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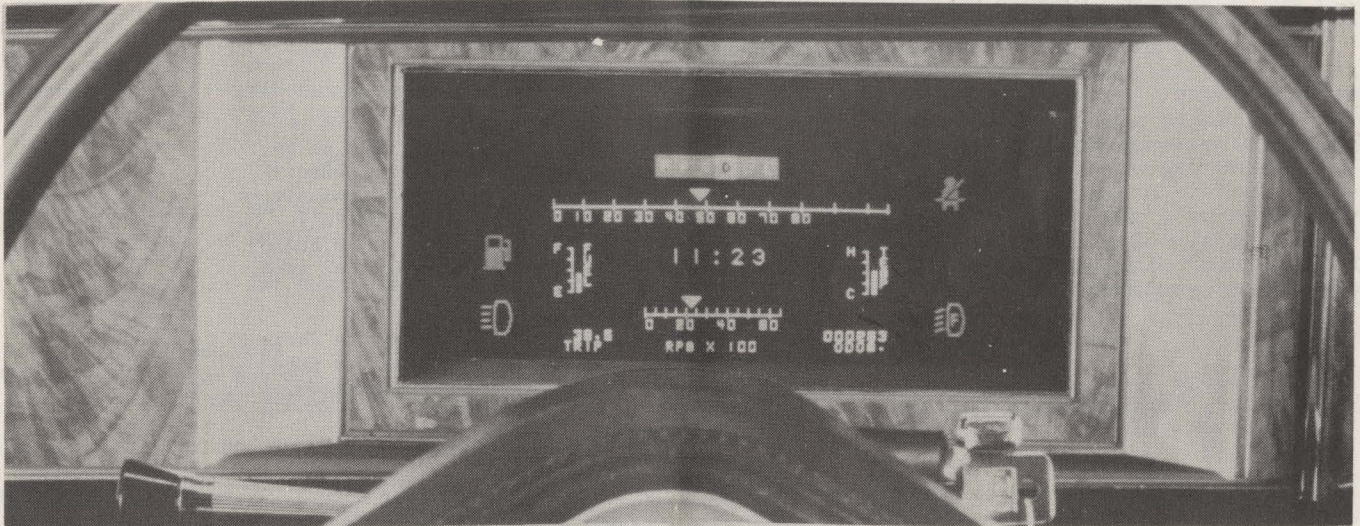
VEHICULAR TECHNOLOGY SOCIETY

NEWSLETTER

Editor: A. Kent Johnson

Vol. 28, No. 2, May 1981

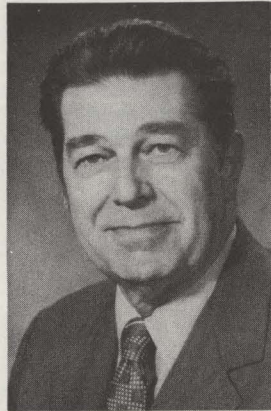
(ISSN 0161-7887)



**Instrument Panel Display Using a Vehicular Cathode Ray Tube
See Automotive Electronics**

7-880-8786

1588466 SM	O&N	***
ROGER D MADDEN		JUN11
8805 STEWART ST		VA 22015
BURKE		



President's Message

Stuart F. Meyer
President
IEEE Vehicular Technology Society

We have just concluded another Annual Vehicular Technology Conference - Our 31st - this year held in Washington, D.C. All reports indicate that it was another excellent meeting and the Washington, D.C. Chapter is to be commended for its dedication and superior performance.

On another page of this newsletter you will see a nominations message from Roger Madden. Please give this matter your careful consideration. The Society needs the help and guidance of many of you within our ranks and YOU need the Society. To those of you who are not in a position to serve at the National level, why not get more involved with your local chapter. These groups provide an excellent opportunity for you to supplement your career with a meaningful self-improvement program.

Our local chapters need increasingly higher levels of activity, both to provide opportunities for members to become more involved, as well as to attract new members. This can be accomplished by building a supplemental "meeting notice" mailing list from the many names in individual communities who are known to have an interest in matters pertaining to our Society. While secretary of the Washington D.C. Chapter, I had no trouble in building such a list which equaled the number of IEEE-VTS members in that area. This approach made a noticeable difference in our attendance.

I have been discussing the matter of increased Awards activity with Jack Neubauer (our awards chairman) and you will be reading more on this subject in the next issue of our Newsletter. If you have any suggestions, please feel free to drop him a line.

