the Equal Employment Opportunity Commission in response to a request for comment on EEOC's Advance Notice of Proposed Rulemaking relating to early retirement plans. In the letter, IEEE-USA suggested that any early retirement plan should:

- allow employees to take two months to consider the benefits and disadvantages of the offer;
- include a period of from three to six months for employees to reverse their decision to retire and return to the company without loss of benefits. All early retirement benefits paid to the individual up to that time would be repaid to the company.
- include a clear list of the advantages and disadvantages of early retirement for both the employee and the employer.

"Early retirement offers usually are contingent upon signing a waiver of the employee's rights under the Age Discrimination in Employment Act (ADEA)," IEEE-USA wrote. "The threat is obvious to the employee, but the long-term effects of signing the waiver are not. We believe waivers should be utilized only in special instances, with the procedures of the Fair Labor Standards Act being followed as the ADEA specifically mandates, and that their use should be supervised by EEOC."

For more information, contact the IEEE-USA Office in Washington, D.C.

New Employment Registry-- The United States Activities Board recently approved establishing a new employment registry. The Non-Employed Engineers Registry (NEER) will be operated in much the same way as PEER (Professional Engineering Employment Registry), SEER (Self-Employed Engineers Registry), and GEER (Graduating Engineers Employment Registry), the other employment registries operated by IEEE-USA. It will be a non-confidential database, since unemployed people are not concerned about a current employer learning they are job-hunting. Prospective employers will be able to contact the individuals directly.

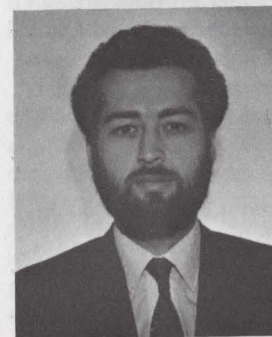
NEER will be offered without charge to employers who are seeking employees. At the same time, IEEE members may place their names and credentials in the database free of charge. Their names will also be listed in the PEER database.

For information about NEER or any of the other three employment registries, contact the IEEE-USA Office in Washington, D.C.

Health Care-- IEEE-USA's Health Care Engineering Policy Committee is looking for IEEE members who are interested in serving on one of three newly established subcommittees. Beginning in 1989, the Committee is establishing groups to consider the impact of regulation on device development; Federal funding of biomedical engineering research; and the role of biomedical engineers in health care delivery.

The Committee was established 10 years ago "to bring IEEE's interests and capabilities health care-related technologies to bear on national health care policy issues." For more information about the Committee and its activities, or to offer your efforts to the subcommittees, contact the IEEE-USA Office in Washington, D.C.

Communications



J. R. Cruz
Communications Editor

ABSTRACTS

"Short Distance Attenuation Measurements at 900 MHz and 1.8 GHz Using Low Antenna Heights for Microcells," P. Harley, IEEE J. Select. Areas Commun., Vol. 7, No. 1, January 1989.

Short distance, low antenna height signal attenuation measurements are presented for their use in the design of future microcellular radio networks. Measurements presented are based on the propagation along busy city streets in a direction radial to a fixed antenna site.

Antenna heights between 5 m and 20 m were chosen for the fixed site, while 1.5 m was chosen for the mobile vehicle. The signal strength was then measured out to a distance of 1 km in a line of sight path from the fixed site at both 870.15 MHz and 1.8 GHz.

Current cellular system designs are often based on the work of Okumura [1] or Hata [2] who have not considered propagation from low antenna heights (less than 30 m) or over the short distance (less than a kilometer) expected in microcells. The measurements show that extrapolation of the Hata [2] and Okumura [1] formulas into the low antenna height, short distance area is not valid and can lead to inaccuracies.

The results show that at short distances from the antenna the signal attenuation slope is very much less than that predicted by extrapolating the results of Hata [2] and Okumura [1]. In addition, the measurements also suggest that the signal attenuation slope increases as the distance between the fixed and mobile site is also increased.

"Estimation of Multipath Channel Response in Frequency Selective Channels," D. Hatzinakos and C. L. Nikias, IEEE J. Select. Areas Commun., Vol. 7, No. 1, January 1989.

A new discrete-time method is proposed for estimating the impulse response of a frequency selective digital modulated communication channel. The received signal is first demodulated and sampled and then the fourth-order cumulants of the resulting discrete-time sequence are estimated. The method estimates the channel impulse response from the complex cepstrum of the aforementioned fourth-order cumulants (i.e., tri-cepstrum). As such, the new method depends only on the second- and fourth-order statistics of the transmitted sequence and is capable of reconstructing nonminimum-phase impulse responses. Monte Carlo simulation results demonstrate the effectiveness of the method, its low sensitivity to observation noise, and its improved performance in terms of probability of error of the reconstructed transmitted sequence. Performance comparisons are also given using existing equalization techniques.

