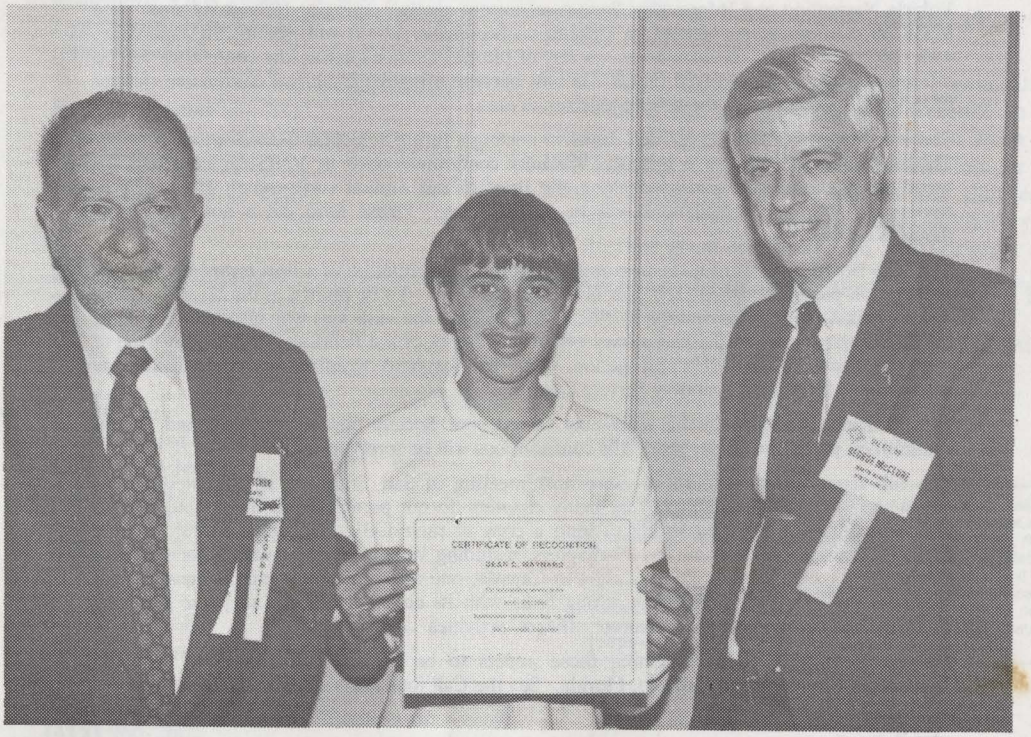
IEEE

VEHICULAR TECHNOLOGY SOCIETY NEWSLETTER

Vol. 36, No. 3, August 1989 ISSN 0161-7887 Editor: A. Kent Johnson

39th IEEE Vehicular Technology Conference Awards Lunch



Recognition of Excellent Job. From the left: Frank Thatcher (Chairman for VTS '89 Conference), Dean Maynard (Volunteer Worker for the entire three day conference), George McClure (VTS President and Chairman for '90 Conference in Florida).

See "Reminiscences of VTC" page 9.

President's Message

George McClure
President
IEEE Vehicular Technology Society

The high level of interest in vehicular technology was evident at our very successful annual conference this year in San Francisco. The attendance exceeded expectations, with over 400 registered. Our thanks go to Frank Thatcher and his committee for a fine professionally-produced conference!

Digital cellular system standards and developments were the focus of a well-attended evening session, organized by Dr. Bill Lee. The international panel of speakers gave us insights into the plans to rapidly bring this new generation mobile telephone service to market and thus relieve capacity limitations that are already limiting ability to meet demand in major markets. Definition of standards is to be complete this year.

Vehicle Navigation and Information Systems represent another emerging technology area. The VNIS '89 conference, to be held in Toronto on September 12-13, will explore the field fully, with reports on current developments. A day of tutorial seminars before the conference will be offered as well. It is expected that VNIS will become a regular bi-annual conference, just as CONVERGENCE has in the vehicle electronics area.

There is interest both in Europe and Japan in hosting a future vehicular technology conference. This may take the form of a technical specialty conference, such as VNIS, or of a regional broad-based conference organized along the lines of our annual conference. Your advice, comments, and recommendations will be helpful here. Please send me a note with your thoughts on this.

The VTS Board of Governors unanimously approved the formation of a new award for the best propagation paper published each year in the Transactions. To be known as the Neal Shepherd Award, this recognition includes a certificate and $500 to the author(s) who also will be eligible for the regular papers-of-the-year award program. Copies of the February 1988 special issue of the Transactions on 900 MHz propagation, that Neal Shepherd organized before his death, are still available from the Piscataway Service Center.

Jack Neubauer, who for many years ably served your Society on the standards and awards committees, passed away this year. His contributions will be sorely missed.

The full report on the Board of Governors meeting in San Francisco is presented in this Newsletter. You will note there that many chapters do not participate in the chapter-of-the-year competition, simply by failing to send a copy of their L-31 meeting report form to the Chapters chairman. VTS now has 29 chapters, including 18 joint chapters with other societies. Of the 29, 23 are in the United States, 4 in Canada, one in Sweden, and one in Japan. Your society is interested in maintaining strong links with its chapters. Please keep the Chapters chairmen updated on changes in chapter officers, activities, or problems.

Now is the time to begin planning those papers to be presented at the 1990 Vehicular Technology Conference in Orlando, Florida. See the Call for Papers elsewhere in this issue.

George McClure
1730 Shiloh Lane
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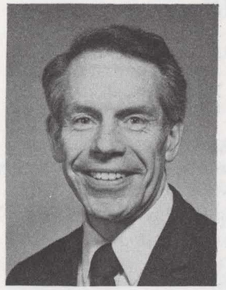
Newsletter Staff

Editor's Notes



A. Kent Johnson
Newsletter Editor

Our recently completed Annual Conference in San Francisco was a huge success and Frank Thatcher and his committee deserve a big vote of thanks from all of us. We are fortunate to have several features from the conference in this issue of the newsletter. We especially thank those who provided the photographs and Al Isberg for his comprehensive summary of the conference events. The panel sessions were a big success and we have included a brief summary of the Digital Panel elsewhere.

The San Francisco conference generated great enthusiasm for the upcoming conference in Orlando, Florida. That conference will be held from May 7-9, 1990 in the Crowne Plaza-Holiday Inn in Orlando. You will find a call for papers for that conference elsewhere in this newsletter. Start making your plans for another great conference in another great city.

In this issue of the newsletter, we mark the passing of our colleague Jack Neubauer. Excerpts from his obituary are duplicated elsewhere in the newsletter.

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

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

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BOARD OF GOVERNORS

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Robert E. Fenton(91)	Sr.Past President/Planning
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Leo M. Himmel(89)	Chairman, Education Committee
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Evan B. Richards(90)	National Conference Chairman
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Raymond C. Trott(90)	Membership Chairman

Board of Directors Report

James M. Sears

VTS Secretary

MINUTES OF THE IEEE VTS BOARD OF GOVERNORS MEETING

The IEEE VTS Board of Governors met on April 29, 1989 at the Sir Francis Drake Hotel in San Francisco, California. The meeting was called to order at 2:00 PM.

ROLL CALL

The following were in attendance:

	Linda Sue Boehmer	88-89 LTD Chairman
#	J. R. Cruz	Assoc. Newsletter Editor
	Anthony Daniels	Chmn. Land Transportation Div
	Robert French	Nav. & Info. Sys. Chairman
#	Arthur Goldsmith	Const & Bylaws Chmn.
	David Goodman	Education Chairman
	R. A. Isberg	Chmn. Fellows Election Committee
#	A. Kent Johnson	Newsletter Editor
	W. C. Y. Lee	Publications Chmn.
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#	Roger Madden	Vice President
#	Robert A. Mazzola	Vehicular Elec. Liaison.
#	George McClure	President, VTS
#	Sam McConoughey	Avant Garde/Public Relations
#	Stu Meyer	Past President/ Nominations/Awards
	Hugh Reekie	VNIS'89 Publicity Chairman
#	Evan Richards	Natl. Conf. Chairman
	Giorgio Rizzoni	Transactions Assoc. Editor
#	Jesse Russell	Standards Chairman
	Jim Sears	Secretary
	Thomas P. Stanley	FCC Chief Engineer
	John Tary	VTC'92 Conf. Chmn.
	Frank Thatcher	VTC'89 Conf. Chmn.
#	Ray Trott	Membership Chmn./ Chapter Activities
	Jay Underdown	1991 Conf. Chmn.

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

The President modified the agenda, and after discussion, it was approved with corrections. He encouraged persons giving reports at the meeting to provide written reports to the secretary. These can be mailed to the secretary after the meeting.

CONVENTION PRE-REPORT

Frank Thatcher gave the following pre-report on the convention. There were 370 registered for the convention with 283 committed for the lunch meetings. All social events were sold out. Only 350 Conference records were available. One hundred forty four papers are included in the conference records. The conference records are included in two volumes and cover widely diversified subjects. Frank also introduced Tom Stanley, FCC Chief Engineer, who was the keynote speaker for the conference.