Stuart F. Meyer

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August	6-09-81	7-13-81
November	9-15-81	10-20-81
February	12-14-81	1-18-82
May	3-9-82	4-13-82

* Inputs for newsletter staff editors should be received by newsletter editor 1 to 2 weeks before these dates.

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Editor's Notes



A. Kent Johnson
Newsletter Editor

This past quarter has been an exciting one for members of the Vehicular Technology Society. We have just completed our very successful 31st annual conference at the Capital Hilton in Washington D.C. We take this opportunity to commend Stuart Meyer and his capable staff for a job well done. There were many fine exhibits available and many very interesting technical papers were presented.

Cellular technology was highlighted both in the exhibit area and in several of the technical presentations. Then almost as though it were planned as a fitting conclusion to our conference the FCC met on April 9 to give final approval to rules establishing cellular mobile telephone service. By so doing they agreed to begin licensing cellular systems throughout the country. This is an action long anticipated by many of our society members and one that is expected to have substantial impact on many of our activities in the years ahead.

We again thank those who helped make our week in Washington a successful one. Scenes from the conference are found throughout this newsletter and we thank Sam McConoughey for providing these pictures since our own camera failed us.

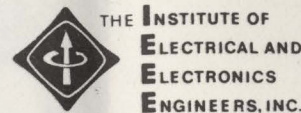
Call for Nominations

Each year nominations are received for candidates for election to the Board of Directors. Each year five members of the Board of Directors are elected for a three year term. Candidates for nominations are selected by the Nominating Committee and by Petition of the General Membership. At this time we are requesting suggestions from the General Membership as to appropriate candidates for nomination.

Please send your suggestions of a candidate to me at the following address:

Roger D. Madden
2025 M Street, N.W.
Room 5322
Washington, D.C. 20554

In addition to identifying the candidate it would be useful to have their address and telephone number for contact purposes.



32nd VEHICULAR TECHNOLOGY CONFERENCE
SAN DIEGO, CALIFORNIA MAY 23-26, 1982

CALL FOR PAPERS

Authors are invited to submit 500-word abstracts
for proposed papers on the following subjects:

COMMUNICATIONS

. . . including Land Mobile and Personal Communications

TRANSPORTATION

. . . including Automated Vehicles, AVM, Traffic Analysis,
and Rail Rapid Transit Control Technology

AUTOMOTIVE ELECTRONICS

. . . including Electric & Hybrid Vehicles, Engine and Vehicle
Control Systems, Transducers and Instrumentation,
Automotive EMC, Microprocessor Applications, and
Collision Avoidance and Safety Systems

HIGHWAY ELECTRONICS

. . . including Traffic Monitoring and/or Control, Driver
Information Systems, Motorist Aid Systems, and Automated
Highways

SUBMISSION

Abstracts for proposed papers falling into the above broad
categories should be submitted to:

Tom Rubinstein
Motorola C & E, Inc.
P.O. Box 85036
San Diego CA 92138

Abstracts must be received not later than **SEPT. 15, 1981**

Board of Directors Report

Samuel A. Leslie
VTS Secretary

George F. McClure
Guest Secretary

Board of Directors Report

ROLL CALL

The first board meeting of 1981 was called to order at 12:45 PM on April 8, by President Stu Meyer. There were 8 elected members (out of the total of 15 elected) among the 21 present.

MINUTES OF LAST MEETING

Roger Madden moved, Bob Fenton seconded, that the minutes of the last meeting be accepted. The vote in favor was unanimous. George McClure reported that Virginia Edgerton has requested that her name not be part of the reorganization committee. This change was made. Fred Link complimented Sam Leslie on the completeness of the minutes that he has provided of the board meetings.

CONFERENCE ACTIVITY REPORTS

Stu Meyer reported a total of about 300 paid registrations for the 1981 conference in Washington, held concurrently with this meeting. Some 60 papers were presented and there were 15 exhibitors. Owing to late receipt of some papers from the authors, the conference record will be printed following the conference and mailed to attendees.

A report on the 1982 conference, to be held in San Diego, was given by Tom Rubinstein, program chairman. The program committee also includes Dick Miller, Communications; Vince Esposito, Automotive Electronics; and Dave Turner, Transportation. Eddie Simon is the general chairman. The location will be the Town and Country Hotel, on Hotel Circle. Dates are May 23-26, 1982. President Stu Meyer plans a trip to San Diego to meet with the conference committee. An effort will be made to sign up exhibitors during Mobile Radio Week in Denver, June 1-5, as suggested by Fred Link.