"A Comparison of Indoor Radio Propagation Characteristics at 910 MHz and 1.75 GHz," R. J. C. Bultitude, S. A. Mahmoud, and W. A. Sullivan, IEEE J. Select. Areas Commun., Vol. 7, No. 1, January 1989.

There has recently been much deliberation regarding whether indoor radio communications systems should operate in the 900 MHz band, or in the 1.7 GHz band. However, there are no propagation results available in the literature which compare indoor channel characteristics in the two bands. This paper presents the results of temporally and spatially distributed wideband (impulse response) propagation measurements on fixed indoor radio channels in these bands. Impulse response parameters, as well as envelope fading and frequency correlation statistics are presented and compared for the two bands, and for two different buildings.

Results from the temporal experiments show that for a specific location in either of the two buildings, the dynamics of indoor channels are slightly less random at 910 MHz than at 1.7 GHz. It is believed, with due regard for the quasi-static nature of the fading, that this would result in marginally better performance on a given transmit/receive link in the 900 MHz band. The spatially distributed measurements showed that the structures of average impulse response envelopes differed for channels in the two buildings. In one building, rms delay spreads were slightly greater in the 1.7 GHz band for over 90 percent of transmit/receive link configurations. In the other building, rms delay spreads were marginally greater in the 900 MHz band for 70 percent of the configurations. It was also found that the standard deviation of rms delay spreads for different link configurations was greater for both frequency bands in this building. In both buildings, the standard deviation in rms delay spread standard deviations are considered to be important in the evaluation of coverage capabilities in different buildings and for different frequencies of operation.

"Propagation Characteristics on Microcellular Urban Mobile Radio Channels at 910 MHz," R. J. C. Bultitude and G. K. Bedal, IEEE J. Select. Areas Commun., Vol. 7, No. 1, January 1989.

It has been proposed in current literature that future urban mobile radio systems be configured with many small cells

having low-powered base stations with street-lamp-level antennas. This configuration contrasts with conventional designs for urban mobile systems in which one centrally located, high-powered base station with an elevated antenna is employed to serve a large coverage area. The results of measurements made to determine propagation characteristics on urban mobile radio channels with low base station antennas and line of sight between the base and mobile units are reported in this paper. Cumulative distribution functions for envelope fading, as well as delay spread and frequency correlation statistics are presented. In addition, comparisons are made to similar statistics computed for conventional urban mobile radio channels. There are no previously published papers regarding these characteristics on microcellular-type channels.

Results show that multipath propagation conditions would be significantly less severe if small-celled systems were implemented. Root mean square delay spread averages computed by considering all multipath signal components with powers greater than 25 dB below the peak were reduced by a factor of approximately four in comparison to those typical in conventional systems. In addition, microcellular-type channels have Rician, rather than Rayleigh, envelope fading characteristics, and correspondingly different frequency correlation statistics. It is shown that coherence bandwidths are difficult to define for Rician channels since frequency correlation function envelopes remain at high values over very large bandwidths. The area bounded by the correlation envelope is therefore introduced as a measure of channel quality, and these areas are shown to be larger for Rician channels than for Rayleigh channels.

"UHF Fading in Factories," T. S. Rappaport and C. D. McGillem, IEEE J. Select. Areas Commun., Vol. 7, No. 1, January 1989.

There has been recent interest in characterizing UHF propagation within buildings and houses. Factory radio channels, however, have not been discussed previously in the literature. This paper details the results of narrow-band propagation measurements performed at five factories. The extensive empirical data indicate that path loss is dependent upon local surroundings and is log-normally distributed, temporal fading is Rician, and small-scale signal fluctuations due to receiver motion are primarily Rayleigh, although Rician and log-normal distributions fit some of the data. Shadowing effects of common factory equipment likely to obstruct indoor radio paths are also given here.

"Indoor Radio Communications Using Time-Division Multiple Access with Cyclical Slow Frequency Hopping and Coding," A. M. Saleh and L. J. Cimini, Jr., IEEE J. Select. Areas Commun., Vol. 7, No. 1, January 1989.

We describe and analyze a flexible, robust, multichannel TDMA radio communications system that is ideally suited for portable as well as mobile indoor use. It employs noncoherent signalling and incorporates slow cyclical frequency hopping and burst-error-correcting coding to provide low-error communications at aggregate rates of several Mbits/s without the need for antenna diversity of adaptive equalization. The system can be implemented in a small building using a centralized architecture or in a large building using a distributed antenna system. In addition, a cellular architecture can be used to extend the capacity.