TREASURER'S REPORT

Sam Leslie could not attend the meeting, however, he provided a written summary of the Society's financial status. Art Goldsmith, past treasurer, reminded the board of the importance of budgeting sufficient page count for the conference

records. The 1990 publications budget has been increased to $101.7 thousand. It was concluded that society dues can remain unchanged for another year.

Roger Madden moved, Art Goldsmith seconded that the board accept the treasurer's report. The vote was unanimous in favor.

PUBLICATIONS

Bill Lee, publications chairman, reported that a special issue of the Transactions on "Highway Electronics" will be featured this fall. J. R. Cruz reported that about 20 new papers have been submitted this year and are in the review process. Giorgio Rizzoni reported that the backlog of paper reviews for the past year is now complete. Seven papers have been selected for publication. Hugh Reekie suggested that some of the papers could be included in the VNIS transactions. Bill Lee will follow up on this possibility.

Bill Lee moved and David Goodman seconded that the Federal Highway Administration's request for 2,000 copies , bulk sale, of the upcoming Highway Electronics special issue be granted at a price of $3.00 each. (This is a 150 page issue.) The vote was unanimous in favor.

Four Transactions issues are planned this year including two special issues. 596 pages are budgeted for the four issues. From previous meeting minutes these upcoming special issues are being planned.

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

Kent Johnson requested that Newsletter articles for the August issue be submitted before June 9th.

CONFERENCES AND MEETINGS

Joint Railroad Conference, Apr 25-27, 1989, Philadelphia

Linda Sue Boehmer reported that the conference had record attendance up 20 percent from the 1988 conference. Financial results are not yet complete.

1989 VNIS Conference, Sept. 12-14, Toronto

Bob French reported that plans were on schedule. Programs will be mailed in mid May. The President was requested to appoint a VTS representative to meet with Rye Case, VNIS'89 Chairman, concerning the conference.

The Toronto section has declined to sponsor VNIS '91. However, they will consider future sponsorship. The Southeast Michigan chapter has expressed interest in the 1991 sponsorship. Bob will contact Mark Krage regarding the conference.

40th VTC Orlando, FL, May 7-9, 1990

George McClure reported on the status of the conference to be held at the Holiday Inn Crowne Plaza. A call for papers flyer, attached to the minutes, was distributed at the San Francisco Conference.

41st VTC St. Louis, May 19-22, 1991, Sheraton Westport

Evan Richards submitted a report of conference plans. Jay Underdown, Conference chairman, was present and reported that local phone calls at the conference would be free and long distance calls were negotiated at no hotel surcharge. Insurance is being negotiated with TAB. Art Goldsmith was requested to review with TAB, policies regarding conference insurance. Land Transportation is assisting with conference preparation. An excellent advance announcement postcard was distributed at the San Francisco conference.

42nd VTC Denver, May, 1992

John Tary, Denver section conference coordinator, was present at the meeting and reported that conference plans are on schedule. The second week in May has been targeted for the conference. A down town facility is planned for the conference.

Joint Railroad Conference, Chicago, April 17-20, 1990

Linda Sue Boehmer reported that ASCE is cosponsoring the conference. Plans are on schedule.

Joint Railroad Conference, St. Louis, 1991

Linda Sue Boehmer reported that plans continue for a joint Railroad/Vehicular Technology Conference.

A decision will be made by ASME later this year whether the 1992 Railroad conference will be jointly scheduled with VTC in Denver. Anthony Daniels is the new Chairman of ASME Land Transportation Division.

43rd VTC, 1993

Dave Goodman reported that there was interest in having a VTS conference in Europe in 1993. Previously, many papers have been submitted from Europe. Only 65% of the papers are from the USA. Roger Madden suggested the possibility of cosponsoring a meeting with a European conference. Art Goldsmith was appointed to call Bob Fenton, not present, regarding a possible European conference.

VNIS 1993

Bob French suggested that both Europe and Japan be considered for a possible conference site.

44th VTC, 1994 - No report.

Convergence Conferences

From previous minutes, the following dates have been set for upcoming Convergence conferences.

October 12-17, 1990
October 17-22, 1992 (VTS sponsored)

No further report was made.

COMMITTEE REPORTS

Land Transportation

Linda Sue Boehmer reported that new officers are now in place and an updated list was supplied to the secretary. Membership mailing list has also been updated.

Constitution and Bylaws

Roger reported that the new Constitution should be out in approximately six weeks.

Membership

Ray Trott reported that the VTS membership brochure has been updated and that copies are available at the conference. An ad is also being prepared for a future copy of the student magazine "Potentials". Linda Sue Boehmer proposed that the membership brochure should be clarified to include interest areas in automotive technology, communications, land-mobile transportation, and vehicular navigation. The Technical Interest Profile was suggested as a better place to target special interests. Ray is to follow up this option with Mel Olken at TAB.

Ray was requested to also track the retention of graduating seniors and propose ways to encourage their remaining in IEEE.

Publicity - No report was available for the meeting.

CCIP Representative

Stu Meyer represents VTS on the CCIP committee. At present there is high interest in activities regarding high-definition television.

USAB Engineering R&D

Arthur Goldsmith resigned as USAB representative due to his recent election as Division III Director. Dr. Thomas Stanley, FCC Chief Engineer was appointed to serve as the future USAB representative.

Noble Fellowship

Sam McConoughey reported that applications have been received and selections made for Fellowship nominations. Arthur Goldsmith recommended that a uniform policy be established regarding nominees. If nominations are opened world wide, Motorola will require a full time person to man the program. The matter was referred back to committee for a recommendation. A replacement for Jack Neubauer is needed to interface with Motorola regarding administering this award.

Transportation Electronics Fellowship

In a letter from Bob Fenton, both the Noble and Transportation Electronics Fellowships require resolution of at least two issues if opened world wide. One issue is management expense and the other is fair evaluation of applicants coming from uneven curricula and different scholastic standards. These issues and others will be reported in depth at a future board meeting.

Chapter Activities

Stu Meyer reported that Frank Thatcher will be presented the Chapter of the Year Award during the Tuesday awards luncheon. There are still only a few chapters filling out their reports to participate in this award selection. Stu also reported that Philadelphia is interested in reforming a VTS chapter.

Standards

Jessie Russell stated that material is in the process of being transferred from the previous chairman. Stu Meyer is assisting with the transfer from Jack Neubauer, deceased. Standards activity is on the upswing.

Awards

Stu Meyer has been appointed Awards chairman in place of Jack Neubauer. Roger Madden recommended that $500.00 annually be provided for the Neal Shepherd Award for the "Propagation Paper of the Year". Receiving this award does not exclude the paper as an applicant for the Paper of the Year Award. Seconded by Richard Evans and unanimously approved.

The Newsletter Editor was asked to highlight the Neal Shepherd Award in the next edition. A letter will also be written by the President to Mrs. Shepherd in appreciation for Neal's service to the industry.

A plaque award has been prepared for John Galanti in appreciation for his service as Philadelphia Conference chairman.

Sam McConoughey was appointed Avant Guard responsibility.

Fred Link recommended Walt Williams as a candidate for the Avant Guard award for his service to IEEE-VTS. As an alternate, a Certificate of Appreciation should be presented. Seconded by Evan Richards and unanimously approved.

Fellows Report

A written report from Al Isberg states that two VTS Senior Members were elected to Fellow Member grade in 1988. At least three additional nominations are expected this spring. He also recommends a 3 year term for the Fellows committee and, therefore, requested that his replacement be selected.

Education Activities

David Goodman presented a letter from Stephen Kahne, Chairman, IEEE Engineering Skills Assessment Committee (ESAP) requesting continued VTS support for future workshops. A video tape is being provided

to each Society President which describes in detail the Engineering Skills Assessment Program within each society. Dave suggested that the workshops be combined with future conferences to minimize expenses.

Propagation Committee

A chairman is needed to replace Neal Shepherd.

Nominations Committee

Stu Meyer reported that letters will be mailed to incumbents for the fall election in May. Terms will begin January 1, 1990. Five directors are rotating off the Board.

OLD BUSINESS

Ray Trott has upgraded the VTS Membership brochure to include description of associate member grade. An appropriate magazine ad is also being prepared to encourage qualified associate memberships.

Linda Sue Boehmer reported that program planning to attract Land Transportation members was progressing. Mailing lists have been updated for future mailings.

Arthur Goldsmith reported that joint support of IEEE conferences with Trade or other Industrial associations is authorized as long as commercial purpose is not intended. The IEEE policy manual cover this subject.

NEW BUSINESS

A motion was made by Arthur Goldsmith that a letter of appreciation for Jack Neubauer's service to IEEE-VTS be written by the President to Mrs. Neubauer. Seconded by Kent Johnson and unanimously approved.

Arthur also reported that Ted Gerlach is no longer with IEEE headquarters. Several IEEE activities are moving to Piscataway, NJ, including TAB. The Board recommended to Arthur that a liaison person be added at headquarters to assist societies.

It was reported that Sam McConoughey is running for IEEE Division III director post.

Director Travel

Roger Madden recommended that all 15 elected board members be authorized reimbursement for one days lodging, meals, and round trip air fare at the most economical rate to attend Director's meetings, if expenses cannot be covered by employer. For directors on the conference program, expenses for the complete term between program and directors' meeting are to be covered and the $500.00 limit is to be removed. Conference registration fees are not included. This will be re-evaluated annually. Seconded by Sam McConoughey and unanimously approved.