The Toronto Chapter had been invited by Al Goldstein, National Meetings Committee, to propose hosting the 1983 conference. C. Vinodrai was present to present the proposal. Also on the organizing committee are Walter Solo and Dale Moreland. Two Toronto hotels and the Convention Bureau have been contacted. A May date is planned, close to the Canadian RCC meeting date. Fred Link requested that a firm proposal from the Toronto group be presented at the June board meeting. Madden moved, Fenton seconded, that the Toronto location be approved for the 1983 conference. The motion passed without dissent.

For the 1984 conference, a southwest location was suggested. Fred Link mentioned the desirability of Houston as a location. Madden moved, McConoughey seconded, that Link's Meetings Committee explore a southwest location. The motion passed.

Jack Neubauer suggested that the 1985 conference be located in St. Louis, with the APCO meeting.

FINANCE REPORT

Dave Talley reported that, assuming an income from meetings of \$30,000, the budget of VTS for 1980 will show a \$9900 loss. Administration expenses for 1980 were \$13,400, rather than the \$3000 budgeted. The overrun was caused by payment of travel expenses for the President and some other board members on VTS business. The share of the surplus due VTS from CONVERGENCE '80 has not yet been received. Past Treasurer Bill Chriss of VTS had delayed closing his books to receive this payment, but he has been instructed to complete the close-out and pass the VTS books to Treasurer Bob Fenton. Fred Link will assist in completing this action. In addition to an estimated \$25,000 surplus payment from CONVERGENCE '80, VTS will receive repayment of its cash advance of \$8,000.

Dave Talley's report shows that net worth for VTS fell from \$42,500 in January 1980 to \$32,600 in January 1981 (assuming repayment of outstanding loans totaling \$9250 for the 1980 and 1981 conferences). Talley offered his assistance on a continuing basis to the new treasurer.

McConoughey suggested an agenda item to consider travel costs and how to work around them; in view of reduced travel budgets available to some board members. Meyer requested that McConoughey provide a written report on this subject for the next board meeting. Madden noted that VTS has some of its funds in a IEEE short-term investment account. Neubauer noted that there are four current honorary members of VTS. Talley commented that these do not show in data from Headquarters. Fenton moved to accept Talley's report, with a footnote to show the amount due from CONVERGENCE '80; McClure seconded. The motion passed.

OTHER CONFERENCE PARTICIPATION

Talley reported that VTS could participate in the Global Communications Conference to be held in Bal Harbour, Florida, November 29-December 3, 1982. Madden moved to have VTS sponsor at least one technical session; Ron Rule seconded. The motion passed.

AWARDS

Neubauer reported that the two papers receiving awards at this conference will be submitted for the competitions for the Browder Thompson and W.R.G. Baker field awards. For the Chapter-of-the-Year award, Neubauer moved, Madden seconded, that up to \$500 be allocated for a pass-along award to be held by the winning chapter for a year, to include cost of a certificate and plaque for the chairman of the winning chapter, and that up to \$100 per year be authorized for a plaque and certificate for future winning chapter chairmen. The motion passed.

Motions were made and tabled dealing with setting amounts of monetary awards for prize papers. Neubauer will check practices of other societies and report back to the board.

An award for the best paper presented at a Chapter meeting during the year, \$100, has never been awarded, although it has been available for 20 years. It would be awarded on the basis of an oral recommendation from the chapters. Neubauer will check with the chapters on their views of the value of this award and report back.

Neubauer noted that VTS has an honorary life member award for "One who has made a significant technical contribution or performed outstanding service to the Society." Madden moved, Link seconded, that Robert E. Tall be selected for this honor. The motion passed unanimously. A motion on a second nomination was tabled.

Ron Rule noted that the Avant Garde award requires that, to be considered, a member must have 20 years of experience. While that may be reasonable for a member in the communications field, no automotive electronics or transportation system have such longevity in their fields. Link suggested that a "Hall of Fame" be established to recognize such worthy members. Neubauer made a motion for this, seconded by Madden, that passed. Avant Garde will be continued also.