The TDMA protocol allows the various users the flexibility of choosing their own desired rates of data communications.

Moreover, the capability of using different levels of coding gives the users the option of selecting their own error performance. Thus, a simple single stage of coding may be chosen for voice communications by one user, while another user could employ two-stage coding to permit reliable data communications by overcoming both multipath fading and interference. The ability to combat interference is one of the salient features of this system that is not present in many other systems.

"User Access in Portable Radio Systems in a Co-Channel Interference Environment," R. C. Bernhardt, IEEE J. Select. Areas Commun., Vol. 7, No. 1, January 1989.

A computer simulation study of user access in a universal digital portable communications (UDPC) system is described. An access algorithm consisting of relative power channel-ranking followed by data error detection is evaluated and compared to an optimal reference in a co-channel interference environment. For typical propagation conditions and radio configurations, it was found that an access algorithm based on the ranking of system channels by relative power provides a viable means of channel selection for the portable radio. It was found that the multiple-block data error check improved transmission quality in a co-channel interference environment, approaching the optimum with respect to a 99 percent statistical reliability criterion.

"Teletraffic Performance of Highway Microcells with Overlay Macrocell," S. A. El-Dolil, W. Wong, and R. Steele, IEEE J. Select. Areas Commun., Vol. 7, No. 1, January 1989.

Teletraffic performance of highway microcellular digital mobile radio systems having an oversailing macrocell that spans many microcells is presented. The microcellular cluster is composed of concatenated segments of the highway where each segment is a microcell, typically, 500-2000 m in length, with the base stations located at lamp-post elevations. A narrow-band time division multiple access arrangement supporting 10 channels per carrier and one carrier per base station is employed. The teletraffic analysis assumes there are n -up and n -down lanes, and that the vehicular speeds conform to a truncated Gaussian distribution whose mean speed is 100 or 10 km/h when the vehicular traffic is free flowing or in traffic congested conditions, respectively. A one-dimensional teletraffic model for the highway microcellular cluster is considered based on a finite number of mobile users. The degree of call blocking is calculated using a modification to the Engset equation that caters for mobile call hand-offs as the mobile stations travel across the microcellular boundaries.

We consider three situations; namely, where no priority is given to any mobile station (MS), where priority is given to hand-off calls, and where a macrocell overlaying the microcellular cluster is deployed that makes channels available to transfer calls from those MS's that would be blocked during microcellular base station hand-offs.

"ALOHA with Capture Over Slow and Fast Fading Radio Channels with Coding and Diversity," I. M. I. Habbab, M. Kavehrad, and C. W. Sundberg, IEEE J. Select. Areas Commun., Vol. 7, No. 1, January 1989.

The effects of capture on the average system throughput and delay performance of slotted ALOHA have been analyzed

for slow and fast Rayleigh fading radio channels. A short range multipoint to base station packet radio network is considered. Several different definitions of capture are considered where the bit error probability is used as a criterion. We show that larger capture effects and thus improved network performance can be achieved with proper choice of modulation. We also show that the use of simple error-correcting codes improves capture. The use of selection diversity also improves the capture effect both for fast and slow fading. It is concluded that the inverse distance variability of the received signal is the main reason for the capture effect. The Rayleigh fading alone yields a very small contribution in terms of throughput, nonetheless, it helps to stabilize the system. Numerical results are presented for a slotted ALOHA system with 50 users. We have found that the maximum average throughput can be increased from about 36 percent to almost 60 percent by using channel coding and space diversity.

"Diversity Selection Using Coding in a Portable Radio Communications Channel with Frequency-Selective Fading," L. F. Chang and J. C.-I. Chuang, IEEE J. Select. Areas Commun., Vol. 7, No. 1, January 1989.

TDMA digital transmission is attractive for use in certain types of portable radio systems. A system using this scheme requires wide bandwidth for digital transmission. In multipath media, when delay spread is a significant fraction of the symbol period, the performance of wideband digital transmission systems is severely degraded by having an irreducible symbol error probability caused by intersymbol interference. This paper shows that the degradation can be reduced by employing diversity selection using coding.

A BCH (31, 21, 5) double-error-correcting code and QPSK modulation with coherent detection are used for this study. The probability of word error is taken to be the measure of system performance. In this study, analytic expressions were derived for the word error probability; these expressions simplify the simulation processes. It is found that a diversity selection algorithm employing coding can reduce the floor of word error probability and increase the dynamic range of received power before the word error probability reaches that floor.

"A Differentially Coherent Receiver for Minimum Shift Keying Signal," G. K. Kaleh, IEEE J. Select. Areas Commun., Vol. 7, No. 1, January 1989.