Joint Technical Advisory Committee (JTAC)

Stu Meyer proposed the reinstatement of JTAC which was terminated in the late 1960's. Jessie Russell was suggested as committee chairman. After considerable discussion regarding the committee, the President appointed Stu Meyer, Jessie Russell, and Sam McConoughey to review the alternatives and report at the next board meeting.

New Chapter Formation

Item #5 in the President's report reflects changes needed to comply with IEEE 406.3 policies regarding new chapter formations. Sam McConoughey moved that item #5 in the report be approved as stated. Evan Richards seconded and approved unanimously.

Chapter Improvements

A motion was made by Stu Meyer that up to $300.00 be made available to VTS Chapters for membership promotion activities. Motion was seconded by Arthur Goldsmith and unanimously approved.

Job Descriptions

The President requested that each elected board member submit a job description of their responsibilities. This will be used as the basis for compiling a list of job descriptions for future board members.

Recognition of Conference Workers

After some discussion as to how to show appreciation to those working behind the scenes at conventions, it was agreed that this should be handled by the convention chairman and any expense incurred should be treated as a conference expense.

Jack Neubauer Award Proposal

Roger Madden was asked to make a proposal at the next directors meeting for an appropriate recognition for Jack. Stu Meyer will also present a plaque to his wife in honor of Jack's service. Kent Johnson will include an article in the "In Memoriam" section of the Newsletter.

The Board expressed their regrets over Jack's death and their deep appreciation for the many years of service he rendered to IEEE-VTS.

NEXT MEETING

The next board meeting is scheduled for 9:00 AM Thursday, September 14, 1989, at the King Edward Hotel, 37 King St. East, in Toronto. This is in conjunction with the VNIS Conference September 12th and 13th.

ADJOURNMENT

The meeting was adjourned at 7PM.

Respectfully submitted,

Jim Sears, Secretary

Chapter News

Gaspar Messina
Chapter News Editor

Meetings

Washington, D.C. (Joint VTS/Land Transportation Committee)

Subject: Future of Light Rail in Maryland
By: Mr. Paul J. Wiedefeld
Maryland DOT
Maryland DOT Headquarters, BWI
Held: April 11, 1989
Attendance: 36 (14 guests)

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

John R. Neubauer

Many of us lost a close friend and colleague with the passing of John R. Neubauer on April 5, 1989. Over the years, Jack has been very active in the Vehicular Technology Society serving at one time as Chairman of the Vehicular Technology Group before we became a Society. We quote below, excerpts from his obituary as published in a local New Jersey newspaper.

"John R. Neubauer, a retired RCA engineer and an active member of the Haddon Heights Baptist Church, will be remembered as a man who devoted his life to showing others the relationship of science to the Bible.

"Mr. Neubauer died April 5, 1989 after a lengthy illness at Cooper Hospital-University Medical Center, Camden. He was 74.

"A graduate of Colorado University and Colorado A & M College, Mr. Neubauer worked in radio and communications in the Midwest for more than 15 years.

"During World War II, he served as a civilian instructor in the Signal Corps and later as chief radio operator with the Army Domestic Air Transport Service.

"In 1950, Mr. Neubauer came to New Jersey to join RCA's Communications Engineering Section and was soon made supervisor of the New Communications Systems unit.

"Serving more than 20 years as Engineering Project Director, he supervised communications for the Minuteman Weapon System and developed the "man pack radio" system, which was used by the astronauts to communicate with the earth station when they were 250,000 miles away in space.

"Granted two patents, Mr. Neubauer achieved many other accomplishments in the field of radio and communications.

"Upon his retirement in 1972, Mr. Neubauer was licensed by the States of Pennsylvania and New Jersey as a Professional Engineer and Consultant.

"During these years he was widely sought as a consultant in the fields of transportation and security, mobile radio and analysis and systems designing.

"Mr. Neubauer often gave lectures to college and service organizations. He wrote articles for many communication publications and was featured in Encyclopedia Americana International Edition regarding special applications of radio.

"Mr. Neubauer was also a member of the Institute of Electrical and Electronics Engineers, National Society of Professional Engineers, American Institute of Aeronautics and Astronauts, Radio Club of America, American Association for the Advancement of Science and New Jersey Society of Professional Engineers.

"Besides his professional duties, Mr. Neubauer will be remembered by his family and friends as a devout Christian.

"Serving as past regional chairman of the Christian Businessmen's Committee International of Camden, he was active in the Gideon's International.

"A 36-year member of Haddon Heights Baptist Church, Mr. Neubauer served on the Board of Deacons and taught adult Sunday school.

"Described as a "behind the scenes man who was always in the sound room", members of the church will remember him for development and operation of the sound system of the church and their high school.

"A resident of Haddon Township, he served on the planning board for 25 years, holding the position of vice chairman.

Reminiscences of VTC 1989

By Al Isberg

The 39th IEEE Vehicular Technology Conference in San Francisco, April 30th through May 3rd, established new records for attendance and the number of papers presented. More then 540 persons attended and 48 were from student IEEE chapters. One hundred forty four papers were presented, 66 from the USA, 25 from Japan, Canada 17, England 8, West Germany 6, Sweden 4, Netherlands 2, Spain 2, Iran 2, Italy 3, and one each from Saudi Arabia, Australia, Switzerland, Egypt and India. Truly, it was an international conference!

Digital topics comprised 32% of the papers, cellular 20%, guided radio systems (including enhancers, boosters, on-frequency repeaters and distributed antenna systems) 8%, antennas 8%, automotive electronics 7%, rail transportation 6% and miscellaneous 15%. In order to balance program topics, some of the outstanding papers from the 1988 International Congress on Transportation Electronics (Convergence) were repeated in the automotive electronics sessions. Most of the papers in rail transportation and guided radio systems also were invited.

It began on Sunday, April 30th, with a bus tour across the Golden Gate Bridge through beautiful Marin and Sonoma counties to sample varieties of wine at two of the prettiest wineries in the area and to enjoy box lunches in the historic Sonoma village square. Two buses carrying 96 persons had been ordered based upon advance registrations. Many without reservations were disappointed.

On the return trip, we were treated to views of beautiful San Francisco bay literally covered with sail boats in the seasons opening regatta. On Sunday evening, we renewed old acquaintances at the VTS Chapter's Reception and cocktail party before dining at excellent restaurants nearby.

The technical conference began on Monday with six very well attended parallel sessions. Thomas P. Stanley, FCC Chief Engineer, was the keynote speaker at the Kickoff Luncheon. Bill Lee's panel discussion at 7 PM, on the major concerns about digital cellular, attracted a standing room only audience in the Ball Room.

On Monday, the spouses and guests enjoyed a three hour city orientation tour and lunch at Pier 39. On Tuesday, they had a bus tour to Muir Woods and Sausalito, where they had lunch at various quaint restaurants, and the delightful return trip was on trans-bay ferry boat. We received many favorable comments about the spouse and guest program.

At the Awards Luncheon on Tuesday, Dr. Kamilo Feher, received his Fellow Member certificate. Stu Meyer, VTS Awards Chairman, presented a plaque to John Galanti in recognition of the successful 38th VTS Technical Conference in Philadelphia last year. George McClure, VTS President, announced the establishment of a new annual VTS award for the best paper on radio wave propagation in memory of Neal H. Shepherd. He also reported that funds from Convergence (the large technical conference jointly sponsored by VTS and the Society of Automotive Engineers) plus other sources will be used for new scholarship awards. Tony Van den Heuvel, Motorola Inc., announced that the 1989 Dan Noble Fellowship has been awarded to Stephen P. Emcott, an Honors Student at MIT.

On Tuesday evening, a panel discussion of applications, technology and standards for premises area and personal radio communications was very well attended. It was organized and chaired by Chandos Rypinshi, President of LACE, Inc., Petaluma, CA. The panelists were: Dr. David J. Goodman, Rutgers University; Dr. Louis P. Shu, AT&T Bell Labs.; Philip Porter, Bell Communications Research and Michael Callendar, British Columbia Telephone Co.

VTC: '89—Kick off lunch.

The Chairman described the concepts and the various concerns about how premises area radio might be used. The panelists and the audience discussed applications, the technology and proposed standards. Personal radios operating with less than ten milliwatts power will be used. The premises area radio networks will be in large offices, factories, warehouses, etc. The networks could be arranged as micro or pico cells using high microwave frequencies.

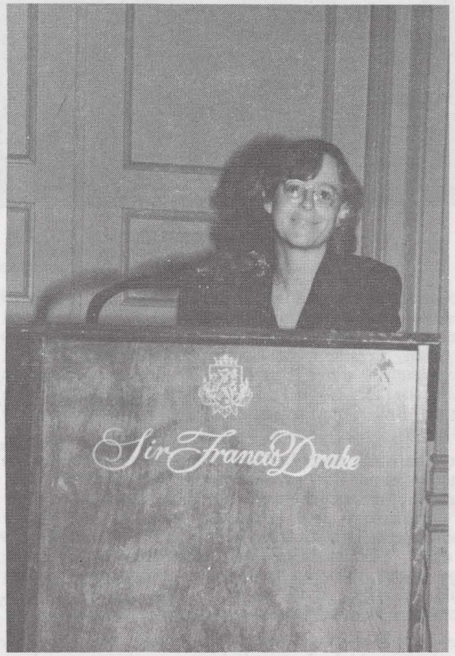
The big event on Wednesday was the Students Luncheon which featured four prominent speakers discussing cellular technology and anticipated future developments. The speakers were: Jesse Russell, AT&T; James Mikulski, Motorola, Inc.; Dr. David Goodman, Rutgers University and Harold Horton, GTE Mobilnet.