Al Goldstein reported on progress toward the Dan Noble Award, a planned scholarship award. Dr. Irv Engleson at IEEE Headquarters has supplied sample forms used with the Fortesque Scholarship, sponsored by the Power Engineering Society and Westinghouse. Goldstein and Neubauer will prepare a plan for the next board meeting to include 1) cost, 2) investment method and return, 3) method of selection of students to receive award, 4) composition of selection committee, and 5) means for making the award perpetual.

NOMINATIONS

Roger Madden reported that five board members have agreed to stand for election again and that there are 9 probable candidates for a 1982-85 term. Biography forms are being distributed to candidates and Madden expects to mail a package of biographies for all candidates to Headquarters by May 15. Others interested in standing for election should contact Madden.

CHAPTER ACTIVITIES REPORT

McConoughey moved and Madden seconded a motion that the Chapter Report be accepted, subject to clarification on the number of meetings held by the Cleveland chapter (8 or 9). The motion passed without dissent.

REORGANIZATION

Bob Fenton reported that the reorganization plan is to be modified and considered again at the June board meeting. The revision will be distributed with the minutes. Madden suggested that the board activate the Constitution and Bylaws committee. The most recent copy of VT Constitution and Bylaws on file at Headquarters is dated October 1969, Neubauer noted. Madden suggested Dr. Art Goldsmith be appointed to prepare an update (he wrote the Constitution and Bylaws for the Engineering Management Society). Meyer will contact Goldsmith about this.

NEXT MEETING

The next board meeting will be held in Chicago on June 18, following IOC in Denver. The Executive Committee will meet starting at 7:30 AM, with the board meeting to start at 10:00 AM to discuss the reorganization before lunch, and other items to be considered in the afternoon. The tentative location is the Arlington Park Hilton.

ATTENDANCE AT BOARD OF DIRECTORS MEETING

Stuart Meyer	President
Robert Fenton	Treasurer
Roger Madden	Jr. Past President
Fred Link	National Meetings Chmn.
Al Goldstein	1982 Conference Coordinator
Sam McConoughey	Chapter Activities Chmn.
David Talley	Financial Sdvisor
Ronald Rule	Education Committee
James Mikulski	VTS Rep., CSIT
Kent Johnson	Newsletter Editor
Bill Lee	Communications Editor, Trans.
George McClure	Transactions Editor
Jack Neubauer	Awards Chairman
Dave Place	Chairman, Cleveland VT Chapter
Neal Pike	Chairman, Washington VT Chapter
Tom Rubenstein	1982 Conference Committee
Gaspar Messina	1981 Conference Committee
Art Goldsmith	1981 Conference Committee
Dave Reid	Toronto VT Chapter
C. Vinodrai	Toronto Conference Committee
George Dewire	1981 Conference Committee

ADJOURNMENT

The meeting was adjourned at 4:00 PM.

Respectfully submitted,

George F. McClure

George F. McClure for
Samuel A. Leslie
IEEE-VTS Secretary

URSI XXth General Assembly
Washington, D.C.
August 10-19, 1981

The International Union of Radio Science (URSI) meets for its General Assembly once every three years. The last General Assembly held in the United States was 24 years ago. A very extensive program (including more than 500 papers from all over the world) is planned for Washington, DC, August 10-19, 1981, presenting many original contributions in electromagnetics and electronics. For further details and registration material, please write to:

Mr. R.Y. Dow
Organizing Committee for URSI XX G.A.
National Academy of Sciences
2101 Constitution Avenue, N.W.
Washington, DC 20418

REQUEST CARD

Please send me details and registration material for the XXth General Assembly of URSI.

Name: _____

Address: _____

Please print or type.