We extend to the case of minimum shift keying (MSK) modulation the differentially coherent reception theory established for the phase shift keying (PSK) modulation. A new differentially coherent detector for MSK is thus derived. The receiver filter is equivalent to the cascade of a matched filter and an equalizer in order to suppress inherent intersymbol interference. We show that performance can be improved when the delay between signals, multiplied by the differential detector, is increased from one to M bit time intervals. This decreases the effect of noise correlation and, consequently, decreases the bit error probability. In order to keep the differential detector simple, M should be odd.

The bit error probability of the proposed receiver is calculated. It is found that almost all potential improvement, due to the delay M , is obtained with $M = 3$. For the same probability of error the required E_b/N_o in the present case is just 1.15 dB more than for the differential binary PSK. The proposed receiver performs better than conventional differential receivers.

Simulations, made for $M = 1$ and $M = 3$, confirm the theoretical analysis.

"Soft Decision Decoding of Block Codes Using Received Signal Envelope in Digital Mobile Radio," T. Matsumoto, IEEE J. Select. Areas Commun., Vol. 7, No. 1, January 1989.

The codeword error rate (WER) performance of noncoherent FSK with soft decision decoding of block codes using Chase's second algorithm is investigated in a Rayleigh fading channel. The received signal envelope is sampled and used as channel measurement information. The theoretical upper and lower bounds of the WER are derived assuming independent Rayleigh envelope samples in a received block. When the Golay (23, 12, 7) code is used, soft decision decoding with 6-bit error correction capability (3-bit error and 3-bit erasure) requires an average signal-to-noise power ratio about 5 dB lower than that for minimum distance decoding with 3-bit error correction to obtain a $WER = 10^{-3}$. The effects of bit interleaving on the WER performance when fading envelope variations is slow compared to the bit rate are investigated through computer simulations. When $23 \times M_i$ bit interleaving is used for transmitting M_i Golay codewords, the simulation results show that $M_i \approx 0.2 \times$ (bit rate/fading maximum Doppler frequency) is sufficient to obtain the full advantages of soft decision decoding. The theoretical analysis was supported by laboratory experiments.

"Channel Modeling and Adaptive Equalization of Indoor Radio Channels," T. A. Sexton and K. Pahlavan, IEEE J. Select. Areas Commun., Vol. 7, No. 1, January 1989.

This paper analyzes the benefits of using a decision feedback equalizer (DFE) in the indoor radio environment and examines the results of performance predictions for different channel modelings. It is found that a QPSK/DFE modem with second-order diversity can operate at a data rate which is an order of magnitude higher than a QPSK modem without equalization. A given set of measured profiles of the channel impulse response is interpreted using continuous and discrete channel models. The continuous channel model is represented by the delay power spectrum and the discrete channel model by the envelope delay power spectrum and the arrival rate of the paths. The sensitivity of the performance to the shape of the delay power spectrum, the shape of the envelope delay power spectrum, and the arrival rate of the paths is analyzed.

"An Adaptive MLSE Receiver for TDMA Digital Mobile Radio," R. D'Avella, L. Moreno, and M. Sant'Agostino, IEEE J. Select. Areas Commun., Vol. 7, No. 1, January 1989.

The European Telecommunications Administrations (CEPT) have recently defined the standard for the Pan-European public land mobile system. It is based on digital voice coding and TDMA access structure with a bit rate of 270.8 kbits/s and a Gaussian MSK modulation. This paper presents the simulation study of an adaptive receiver, based on the concept of maximum likelihood sequence estimation (MLSE), which compensates for the heavy selective distortions caused by multipath propagation.

The receiver includes a matched filter and a modified Viterbi processor and is suitable to be implemented in a digital form. It operates adaptively, in a training mode at the beginning of each burst, as well as in a tracking mode during message

detection. This makes the receiver robust both to fast Doppler shifts and to a large frequency offset. Simulation results are presented which show the performance in different multipath environments, with echo delay in excess of 20 μ s an vehicle speed up to 250 km/h. Such results have been evaluated using the propagation channel models defined by CEPT experts on the basis of field tests. The adaptive receiver is presently being implemented in the Italtel laboratories.

"Fast Carrier-Tracking Coherent Detection with Dual-Mode Carrier Recovery Circuit for Digital Land Mobile Radio Transmission," S. Saito and H. Suzuki, IEEE J. Select. Areas Commun., Vol. 7, No. 1, January 1989.