Dr. Goodman suggested the student's program to Frank Thatcher, Chairman of VTC '89, who appointed Jim Lang and John Powell to meet with faculty advisers and IEEE Student Chapters and invite them to the conference. Fifty six percent of the 48 registered students were undergraduates from nearby schools and the balance were from schools in the USA, Europe and other regions. In exchange for free registration and the luncheon, students assisted the Session Chairpersons with room lights, projection facilities and changing the "topic being presented" sign at the entrances to the rooms. A large percentage of the papers from fifty one schools had been prepared by graduate students and co-authored by a faculty member. Most of the student's papers were high quality and presented useful information. We believe that the students program should be perpetuated in future VTS conferences and that VTS chapter meeting notices should be sent to the appropriate contacts at IEEE student chapters.

During the afternoon, approximately twenty persons rode a BART train through the tunnel under the San Francisco Bay to Oakland where they visited Cellular One's Mobile Telephone Switching Office (MTSO). Brian Montgomery showed them the Ericsson equipment and described the system. They also visited the BART Central Control which Greg Austin described. They they returned to San Francisco and rode the MUNI subway to visit the San Francisco

Municipal Railway's Control Center.

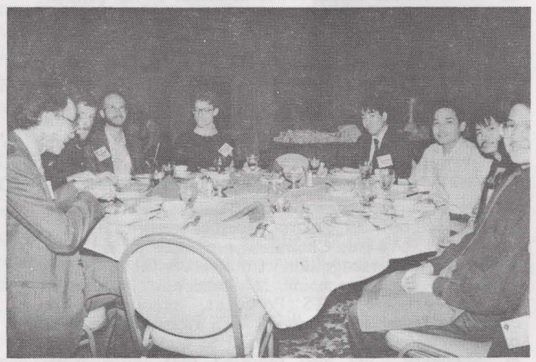
A celebration cocktail party and "very San Francisco" crab cioppino dinner was enjoyed by the VTS '89 Committee and VTS Officers, spouses and guests. It had been a very good technical conference, our principal regret was that we didn't anticipate the demand for Conference Records. We had 800 printed and sold out on the first day! We had hoped for an attendance of 350 to 400 and we had a garage full of past conference records that IEEE Service Center had sent to us to sell. If any of you want to sell your VTS 39th Conference Record, send a not to Frank Thatcher Associates, Inc., Suite 612, 564 Market Street, San Francisco, CA 94104.



Miss Polly Estabrook, graduate student at Stanford University, was session leader for Satellite Mobile Systems II and also presented a paper about her work at the Jet Propulsion Laboratory.

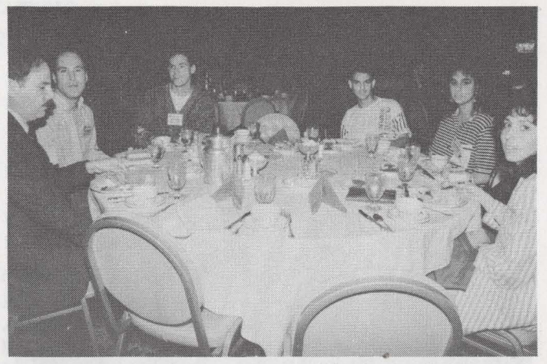
Dr. William (Bill) C. Y. Lee was Chairman of the very well attended panel discussion, "What Are the Major Concerns in Future Digital Cellular?"

Tom Holden, U.C., Davis; Janice Liu and Agnes Yee, City College of San Francisco; Prof. Ted Rappaport and Scott Seidel, Virginia Polytechnic Institute and State University; Harry Bims, Peter Okrah and Rob Ziegler, Stanford University.



Ernst Bonek, Chairman, IEEE Austria Section; Mike Faulkner, Lecturer, Footscray Institute of Technology, Australia; Mats Torkelson and Johnny Svensson, The Lund University, Sweden; Atsushi Fujimoto, Iwatsu Electric Co., Ltd., Japan; Edwin Boongaling and Cassie Ilagan, Frank Thatcher Associates; Reymel Reyes, San Francisco State University.

Wayne Conley, Parviz Yegani, Purdue University; Kumar Sivarajan, Calif. Institute of Technology; Saragwathy Gurunathan, Univ. of Calif., Davis; Dr. Reno Marxheimer, Prof. Electrical Engineering, San Francisco State University; Jiashi Yang and Yanpeng Guo, Univ. of Calif., Davis; Chantelle Cooper, City College of San Francisco.



John Powell, VTS Student's Program Committee; Greg Heinzinger and Paul Jacobs, University of California, Berkeley; Maher Fasheh, Vandana Kaul, Marta L'Italian and Harjit Dhillon of San Jose State University.

Robert Mazzola, Vehicular Technology Liaison; Dr. Takashigi Suijo, Chairman of IEEE VTS Chapter in Tokyo; George McClure, VTS President; Evan Richards, VTS Conference Coordinator.

Dr. Kamilo Feher, Session Leader, adjusting microphone for G. Madhusudhanhana Rao, Andhra University, Visakhapatam, India.

Digital cellular panelists, Bill Lee, PacTel Cellular, Chairman; Jan Uddanfeldt, Ericsson, "The Components View"; and Richard Levine, Northern Telecom, "The Operations/Maintenance View."

Digital cellular panelists, Jesse Russell, AT&T, "The System View"; Dave Sattler, Motorola, "The Transition View"; and Peter Nurse, Novatel, "The Standards View."

May 1, 1989 - Kickoff Lunch
From the left: HOnorable Bill Maher (SF Member Board of Supervisors), Fred Link (VTC Site Selection), Ivy Magsaysay (VTS '89 Secretary and Coordinator), and Frank Thatcher (VTS '89 Conference Chairman).

May 1, 1989 - Kickoff Lunch
Presentation of Certificate of Honor from City and County of San Francisco. Presented by Honorable Bill Maher (SF Member Board of Supervisors) to Frank Thatcher, Conference Chairman.

Al Isberg, Chairman VTS Fellows Committee, presenting Fellow Member Certificate to Dr. Kamilo Feher, University of California, Davis. His citation is: "For contributions to digital communications research and for leadership in applied communication education."

DIGITAL CELLULAR PANEL VTS CONFERENCE

The U.S. Digital Cellular system is developing at a fast pace. This system is targeted for completion by the end of 1990.

At this stage of development, many concerns have been brought up. At the recent VTS conference in San Francisco, a digital cellular panel addressed some of those concerns. We here include a list of the panelists and a brief summary (submitted by the panel member) of their remarks:

Chairman: Dr. William C.Y. Lee

Panelist:	**Discussion:**
William C.Y. Lee (PacTel Cellular)	From the USER'S View
Jesse Russell (AT&T)	From the SYSTEM View (Including ISDN)
Jan Uddenfeldt (Ericsson)	From the COMPONENTS View
Peter W. Nurse (Novatel)	From the STANDARDS View
Dave Sattler (Motorola)	From the TRANSITION View
Richard Levine (Northern Tel)	From the OPERATIONS and MAINTENANCE View

FROM THE USER'S VIEW - William C.Y. Lee

- Operators and end-users
- Big-market operators and small-market operators
- Hill-area markets and flat-area markets
- Mobile users and portable users
- Cell-site equipment and mobile/portable equipment
- Voice users and data users
- Heavy users and light users
- Law enforcement, business and private users

USER PERFORMANCE REQUIREMENTS
(CTIA SUB-COMMITTEE FOR ADVANCED RADIO TECHNOLOGIES)

- 2nd generation life span 1990-1998
- Need a capacity of 10 times by 1998
- C/I = 12 dB
- Availability - The end of 1990
- Quality Performance

  Voice Band: Voice - Same or better than analog, using subjective test
  Data - R=1.2 kbps, BER≤10^{-6}

  Data Band: R=1.2 kbps, BER≤10^{-6}
- Audio Delay - less than 100 ms
- Dual-mode mobile units
- Interface to ISDN
- Delay spread = 20 μs for equalizers

FEATURES

- Alphanumeric display of data
- Voice activated control
- Incoming number display
- Priority access
- Extension phone service
- Lighter portable units
- Encription
- Vehicle location services
- Fraud control
- Imaging service

THE USER'S WISHES

- Please all operators with design parameters
- A workable system with spectral efficiency
- Low cost
- Meet the availability date

FROM THE SYSTEM VIEW (INCLUDING ISDN) - JESSE RUSSELL

Mr. Russell focused his remarks on the keys to the future evolution of cellular telecommunications networks worldwide based on spectrum segmentation, digital cellular technology, and uniform end-user network access standard. He emphasized inoperability between digital cellular networks, and the digital telecommunications network was the key. He also focused on a uniform network interface for the land based and cellular network end-users. The concept proposed by Mr. Russell was based on the ISDN user to network interface for the digital telecommunication networks and cellular ISDN for the future digital cellular telecommunication networks.