1981 IEEE Vehicular Technology Society Directory of Chapters and Chairpersons

As of April 1981

BOSTON	Stuart J. Lipoff Arthur D. Little Inc. Cambridge, MA 02140 (617) 864-5770	LOS ANGELES	Mr. Gary David Gray Chairman '80-'81 Orange County Communications 481 The City Drive South Orange, California 92668 Tel. (714) 834-2137
CANTON	C. T. Unger 3759 Crestwood Drive, NW Canton, OH 44708 (216) 477-5918	MIAMI	Curtis C. Whitney 11000 SW 134 Terrace Miami, FL 33176 (305) 263-3715
CHICAGO	Steve Schnayer Motorola, Inc. 1301 Algonquin Rd. Schaumburg, IL 60195 (312) 576-6345	MICHIGAN, SE	Louis L. Nagy 2528 Irma Wareen, MI 48092
CINCINNATI-Dayton	Fredrick R. Bay 7378 Commonwealth Drive Cincinnati, OH 45224 (513) 761-8678	NEBRASKA	None
CLEVELAND	Mr. David C. Claes Chairman '80-'81 Ohio Edison Co. 76 South Main Street Akron, Ohio 44308 Tel. (216) 384-5658	ORLANDO	Melvin C. Kelch 3118 Ivel Drive Orlando, FL 32806
COLUMBUS	Al Shirk 184 Crandall Drive Worthington, OH 43085	NEW YORK CITY	W. C. Y. Lee 492 Brentwood Drive Willow Grove, PA 19090
DALLAS	J. S. Stover 4025 Druid Lane Dallas, TX 75205	PITTSBURGH	Thomas J. Hutton 222 W. Swissvale Avenue Pittsburgh, PA 15218 (412) 621-1609
DENVER	Bill Whipkey 8069 Meade Street Westminster, CO 80030 (303) 427-2411 (Residence) (303) 779-0600 (Office)	SACRAMENTO	Alfred E. Jacobus 2804 Chad Court Sacramento, CA 95827 (916) 445-8803
FLORIDA-WEST COAST	Acting Chairman William C. Prickett General Telephone Company of Florida 610 Morgan Street Mail Code 66 Tampa, FL 33601 (813) 229-6850 Ext. 2873	SAN FRANCISCO BAY	Terrence J. Ung SRI International 333 Ravenwood Avenue Menlow Park, CA 94025 (415) 326-6200 Ext. 2238
		SYRACUSE	None

WASHINGTON, D.C.

Mr. Neal Pike
Federal Communications
Commission
Room 5120
1919 M St. N.W.
Washington, D.C. 20554
(202) 632-7597

TORONTO

Dale Moreland
Canadian General Electric Co.
Mobile Radio Dept.
100 Wingold Ave
Toronto, Ontario, Canada M6B, 1R2

MONTREAL

None

VANCOUVER

Alex R. Howatson
902 Fourth Street
New Westminster, BC
Canada V3L 2W6

TOKYO, JAPAN

Dr. Marlo Akiyama
Kogakuin University
1-24-2 Nishi-Shinjuku
Tokyo, 191, Japan



Sam McConoughey
Chapter News Editor

Chapter News

MEETINGS

Cleveland

"A History and the Future of Cable TV"
by Mr. John Secrest, Cleveland Area TV
Held on October 21, 1980
With attendance to be reported later.

"Citizens Radio Communications--Then, Now, and Future"
by Mr. Al Gross, Sr. Systems Engineer, Parsons Peebles Electrical Products, Inc.
Held on November 11, 1980
With 20 attending, including 6 guests.

"Impact on Broadcast Radio Service of a 345 kV Transmission Line"
by Mr. David C. Claes, Senior Engineer, Ohio Edison
Held on December 9, 1980
With 21 attending, including 4 guests.

"Is Our Regulatory System Outmoded?"
by Mr. Charles Higginbotham, Consultant and VTS Speaker-of-the-Year
Held on January 13, 1981
With 18 attending, including 6 guests.

"Antenna Design Compromises"
by Mr. Randall J. Friedberg, Vice President, Antenna, Inc.
Held on February 10, 1981
With 17 attending, including 5 guests.

New Jersey Coast

"Use of an Improved Stripline to Generate High Intensity Fields for Radiated Susceptibility Testing"
by American Electronics Laboratory
Held on January 21, 1981
Attendance not reported.

"Modern Facilities for Electromagnetic Emission and Susceptibility Testing and Research"
A field trip to the Bell Labs EMI Lab.
Held on March 25, 1981
Attendance not reported.

Washington, D.C.

"The History of Land Mobile Radio"
by Mr. Stuart Meyer, E.F. Johnson Co.
Held on December 12, 1980
With 29 attending, including 4 guests.

"Voice Privacy and the FBI"
by Dr. Francis P. Pantuso, Federal Bureau of Investigation
Held on January 16, 1981
With 42 attending, including 15 guests.

"The FCC--Some Musings"
by Acting Chairman, Robert E. Lee, Federal Communications Commission and Fellow, Radio Club of America
Held on February 5, 1981
With 61 attending, including 26 guests.

"The History of Land Mobile, Part II"
by Mr. Stuart Meyer, E.F. Johnson Co.
Held on March 20, 1981
With 19 attending, including 3 guests.