A new type of carrier recovery circuit suitable for coherent detection in digital land mobile radio transmission is studied experimentally. This paper proposes a dual-mode carrier recovery (DCR) circuit which adaptively selects one of two phase locked-loop operation modes: the conventional mode, or the adaptive carrier-tracking (ACT) mode. The ACT mode digitally controls the reference phase, and enables instantaneous phase tracking in burst signal operation and/or in a fast fading environment. The DCR coherent demodulator performance is identical to that of conventional coherent detection in the low CNR region, and to that of differential detection in the high CNR region where the ACT mode is selected.

"Equal Gain Diversity Improvement in Fast Frequency Hopping Spread Spectrum Multiple-Access (FFH-SSMA) Communications Over Rayleigh Fading Channels," B. Solaiman, A. Glavieux, and A. Hillion, IEEE J. Select. Areas Commun., Vol. 7, No. 1, January 1989.

This paper is concerned with the performance analysis of a fast frequency hopping spread spectrum multiple-access (FFH-SSMA) system with binary frequency shift keying (BFSK) modulation scheme and noncoherent demodulation, operating in a combined environment of Rayleigh selective fading, other users interference, and additive white Gaussian noise (AWGN). Improvement due to the use of equal gain diversity (EGD) is studied in terms of bit error rate (BER). Expressions of the BER are evaluated when a maximum likelihood decision criterion is used to show the advantages of the use of frequency hopping in selective Rayleigh fading channels. Results obtained in this study show the equivalence between frequency hopping and direct sequence (DS) modulation in combatting multipath fading. The performance, in terms of irreducible error probability (IEP), of the system under study (Fig. 6) and that of the DS-CPSK [3] when using EGD is not significantly different. For instance, when the diversity order is equal to 4, the IEP is approximately 10^{-4} for both systems.

"Throughput and Packet Error Probability of Cellular Frequency-Hopped Spread-Spectrum Radio Networks," J. W. Gluck and E. Geraniotis, IEEE J. Select. Areas Commun., Vol. 7, No. 1, January 1989.

We characterize multiple-access interference for cellular mobile networks, in which users are assumed to be Poisson-distributed in the plane and employ frequency-hopped spread-spectrum signaling with a transmitter-oriented assignment of frequency-hopping patterns. Exact expressions for the bit error probabilities are derived for binary coherently demodulated systems without coding. Approximations for the packet error

probability are derived for coherent and noncoherent systems and these approximations are applied when forward-error-control coding is employed. In all cases, the effects of varying interference power are accurately taken into account according to some propagation law.

Numerical results are given in terms of bit error probability for the exact case and throughput for the approximate analyses. Comparisons are made with previously derived bounds and it is shown that these tend to be very pessimistic.

"Performance Analysis of Spread Spectrum Packet Radio Network with Channel Load Sensing," A. H. Abdelmonem and T. N. Saadawi, IEEE J. Select. Areas Commun., Vol. 7, No. 1, January 1989.

A continuous-time Markov chain model for an asynchronous communication spread spectrum code division multiple access (CDMA) packet radio network is developed. The network is composed of N users, the receiver-based code is considered; a terminal with a packet to send looks up the destination's code and transmits on that code. Each user senses the channel load and refrains from transmission if the channel load exceeds the channel threshold. The model allows us to study the threshold effect of channel load on the performance of the CDMA packet radio network. Improvements in performance of spread spectrum packet radio networks due to channel load sensing are shown. Steady-state results for throughput versus offered traffic and the delay versus throughput are obtained.

"Local Access Radio Interference Due to Building Reflections," A. Ranade, IEEE Trans. Commun., Vol. 37, No. 1, January 1989.

A computer simulation is described for studying the interference effects of building reflections on the system performance of local access radio (LAR). The simulation is based upon geometric optics. Coverage probability, defined as the fraction of subscriber locations that can be served by radio within a given range, is calculated. It is shown that only half of the potential subscriber sites within the range of the node can be served by the node site. Of those, a majority are not limited by self interference caused by reflections. Most of the strong interferences come from structures near the subscriber. Increasing the node mast height has little effect on the coverage. Changing node antennas from three 120° sectors to 6 sectors each covering 60° does not effect the coverage probability. Coverage can be increased by increasing the subscriber mast height. Up to half of the subscribers not served by a node site may be served by an optimally placed node site using different channel frequencies.

"On the Symbol Error Probability of Maximum-Selection Diversity Reception Schemes Over a Rayleigh Fading Channel," G. Chyl, J. G. Proakis, and C. M. Keller, IEEE Trans. Commun., Vol. 37, No. 1, January 1989.

This correspondence discusses the symbol error probability of two selection schemes, namely, maximum signal-to-noise ratio ($M\gamma$) selection and maximum output (MO) selection, for M -ary multidiversity reception over a Rayleigh fading channel. The symbol error probability of the MO scheme is lower than that of the $M\gamma$ scheme. The more diversity receptions used, the larger the difference. A simple expression of the crossover average signal-to-noise ratio (per bit) is presented as a guideline for increasing the number of diversity receptions.