FROM THE COMPONENTS VIEW - JAN UDDENFELDT

The complexity of digital cellular for the Pan European GSM and the North-American TIA standard was discussed. It was stressed that a digital system can be made very complex, especially the digital signal processing (DSP). Dual mode handportables are feasible provided that DSP complexity is controlled.

FROM THE STANDARDS VIEW - PETER W. NURSE

Peter Nurse outlined the participation of the FCC, the CTIA and the TIA in the activities towards a Standard for Digital Cellular in the U.S. The FCC has relaxed the rules governing cellular radio in their document 87-390 which paves the way for the introduction of digital technology in the public cellular service. Both the CTIA and the TIA are working closely to ensure that a Standard is in place by year end 1989, which will govern the operation of dual-mode subscriber equipment, the first step in the ongoing transition from analogue to digital technology.

FROM THE TRANSITION VIEW - DAVE SATTLER

To make the transition from analog cellular to the new analog/digital systems as easy and cost effective as possible for operators, manufacturers will design dual mode subscriber terminals, reuse much of the present cell site hardware and upgrade existing switch equipment.

FROM THE OPERATIONS AND MAINTENANCE VIEW - RICHARD LEVINE

The major features of RF Transition to Digital Cellular include selected cells partially equipped with digital mode base transceivers without changing passive RF gear (combiners, antennas, etc.). Capacity improvement is 3x immediately, 6x or more in future. Equipment such as wideband linear power amplifiers and ASIC signal processors will reduce equipment size and increase efficiency. Fully digital signal test facilitates more automatic loopback tests. More versatile and sophisticated signaling will allow new services and reduce fraud, improve voice privacy over radio, and provide better data transport.

Transportation Systems

Bob McKnight
Transportation Systems Editor

High technology makes automatic equipment identification available

Optical wayside interrogators read colored bar codes mounted on vehicles, packages, pallets, etc., to identify them automatically. These systems were developed in the 1960s and a few are still in operation on transit systems. Many reasons are given for these optical systems demise, but suffice it to say that management support for the system where several departments of a company were involved was a key failure-- to get everyone to cooperate on making the system work-- led to the optical system to be replaced by other means. Another major problem was to keep labels clean. Dirty labels reduced accurate reading considerably.

Now, thanks to technological advances, the current systems have electronic tags mounted on vehicles, etc., that do not require any maintenance. Another advantage is the system works well in reverse, that is, the tag can be mounted on the wayside and the reader on a moving vehicle. In this arrangement, the vehicle location can be accurately tracked on a distance basis.

Track defects located

For example, one railroad has tags at milepost locations. It's track inspection vehicle carries a reader. As the vehicle moves along the track it can accurately pin point track defects because it has an accurate check on milepost locations. An axle mounted tachometer provides footage traveled between mileposts.

Applications of Automatic Vehicle Identification (AVI) are almost limitless because the system provides for identifying an object and/or its location.

With tags on vehicles, pallets, containers, trailers, etc., AVI provides:

-- Identity or description of object on which tag is mounted.
-- Date.
-- Location.
-- Direction of travel.
-- Description of contents.
-- Health of motive power unit or vehicle and/or contents.

With tags mounted along a traveled way-- airport runway, highway, railroad or rapid transit right-of-way, and readers on the moving airplane, vehicle such as bus, train, truck, etc., one can monitor or track vehicle location accurately and in real time.

In one application, a rapid transit train carried a reader which read tags in approach to stations which automatically triggered station announcements aboard the train. Simultaneously, station platform signs alerted waiting passengers of the train's approach.

Several other applications come to mind:

-- Vehicle management on which AVI identifies and tracks vehicles for more efficient dispatching, maintenance scheduling, refueling, trip recording, etc.

-- Weighing applications in which AVI readers at weigh-in-motion scales saves waiting in line and provide accurage identity and weight data. AVI can be interfaced with communications and management information systems.

-- For terminal operations, AVI can log vehicles, trailers and containers in and out to identify and monitor them. Also the AVI system can help in directing the tractor operators to the correct parking spaces, docks, etc. For intermodal terminals, AVI has abundant applications.

-- For parking lots, garages, AVI provides monitoring and control.

-- Also, AVI can monitor passage of specific vehicles for express and toll road control. Information for billing can be automatically obtained from AVI identification of vehicles.

-- Fleet and company car control can be more effective with AVI to log vehicles in and out of locations.

-- Hand held AVI tags permit individuals to be monitored for access to restricted areas. Also can be used for temporary control of vehicles by giving the driver

a hand-held AVI tag and knowing the vehicle he is driving. Hand-held tags can be used to provide temporary access for persons or vehicles.

There are at least three of these automatic equipment identification (AEI) or automatic vehicle indentification (AVI) systems now available. All have been tested by various users. The Association of American Railroads has adopted the standard AEI proposed by the International Standards Organization. The ISO standard does allow for the three present system tags (Amtech, Vapor and GRS) to be used. The tags operate at different frequecies, thus ISO does recognize the need for more than one supplier.

One of the three systems is the Identifier, automatic vehicle identification manufactured by General Railway Signal Co.

AVI operation

Two basic units are used in the GRS AVI system: (1) the tag which is the programmable identification device; and (2) the reader which is the micro-processor controlled electronic unit used to process and report the identification code programmed into the tag. Operation is shown in Figure 1.

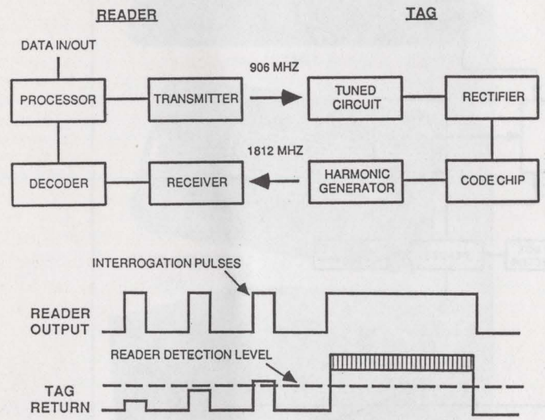


FIGURE 1

Within the reader, the transmitter generates a pulse-modulated 906 MHz carrier that power the tag. This carrier is radiated toward the tag by a directional antenna, interrogation pulses are received by the tag and are passed through a tuned circuit which insures that the tag will respond only to the signal generated by the reader. Within the tag, the carrier signal is rectified to provide a dc power source for the code chip which generates the modulation signal for the harmonic generator. The tag then transmits its programmed identification code back to the reader in the form of an 1812 MHz amplitude-modulated carrier signal.

When the tag return signal is detected by the reader's receiver, the microprocessor switches the transmitter to a steady carrier output signal to provide a sustained power source for the tag. The receiver output signal is passed through a hardware decoder which formats the identification data for use by the microprocessor. Finally, the microprocessor checks the received data for errors and, under software control passes it on to a receiving device through the Data In/Out port.

AVI or AEI crosses oceans

While American President Lines is equipping its containers with AEI tags-- which prompted AAR and others to look into standardization-- the automatic equipment or vehicle identification systems are receiving attention in countries other than in the United States.

Spanish national railways has ordered the GRS AVI system for keeping track of its trains. The order valued at $8.7 million calls for furnishing 2,500 readers and several thousands of tags.

Also, Chicago & North Western Transportation Co. has ordered an AVI system to include 49 readers to be located along its 6,000-mile system to identify it motive power fleet numbering approximately 1,000.

An interesting airport vehicle control and revenue enhancement system is in place at San Francisco's International airport. The problem was to relieve the congestion created by the continuing sweep of hotel and rental car courtesy vans through the airport. Solution was to have each such vehicle carry a GRS AVI tag on the roof of the vehicle and the airport has readers at entrances and exits where the vehicles enter/leave the airport. Instead of a flat fee per month, these vehicles now pay a fee per trip. From $50-100 per month, the fee is now 35¢ per trip. Although the fee is expected to be raised next year to $1, all concerned believe the system to be making more efficient use of vehicles and have brought some relief to traffic congestion. The AVI system is linked to a PC AT where software provides for customer billing and reports on driver activity.

In another application sponsored by the Oregon Department of Transportation, is one in which trucks are equipped with the GRS AVI tags and a reader located at weigh-in-motion scales records identity of the vehicle and its weight. The system benefits, according to state DOT include:

-- Reduce time trucks spend at weigh stations. Trucks can approach the weigh scale at up to 35 mph. If they are under weight, the driver gets a green light and can proceed. If not, he sees a red light and must be weighed on a regular scale.

-- Route trucks more efficiently.

-- Locate missing trucks and cut vehicle theft, as well as having owner not knowing what is being hauled by his tractor, sometimes known as "hot" or unauthorized loads.

-- Provides a cross check on drivers' mileage reports.

The tag contains information about the identity of the vehicle, its number of axles and their distances apart, truck classification, etc., Hooked to the

"electronic reader", information is developed about the speed of the vehicle, location and direction. In another Oregon installation, the readers or interrogators cover all highway lanes on an Interstate highway and record speed of all vehicles passing. This gives a check on those meeting the speed limits of the highway.