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ELECTION RESULTS

Chicago

Mr. Steve Schnayer, Chairman
Motorola, Inc.
1301 Algonquin Rd.
Schaumburg, IL. 60195
312-576 6345

Toronto

Mr. Dale Moreland, Chairman
Canadian General Electric Co., Mobile Radio Dept.
100 Wingold Ave.
Toronto, Ontario, Canada M6B,1R2

CHAPTER OF THE YEAR

The VTS Chapter of the Year Award goes to the Washington, D.C. Chapter for the Sept.79-Aug.80 season. Congratulations to Mr. Manuel Mayobre, Chairman and his staff. The season attendance, 153. Cleveland and the San Francisco Bay Area ran a close second and third followed by NJ Coast. The New Jersey Coast Chapter, joint with EMC for an unprecedented third time in the past four years won the EMC Society Chapter of the Year Award. Congratulations!

SPEAKERS OF THE YEAR

We are pleased to announce that Dr. Robert E. Fenton, Director of the Transportation Control Laboratory at Ohio State University has agreed to serve as one of our speakers. Bob is a Senior Member of the IEEE and is also currently Treasurer of the Society. Chapter Program Chairpersons contact Bob directly to make arrangements for him to speak at one of your next meetings. Remember, the VTS picks up the tab for the travel of our speakers to your city. The local chapter picks up the tab for local living expenses and transportation. Listed below is Bob's address and an abstract of his talk.

ABSTRACT

FUTURE GROUND TRANSPORTATION SYSTEMS

Dr. Robert E. Fenton

The Ohio State University
Department of Electrical Engineering
2015 Neil Avenue
Columbus, Ohio 43210
Phone: 614 422-2572

The need for major improvements in our Nation's ground transportation network is plainly evident from an evaluation of both our current and projected future transportation needs. One attractive approach toward meeting at least some of these needs is the automation of various facets of ground transportation. This would include central-business-district circulation systems, urban roadway networks, and intercity highways.

The status of research and development for the first two of these facets will be overviewed with an emphasis on the required command and control systems. Then the third, the intercity automated highway, will be examined in detail with an emphasis on both some possible command and control configurations and an overview of ongoing research activities which have been focused on the design, implementation, and field evaluation of both automatic (hands off) steering systems and those for automatic longitudinal (velocity and position) control of individual automobiles. The talk will be concluded with an assessment of future directions in these areas.

And in addition to Dr. Fenton, don't forget we have three other speakers: Charlie Higginbotham, Fred Link and Jerry Stover. (See the February 1981 issue of the Newsletter for details.) That's four meeting programs already taken care of for you!

WARC SYMPOSIUM

New York City Chapter organized and held a two day symposium, jointly sponsored by the AIAA on the World Administrative Radio Conferences held in Geneva in 1979. Organized by Dr. William C.Y. Lee, and held on January 26 and 27, 1981, the symposium was divided into three sessions chaired by Mr. Stephen Doyle, OTA, Mr. Howard White, Sr. V.P. of I.T.&T., and Marvin Robinson, Director, United Nations, respectively. The keynote address was given by Mr. Kalman Schaefer of the FCC.

NEW CHAPTER?

SAN DIEGO?

We understand that there is some interest in starting a new chapter in San Diego. Readers from that area should get together and send in a petition. Perhaps Tom Rubenstein can help? As a former VTS Chapter Chairperson from Los Angeles, he can tell you how....why not contact him now? (Our thanks to Al Goldstein for the tip. Really, San Diego, you wouldn't want to be the host city for the VTS-32 without having a Chapter would you?)

31st ANNUAL VTS CONFERENCE

At this writing, the 31st Annual Conference is underway. From all indications it appears highly successful. A detailed report will appear in the Newsletter at a later date.

IEEE VTS FELLOWS

Our congratulations to George McClure of the Orlando Chapter and Dr. Hiroshi Sakai of the Tokyo Chapter on their elevation to the status of a Fellow in the Institute.

-30-

Sam McConoughey, Editor
Gaspar Messina, Staff

Communications

Tom Rubinstein
Communications Editor

CSPM

Many of you sent me letters regarding my November article. Most of those letters were requests for the reference list, which I inadvertently omitted. Some of the letters were more detailed, and most interesting. The reference list is immediately below. I will attempt to find space to print some of the more interesting letters in a future issue.