"Performance of Binary FSK Communications Over Frequency-Selective Rayleigh Fading Channels," F. D.

Garber and M. B. Pursley, IEEE Trans. Commun., Vol. 37, No. 1, January 1989.

This paper is concerned with the performance of binary frequency-shift keyed (FSK) communications over frequency-selective wide-sense-stationary uncorrelated-scattering Rayleigh fading channels. Previous analyses of FSK communications over frequency-selective channels have considered the average probability of error for specific models for the fading channel and typically assume that the two FSK signals are orthogonal. This paper describes a technique for obtaining bounds on the average error probability for FSK in terms of one or two parameters obtainable from multipath spread or frequency correlation function channel measurements.

"An Architecture for a Mobile OSI Mail Access System," R. Cole and J. Burns, IEEE J. Select. Areas Commun., Vol. 7, No. 2, February 1989.

This paper describes an architecture and implementation design which support an interface to the X.400 mail environment using the full Open Systems communications protocols for a portable computer. The implementation is designed to be used over a cellular radio telephone network to provide mobility. The portable computer is used to implement the User Agent interface of the CCITT X.413 (1988) Message Store. A full set of security facilities, designed for use with Inter-Personal Messaging (IPM), are included in the architecture. These facilities are existing and proposed International Standards as far as possible.

A number of important issues are discussed regarding the placement and management of keys for the IPM security, as well as authentication between the user and the portable computer and between the User Agent and the Message Store. To support the use of the CCITT Message Store model, it was necessary to implement a full protocol stack for Open Systems Interconnection (OSI) on the portable computer; our design and experiences are described.

"Doppler-Corrected Differential Detection of MPSK," M. K. Simon, D. Divsalar, IEEE Trans. Commun., Vol. 37, No. 2, February 1989.

This paper presents an open-loop technique for estimating and correcting Doppler frequency shift in an M -ary differential phase shift-keyed (MDPSK) receiver. The novelty of the scheme is based upon the observation that whereas the change in phase of the received signal over a full symbol contains the sum of the data (phase) and the Doppler-induced phase shift, the same change in phase over half a symbol (within a given symbol interval) contains only the Doppler-induced phase shift. Thus, by proper processing, the latter can be estimated and removed from the former.

Analytical and simulation results are given for the variance of the above estimator and the error probability performance of the MDPSK receiver is evaluated in the presence of the Doppler

correction. Next, the practical considerations associated with the application of this technique on bandlimited Nyquist channels are discussed and incorporated into the final design. In particular, using a modification of the conventional single sample per symbol detection algorithm, it is shown that the receiver can, in the absence of timing jitter, be designed to allow combined Doppler correction and data detection with no penalty due to intersymbol interference (ISI). Finally, the effects of ISI due to timing jitter are assessed by computer simulation.

"Performance Analysis of a Time Diversity ARQ in Land Mobile Radio," F. Adachi, S. Ito, and K. Ohno, IEEE Trans. Commun., Vol. 37, No. 2, February 1989.

A time diversity automatic repeat-request (ARQ) scheme with the finite number of transmissions is investigated for a digital FM mobile radio with frequency demodulation (FD). It processes all the retransmissions of a single data block using postdetection diversity combining. The analysis of the signal energy per bit required for a given bit error rate (BER) and the spectral efficiency in a cellular mobile radio system are presented. The results obtained from the numerical calculations show that this ARQ scheme offers a performance superior to both the basic ARQ scheme and the time diversity scheme.

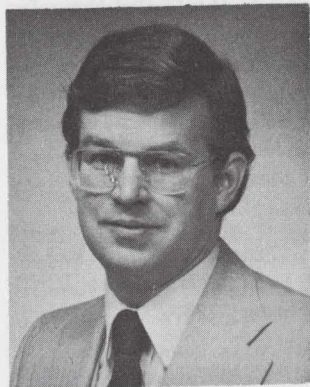
"High Capacity Cellular Patterns for Land Mobile Radio Systems Using Directional Antennas," S. Heeralall and C. J. Hughes, IEE Proc., Part I, Vol. 136, No. 1, February 1989.

To meet increasing demand for mobile communications with a fixed spectrum and at reasonable cost, directional antennas have been used in cellular mobile radio systems. This paper reviews sectorised patterns that have been proposed so far, and then describes how to achieve high capacity systems by taking a new approach to the design of cellular patterns. Some novel patterns, with less than or equal to two hexagons per cluster are described. Performances are assessed in terms of the first decile carrier-to-cochannel interference (C/I_c) and traffic density for a given blocking probability. Cell site efficiency is also considered.