AEI/AVI applications limitless

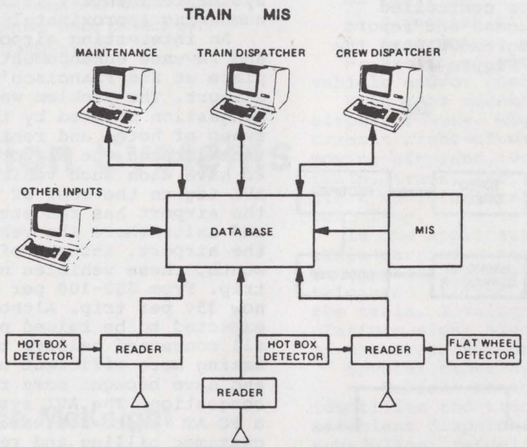
Call it what you will, but as some transportation experts or students of the flow of vehicles will say, if you can identify an object at a specific location and at a specific time, you can control movement of the object.

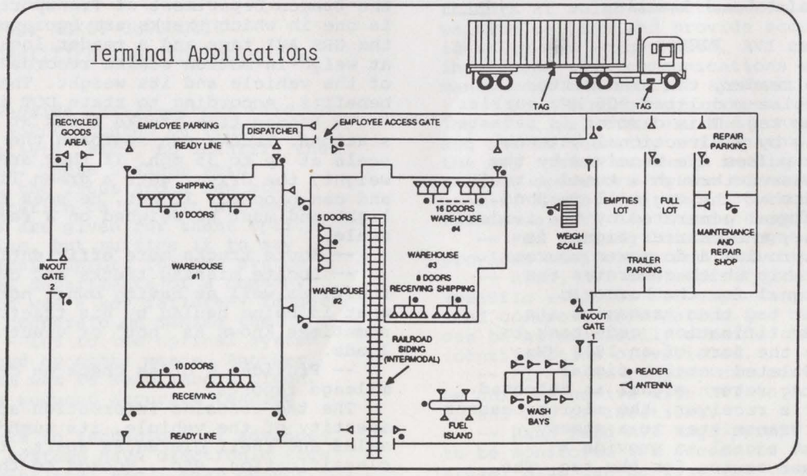
In addition to the "ground borne" systems mentioned in this article, there are at least two "satellite" systems in operation- Rockwell International's ARES (Advanced Railroad Electronics System) and Railstar Control Technology's system. Rockwell uses the Navstar satellites while Railstar uses geostationary satellites (See VTS Newsletter for May 1989). In these satellite systems the vehicle identification is transmitted to the satellite, and thence to a ground station.

Discussion about which system-- satellite or ground system is better is really fruitless- each has its own application advantages and disadvantages. But one thing is sure- object identification is here and technology makes automatic identification an economical and efficient way to operate, especially if the object moves.

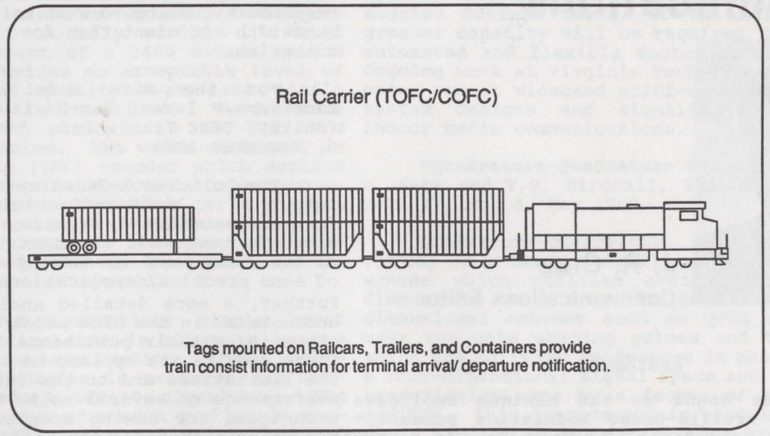
TRAIN MANAGEMENT INFORMATION SYSTEM

Develops Detailed Data Base on Operations





Intermodal Freight Movements



Communications

J. R. Cruz
Communications Editor

ABSTRACTS

"A Lower Bound on the Minimum Euclidean Distance of Trellis-Coded Modulation Schemes," Marc Rouanne, and Daniel J. Costello, Jr., IEEE Trans. Info. Theory, Vol. 34, No. 5, September 1988.

Bandwidth-efficient codes can be used to improve the performance of digital transmission on bandwidth-limited channels such as the telephone channel and band-limited satellite channels. An important class of error-correcting codes suitable for bandwidth-limited channels is referred to as trellis-coded modulation (TCM). Such codes combine a binary convolutional encoder and a modulation scheme. Recently, many good TCM schemes have been found. A lower bound on the minimum free Euclidean distance d_{free} of TCM is derived which guarantees the existence of good TCM codes of any complexity. Lower bounds are often useful design tools for finding good codes. The bound is used to compare trellis codes combined with phase shift keying, pulse amplitude modulation, and quadrature amplitude shift keying modulation. The bound is also compared with known upper bounds. This random coding bound is the first lower bound on the free distance of trellis codes, is tighter than any upper bond for large constraint lengths, and predicts the asymptotic performance of TCM when the complexity of the code becomes large. The bound can be used with any code rate and any modulation scheme and shows that the free distance increases linearly with the constraint length for large values of the constraint length.

"Spectrum, Distance, and Receiver Complexity of Encoded Continuous Phase Modulation," Paul K.M. Ho and Peter J. McLane, IEEE Trans. Info. Theory, Vol. 34, No. 5, September 1988.

A comparison between different classes of encoded continuous phase modulation (CPM) schemes is presented. In terms of joint power-bandwidth performance, it is found that coded eight-level systems are better than coded four-level systems and that partial response signaling is better than full response signaling. In general, the price paid for better performance is increased receiver complexity. Heuristic design rules were used for finding good codes for CPM. In most cases the coding gains found are identical to published results that were generated by exhaustive search. This indicates that our choice of the design rules is quite appropriate. In our study bandwidth efficiency is considered from both the 99-percent and 99.9-percent power bandwidth point of view. For the latter, partial response signaling is even more jointly power and bandwidth efficient than for the former bandwidth criterion.

"On the Rice Model of Noise in FM Receivers," Israel Bar-David and Shlomo Shamai (Shitz), IEEE Trans. Info. Theory , Vol. 34, No. 6, November 1988.

The "click-and-Gaussian-noise" model for the output of a limiter-discriminator receiver for frequency-modulated signals, first proposed by Rice, is reviewed. A short survey is presented of the subsequent research that it generated and of some practical applications that it motivated. Further, a more detailed analysis of parameters encountered in the Rice model is carried out with emphasis on their pertinence to click detection. These results are applied to the understanding of the limitations and to the interpretation of the performance of several noise threshold extension techniques for analog modulations and of error reduction techniques for digital modulations that depend on click detection and elimination.

"Error Rate Performance of Digital FM Mobile Radio with Postdetection Diversity," Fumiyuki Adachi and J. David Parsons, IEEE Trans. Commun., Vol. 37, No. 3, March 1989.

An analysis of bit error rate (BER) in a binary digital FM system with postdetection diversity is presented. Expressions for the average BER due to additive white Gaussian noise (AWGN), random FM noise and delay-spread in the multipath channel are derived for reception using differential demodulation (DD), and frequency demodulation (FD) assuming independent fading signals. Calculated results for MSK show that the BER performance is strongly dependent on the rms-delay to bit duration ratio and that the delay-spectrum shape is of no importance when the receiver predetection filter BT product is optimized for the effect of AWGN.

The effect of fading correlation on the diversity improvement is also analyzed for a two-branch case with multiplicative Rayleigh fading signals. Expressions for the average BER due to AWGN and random FM noise are derived. Calculated results are shown for the average BER due to random FM noise assuming a horizontally spaced antenna system at a mobile station. It is shown that the use of small antenna spacings leads to a diversity improvement greater than that obtainable for the case of independent AWGN.

"Performance of Adaptive Equalization for Indoor Radio Commun.," Reinaldo A. Valenzuela, IEEE Trans. Commun., Vol. 37, No. 3, March 1989.

A time division multiple access system with a QAM point-to-point line strikes the right balance between flexibility and complexity. It will be shown that such a system can support rates of at least 1 Mbit/s. Adaptive equalization is used to ensure that the outage probability is less than 10^{-3} for a target bit error rate of 10^{-4} in buildings with rms delay spread of up to 100 ns.

"Error Correction/Masking for Digital Voice Transmission Over the Land Mobile Satellite System," B. Bryden, G.E. Seguin, J. Conan, V.K. Bhargava and A. Brind' Amour, IEEE Trans. Commun., Vol 37, No. 3, March 1989.

The use of a satellite repeater to extend the range of mobile radio systems requires bandwidth and power efficient transmission techniques in order to be economically viable. In this paper, the development of a 2400 bits/s speech digitizer which provides an acceptable level of intelligibility and quality over land mobile satellite channels is described. Performance tests over simulated channels in the UHF band (800 MHz) are presented. The voice digitizer is a linear prediction (LPC) vocoder which employs a channel error correction and concealment procedure tailored to error statistics for a minimum shift keyed (MSK) downlink to a moving vehicle. The error handling technique is based on perceptual criteria and exploits the parametric nature of LPC representation of speech.

A single error correcting, single burst detecting (28,20) fire code is shown to be the best choice for the application. The intelligibility of the vocoder is measured and compared to the standard LPC-10 algorithm. The major remaining sources of speech quality degradation due to channel errors are determined and ranked.

A General Analysis of Bit Error Probability for Reference-Based BPSK Mobile Data Transmission," A. Bateman, IEEE Trans. Commun., Vol. 37, No. 4, April 1989.

This paper seeks to present a unified analysis of the performance of binary phase shift keying under static and mobile operating conditions, when a separate reference tone is used for channel sounding and subsequent "coherent" data detection. The paper shows that under both Rician and Rayleigh fading conditions, the use of a reference can eliminate the irreducible error rate phenomenon, with minimal sacrifice in BER performance over an ideal BPSK system.

Indoor Radio Communications for Factories of the Future," T.S. Rappaport, IEEE Commun. Magazine, Vol. 27, No. 5, May 1989.

As part of the research mission of the NSF Engineering Research Center for Intelligent Manufacturing Systems, measurement, characterization, and modeling of indoor factory radio channels have been carried out. The work reveals that manmade noise is not a serious problem for indoor factory radio systems at frequencies greater that 1 GHz, and that fading characteristics are highly dependent upon local topography in the workplace. Shadowing data and large scale path loss models have been developed and form the basis for designing reliable narrow-band indoor radio LANs for portable communications and AGV control. Wideband measurements reveal that commercially available technology currently limits data rates to on the order of 150 kb/s in typical factory channels. While this accommodates current needs, it is anticipated that greater capacity will be required for the highly automated and flexible factories of the future. Ongoing work at Virginia Tech is aimed at developing robust wideband multi-access communication system designs and signaling techniques for indoor radio communications.

"Quadrature-Quadrature Phase-Shift Keying," D. Saha and T.G. Birdsall, IEEE Trans. Commun., Vol. 37, No. 5, May 1989.

Quadrature-quadrature phase-shift keying (Q^2PSK) is a new spectrally efficient modulation scheme which utilizes available signal space dimensions in a more efficient way than two-dimensional schemes such as QPSK and MSK. It uses two data shaping pulses and two carriers, which are pairwise quadrature in phase, to create a four-dimensional signal space and increases the transmission rate by a factor of two over QPSK and MSK. This improvement in bandwidth efficiency is similar to the improvement brought by QPSK over BPSK. However, the bit error rate performance depends on the choice of pulse pair.

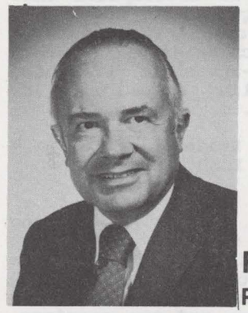
With simple sinusoidal and cosinusoidal data pulses, the E_b/N_o requirement for $P_b(E) = 10^{-5}$ is approximately 1.6 dB higher than that of MSK. Without additional constraints, Q^2PSK does not maintain constant envelope. However, a simple block coding provides a constant envelope. This coded signal substantially outperforms MSK and TFM in bandwidth efficiency. Like MSK, Q^2PSK also has self-clocking and self-synchronizing ability.

An optimum class of pulse shapes for use in Q^2PSK-format is presented. One suboptimum realization achieves the Nyquist rate of 2 bits/s/Hz using binary detection. Duobinary scheme also achieves the same rate but at the cost of three level detection, and hence, more bit energy expenditure.

"A Cellular Mobile Telephone System with Load Sharing--An Enhancement of Directed Retry" J. Karlsson and B. Eklundh, IEEE Trans. Commun., Vol. 37, No. 5, May 1989.

A load sharing facility, which enables subscribers in a mobile telephone system to look for free radio channels in more than one cell, is investigated with respect to blocking probability and channel utilization. Results show that a substantial improvement, compared to other channel allocation techniques, can be achieved. The positive effects are especially dramatic for an asymmetric traffic situation. The improvement is accomplished at the expense of an increased risk of cochannel interference between mobiles.

Professional Activities



Frank E. Lord
Professional Activities Editor

When the Deutsch and Shea Index Is at 100, We're in Trouble

Even though the Deutsch and Shea Index has been promulgated since 1961, its significance is not widely understood. Robert A. Rivers (F), a past member of the Board of Directors, who is currently serving on the IEEE USA Manpower Committee, has been developing methods of forecasting engineering unemployment rates. One of his methods involves a correlation with this index. His presentation which follows not only includes timely information on the present and near future unemployment problem, but some valuable observations on interpreting the Deutsch and Shea Index.

"The Deutsch and Shea Index (also called the High Technology Recruitment Index of HTRI) is a useful predictor of engineering unemployment. Correlation of the bureau of labor statistics engineering unemployment with the index from 6 month previous is now -0.678. The small sample size in the BLS engineering unemployment leads to rather noisy data with a standard deviation of 0.65. Averaging that data would lead to a lower standard deviation, but it would lose its value as a leading indicator. The present correlation leads to the following relationship:

FENUM = 5.416-0.0281*DSHINDX

Where FENUM = the forecast percentage level of engineering unemployment 2 quarters hence.

DSHAINDX = present value of the HTRI

"Misunderstanding of the meaning of the Deutsch and Shea Index is unfortunately widespread due to their having chosen 100 as their starting value and allowing the inference that 100 is "normal". In fact, when the index is at 100 we are dislocating a significant number of engineers.

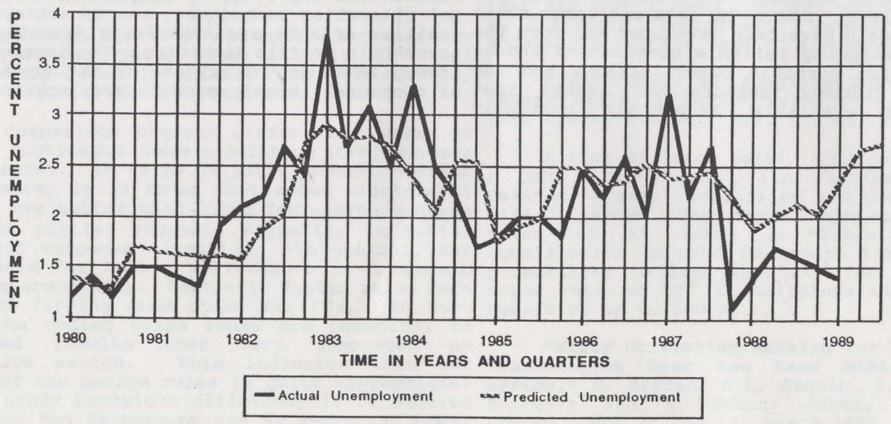
"Reviewing the expression, it is obvious that zero unemployment theoretically would occur when the index is at 192. Historically, the full employment period from 1966 to 1969 had an average unemployment rate of 0.6%. Practical full employment is thus at an index value of 164. When the index value is at 100 as at the present, unemployment should be registering 2.6%, a value that usually indicates significant dislocation.

"In the first quarter of 1983 we had an unemployment value of 3.8% and a 2 quarters previous index value of 89. A crude analysis of the effect on new graduates indicates that an extra 15% of the class of 1983 were permanently lost from the profession. While that is only about 10,000 engineers, it is significant.

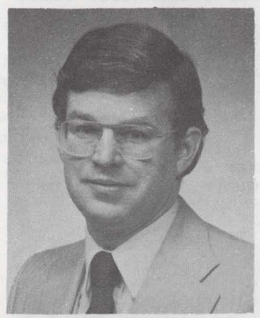
"During that same recession, engineering employment did not grow. The average growth rate of engineering employment during the 80's is 47.4 thousand per year. Total dislocation during that year was thus in the 50,000 range with 10,000 of those being new graduates that have not reentered as of 1989.

"Summarizing then, a Deutsch and Shea Index at 100 or below indicates serious dislocation. Full employment is at a level of 162 on the index. The highest level of demand was experienced in 1980 with an index of 146 and an unemployment level of 1.2%. Figure 1 shows FENUM, the forecast unemployment from the above expression. There is no need to show the index since FENUM is linearly related by the above expression."

6 MONTH FORECAST OF ENGINEERING UNEMPLOYMENT



Vehicular Electronics



Bill Fleming
Vehicular Electronics Editor

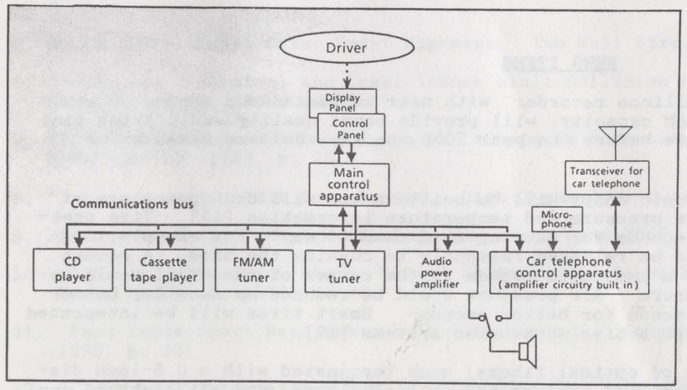
INTERIOR ELECTRONICS -- THE HOTTEST FIELD IN AUTOMOTIVE ELECTRONICS

Interior electronics is the hottest, and most profitable, field in automotive electronics [1]. For example, future climate control systems, under development at Delco Electronics, will feature up to four comfort zones. Body temperatures of each of up to four occupants will be individually measured via infrared sensors, and a comfort level (temperature) associated with each occupant will be "learned." Thereafter, by means of closed loop control, each of four different climate-control zones will be automatically maintained at separate, individually selected, comfort levels [1].