"Efficient Differential Detection of Digital FM Signals in Bandwidth Restricted Channels," N. Ekanayake and U. R. Abeyratne, IEE Proc., Part I, Vol. 136, No. 1, February 1989.

The paper presents a differential detection scheme for noncoherent detection of digital FM signals received over bandwidth restricted channels. The new differential detection scheme observes the phase of the FM signal at centres of signalling intervals to derive the differential phase. Differential encoding of transmitted data is required for preventing error propagation. Numerical results show that the new differential detector yields a superior performance in narrowband channels where conventional differential detection becomes unusable. Error probabilities and optimum BT values are presented assuming that bandlimiting is caused solely by IF filtering.

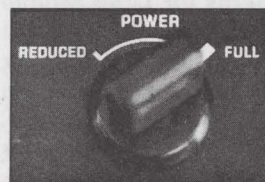
Vehicular Electronics



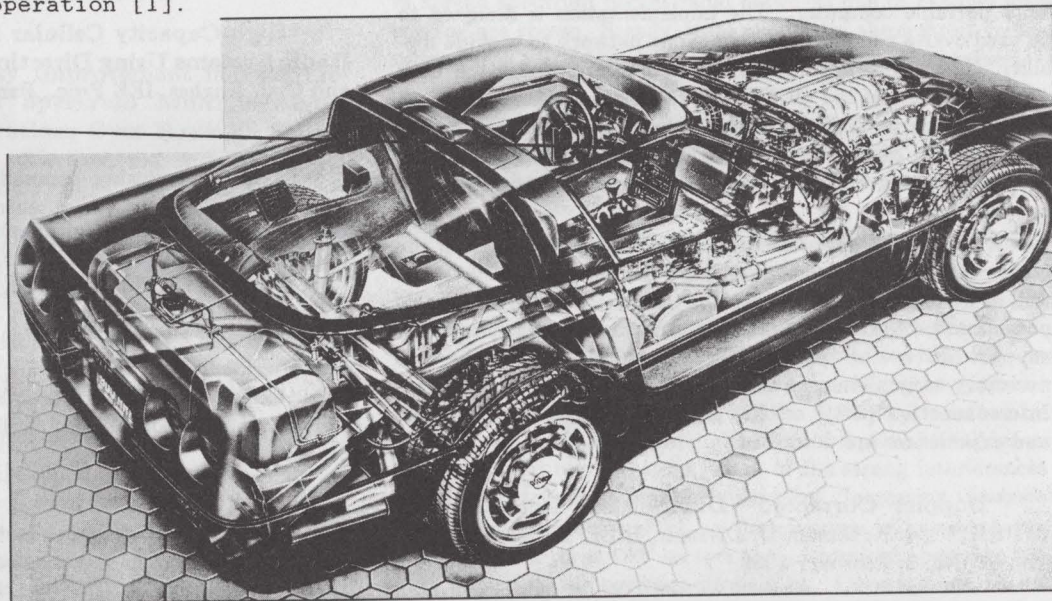
Bill Fleming
Vehicular Electronics Editor

POWER VALET "JUICE SWITCH" FOR ZR-1 CORVETTE

The long-awaited ZR-1 Corvette is now available with its up to 400 hp, four-cam, 32-valve, V-8 engine. The multivalve high-performance engine was jointly developed by Chevrolet and Group Lotus plc. To prevent reckless use by other drivers, such as parking valets, the car is equipped with a second keylock switch that switches between reduced and full power outputs. In the reduced power position, half of the 16 fuel injection valves are closed and one of the two cam lobes is disabled. The power valet feature is also known as the "juice switch" because available engine power more than doubles when the "juice key" unlocks and makes available full power operation [1].



JUICE SWITCH: The Power Valet

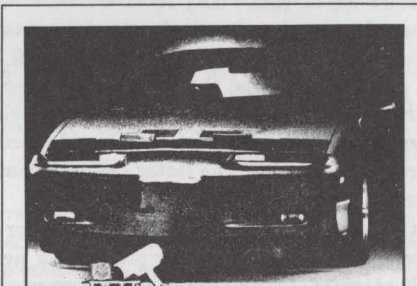


THE "JUICE SWITCH" USED ON THE ZR-1 CORVETTE

STEALTH FAIRING

Innovisions Research, in Denver, CO, now sells what it calls the Cabrella Stealth Fairing. The fairing consists of a car bra that incorporates microwave absorbing material to make vehicles fitted with it less susceptible to detection by police radar 4 .