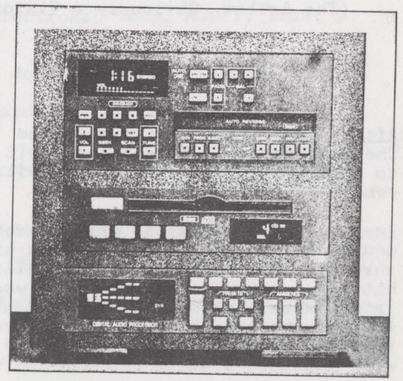
Lots of new things are coming in audio systems. Delco Electronics is developing audio systems that "quiet" the car interior using anti-noise (noise cancellation) methods described previously in this Newsletter [2]. Microphones in seatbacks detect offending noise, and through the use of existing audio system speakers, an inverse audio wave is created that cancels the noisy sound at occupant ear-level. Noise silencing created by this system is said to be dramatic [1]. Moreover, the combination of compact disc with digital signal processing and ambience control creates "concert hall sound," accurate in every reverberated acoustic detail, inside an automobile [1].

Not to be out done, Toyota announced a new top-of-the-line communications option that for $1,638 includes: AM/FM/CD/cassette deck/DAT/TV tuner/cellular phone/videocassette features [3]. Then there's Pioneer's installation of a 2440-watt, 24-speaker, $10,000, ultimate sound system in a $295,000 Porsche Gemballa -- only available in Japan [4].

(I don't know about you, but I'm getting a headache just thinking about a 2440-watt stereo in my Porsche -- I imagine my 13-year old son blowing out the speakers with his Def Leopard and Poison CDs. Who buys this stuff anyhow? One answer: people with the mind-set of a 13-year old).



Toyota/Matsushita $1,638 In-Car Entertainment/Communication System Schematic Diagram [3]



Delco Electronics Digital-Signal-Processing Ambience-Control CD Audio System [1]

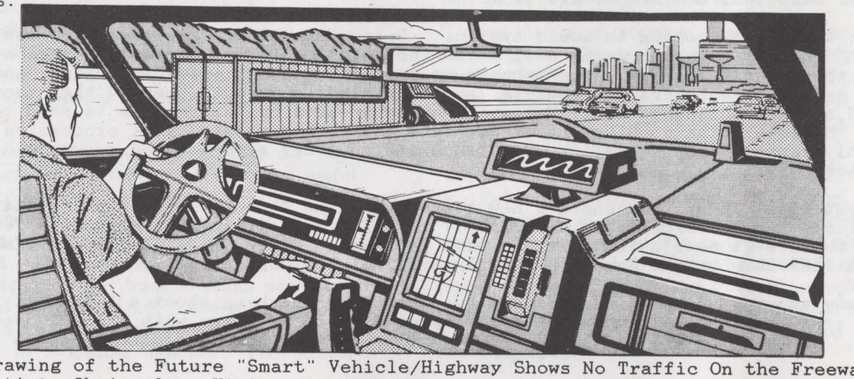
SMART CARS, SMART HIGHWAYS

"Smart" cars running on "smart" highways will whisk drivers (or should I say passengers, since everyone would simply be a passenger) between cities at hundreds of miles per hour, and then let the driver take control on local streets [5]. "Smart" highway systems include road sensors and other equipment to guide authorities and drivers in an effort to keep traffic flowing smoothly and safely. Spurred by ever-worsening traffic congestion, systems are now being tested in California, Europe, and Japan. "Smart" cars and highways could become a reality within 25 years.

Such dream transportation will be enormously expensive. Huge investments will have to made in four major areas [5]: (1) vehicular electronic navigation systems, (2) large-scale traffic control centers, (3) two-way communications between vehicles and control centers, and (4) reliable road sensors to detect traffic speed and flow.

As a first step in proving out the "smart" car concept, and as part of California's Program For Advanced Technology for the Highway (PATH); radar "platooning" or "station-keeping" of vehicles on a San Diego freeway will commence this coming September [5]. On special lanes (the inside car-pool lanes), forward-looking radars will electronically lock onto platoon-member vehicles ahead, and maintain a constant speed and safe vehicle spacing. The goal of PATH, directed by the University of California, Berkeley, is to improve traffic flow and safety by eliminating stop-and-go congestion.

Other related types of systems, particularly those for vehicular Collision Avoidance (C-A), have also recently been in the news [6-8]. Basic C-A systems simply provide an alarm signal that a collision is coming, whereas advanced C-A systems also apply braking [6,7]. The fundamental problem with all systems is false alarms. For example, acoustic signals are sensitive to wind, optical laser beams are blinded in fog and by dusk/dawn sunlight conditions, and radar picks up return signals from nonhazardous objects. Even if only the basic C-A alarm warning function were provided, it is thought that the alarm in some cases would only add stress and would paralyze some drivers into inaction when heading into an accident [6]. Therefore, considerably more development work remains to be done in this area of automotive electronics.



This Drawing of the Future "Smart" Vehicle/Highway Shows No Traffic On the Freeway [5] (The Artist, Obviously a Visionary, Made Future Traffic Almost Nonexistent)

NEWS ITEMS

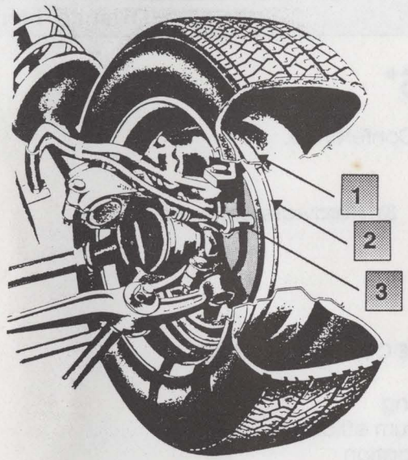
After compact disc, will come the "silicon recorder" with near instantaneous random access. The recorder will have a 4-gigabit RAM capacity, will provide equal quality and playing time to a current CD, and will be available before the year 2000, so says Heitaro Nakajima, a senior Sony executive [9].

Smart tires are coming, where electronic chips will be built in and will draw power via rf coupling, and will transmit back tire pressure and temperature information [10]. Tire pressure will be "adjusted within milliseconds for varying road conditions." For example, upon hitting a pothole, air pressure would be released instantly to cushion the blow. A moment later, when back on smooth pavement, a pneumatic system in the center of the wheel would re-inflate the tire back to normal pressure. Air pressure would be reduced on snow for better traction, and increased at highway speeds for better economy. Smart tires will be integrated with Antiskid Braking Systems and with active suspension systems [10].

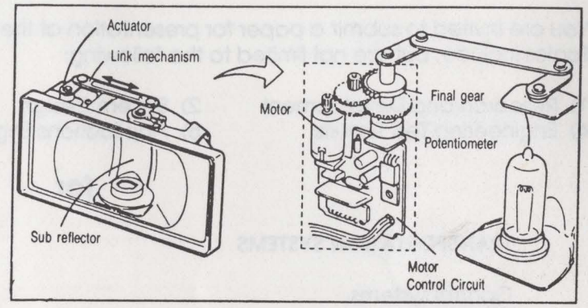
Smart headlights consist of clusters of optical fibers, each terminated with a 0.5-inch diameter lens. Lenses focus light transmitted through the optical fibers, and all light is supplied by a central remote light source. A composite (ensemble) light beam is programmed to provide either high or low intensities, in addition to a fog beam -- all without special filaments. Electronically controlled shutters distribute light to the fibers depending on the

light setting selected by the driver [11]. Fiber optic lighting will also offer space savings over conventional lamps.

"Another EMI Incident" -- Remember the cover of Interference Control Technology's latest catalog (about 8 months ago), showing an alarming illustration of a car in mid-air careening through a guard rail and going over a cliff? NHTSA states that of 100 active auto crash investigations, none are associated with electrical interference. Furthermore, as for unintended vehicle accelerations, "EMI was checked out extensively as a possible cause, and there have been no indications at all that EMI is a factor." NHTSA states further that, "EMI is a well known source of potential problems, so auto manufacturers do a good job of designing to avoid problems" [12].



Smart Tire Includes: (1) Temperature and Pressure Electronic Sensors, (2) Circular Rotating-Wheel rf-Antenna, and (3) Stationary Chassis rf-Antenna [10].



The Steerable Fog-Light by Koito Includes A Subsidiary Reflector That Swings In Relation To The Main Reflector [13] -- (What every Rube Goldberg always wanted to build).

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