"Hey, what about night driving? Wouldn't headlight reflectors contribute such large cross-section radar return so as to minimize effectiveness of the fairing?" "And what about safety hazards associated with narrow-minded stealth-equipped drivers speeding across the countryside? Why in hell are things like this allowed to be sold? Only in America, land of the free, free to endanger fellow man. . . . I could go on, but you get my point."



Stealth Fairing: claims to guard against radar

Stealth Fairing Radar-Absorbing Bra Makes Car Less Susceptible to Police Radar Detection

FAX HITS THE ROAD

Toyota will make facsimile machines available as an option. The unit will be integrally mounted in the rear seat [2].

HOLOGRAPHIC HIGH-MOUNTED STOP LAMP

Pontiac and GM Hughes Electronics are replacing conventional center high-mounted stop lamps with hologram-based lighting in certain Grand Am model SEs in late '89. Instead of seeing a flat image, drivers behind the Grand Am will see an evenly illuminated "floating" disc on the rear glass surface. The display features less vision obstruction, improved appearance, and easier cleaning [3].

REFERENCES

1. "GM to Deploy ZR-1 Technology on Other New Models," Automotive Electronic News, January 30, 1989, p.12.
2. "Fax Hits the Road," Automotive Electronic News, February 13, 1989, p. 4.
3. "Pontiac's Holographic High-Mounted Stop Lamp," Automotive Industries, February, 1989, p. 16.
4. "Out Takes -- Change of Pace," AutoWeek, January 23, 1989, p. 12.



Toronto, Sept 12-14

VNIS'89 IN TORONTO, CANADA

Planning is going ahead for the first International Vehicle Navigation and Information Systems Conference - VNIS'89. Co-sponsored by IEEE-VTS, the Ontario Ministry of Transportation and Transport Canada, the conference will be held at the King Edward Hotel, Toronto, from September 12-13, 1989.

Shown in the photograph, taken at a recent planning meeting, are: Seated, left to right, Lamberto Gomes, Chairman, Exhibits Committee; Rye Case, Conference Chairman; Bruno Di Stefano, Chairman, Finance Committee and Hugh Reekie, Co-Chairman, Publicity and Publications Committee. Standing, Bill Law, Program Committee; Joe Tsai, Co-Chairman, Technical Program Committee; Gene Dempsey, Conference Steering Committee and Chairman, Local Arrangements Committee; Lynne Gaetz, Insight Planners, Conference Managers; Ataur Bacchus, Conference Secretary and Bob French, Vice-Chairman, Technical Program Committee.

Not shown in the photograph are: Bill Johnson, Conference Vice-Chairman; Stuart Meyer, Conference Steering Committee; Lewis Sabounghi, Co-Chairman, Technical Program Committee and Jouko Parviainen, Co-Chairman, Publicity and Publications Committee.



40th IEEE

VEHICULAR TECHNOLOGY CONFERENCE

ON THE MOVE in the '90s

Crowne Plaza-Holiday Inn

May 7 - 9, 1990

Orlando, Florida

CALL FOR PAPERS*

You are invited to submit a paper for presentation at the 1990 VT Conference. Topics include, but are not limited to the following:

- 1) Research and Development
- 2) System Design
- 3) Hardware/Software Design
- 4) Engineering Test Results
- 5) Applications Engineering

for

TRANSPORTATION SYSTEMS

- Control systems
- Traffic monitoring
- Vehicle location
- Maglev
- Electromagnetic compatibility
- Robotics applications
- Headway management

VEHICLE ELECTRONICS

- Information display
- Vehicle control
- Collision avoidance
- Land navigation
- Map generation
- Multiplexed signaling
- Pollution sensing and control
- Microprocessor applications
- Robotics
- Signal Processing
- Propulsion
- Guidance

MOBILE COMMUNICATIONS

- Signaling
- Spectrum efficiency
- Propagation
- Portable communication
- System control
- Regulatory issues
- Digital cellular
- Simulation and test
- Modular techniques
- Dispatch systems
- Emergency communications
- Two-way radio
- Rural radio service
- Satellite technology
- Voice synthesis/recognition
- Channel coding
- Voice coding
- Antenna systems
- Public safety
- Data transmission
- RFI reduction
- Components
- Computer-aided design

* Authors of accepted papers agree to present their papers at the 1990 conference.

Send your summary to IEEE VTC '90, Papers Committee, P.O. Box 1317, Winter Park, Florida, 32790, USA

AUTHOR'S SCHEDULE:

- * Submit four copies of typed summary of Paper (250 words maximum) and a résumé by August 1, 1989
- * Authors notified of acceptance of Papers November 30, 1989
- * Send final manuscripts to VT Conference Record by January 3, 1990

(407) 629-5712

(407) 629-5712