REFERENCES

1. Jennings, R.D. and S.J. Paulson, Communications System Performance Model for VHF and Higher Frequencies, OT Report 77-128. (NTIS Access No. PB 274 458).
2. Okumura, Y. et al., "Field Strength and Its Variability in VHF and UHF Land-Mobile Radio Service", Review of the Electrical Communication Laboratory, Volume 16, No. 9-10, Sept-Oct, 1968.
3. Longley, A.G., Location Variability of Transmission Loss - Land Mobile and Broadcast Systems, OT Report 76-87. (NTIS Access No. PB 254 472).
4. Longley, A.G. and P.L. Rice, Prediction of Tropospheric Radio Transmission Loss Over Irregular Terrain, A Computer Method - 1968, ESSA Tech. Rpt ERL 79-ITS67 (NTIS Access No. 676-874).
5. User Guide to Digital Elevation Models (Produced on GPM-II), U.S. Department of the Interior, Geological Survey, National Cartographic Information Center, 1980.
6. Resampled Digital Elevation Model Data, U.S. Department of the Interior, Geological Survey, National Cartographic Information Center, 1980.

ACSB

The FCC has recently released a Notice of Inquiry (PR Docket 80-440) regarding the possibility of rule changes "to provide for additional technologies which can improve the efficiency of radio spectrum use."¹ One of the "Additional Technologies" which might be permitted by such a rule change is Amplitude Companded Single Sideband (ACSB). Dr. Bruce Lusignan of Stanford University has done a study to determine the feasibility of applying this technique to Land Mobile radio operations.

The following article discussing ACSB was written by Dr. Lusignan. It is my purpose in printing this article to both inform you and to stimulate an interchange of ideas and opinions. Letters regarding this article are welcomed and will be published as space permits.

¹Schimmel, Eric, "Another Great Debate", IEEE Vehicular Technology Newsletter, Vol. 27, No. 4, November, 1980.

NOTES ON ACSB FOR MOBILE RADIO
by Bruce B. Lusignan

Amplitude Compandored Side Band (ACSB) is a modulation technique that has proven to be both more sensitive and more frequency efficient than today's Frequency Modulation (FM). ACSB radios require less power than FM to provide good signals; this sensitivity advantage results in a greater useful range for typical users and fills in many shadow areas in the coverage patterns. ACSB radios have an occupied bandwidth of 3.1 kHz, which allows them to have 5 kHz channel spacing (4 to 6 times better than FM). In addition, one or two "clear" ACSB channels can operate between the existing FM allocations without interference to the FM radios.

With ACSB radios, the voice sounds as natural as with FM radios. There is no processing of the voice in ACSB except for companding and preemphasis, which have been used in the mobile radio, telephone, and high fidelity recording industries for years. In addition, under both good and marginal signal conditions the ACSB radios are quieter than FM radios; they suppress background noise better.

The FCC has recently released a Notice of Inquiry asking for comments on the above findings and asking for industry to conduct large-scale demonstrations to review the results and to develop strategies to implement ACSB in the mobile radio services. Plans for such demonstrations are well underway. Production ACSB radios for four or five major user categories will be in the field in 1 1/2 to 2 years. The price of the ACSB radios will be the same as the price of equivalent FM radios.

What is Amplitude Compandored Side Band?

In a normal sideband radio the audio frequency band is shifted by mixers and oscillators up to the radio frequency and transmitted. The transmitter power is thus directly proportional to the power in the voice as the words are spoken (Fig. 1(a)). In the ACSB radio a variable gain audio amplifier senses the voice level and increases or decreases the gain to make loud syllables of words weaker and soft syllables stronger (Fig. 1(b)). The ACSB transmitter power on weak syllables is thus much closer to the level of strong syllables. On receive, the voice power level is sensed and restored to the original distribution.

As illustrated in Figure 1(c) and (d), this compandor action results in major improvement in the received signal to noise. Weak syllables of words have about a 15 dB improvement in signal to noise entering the receiver over an un-compandored SSB radio. In addition noise between words is dramatically quieted; a -13 dB noise level, which is very bothersome, is reduced to a -40 dB noise level, which is imperceptible in a mobile radio application.

The "capture effect" of the amplitude compandors works as well on coherent co-channel interference as it does on noise. An interferer 5 dB lower than the wanted signal will be suppressed to a level 20 dB lower in the receiver audio. The ACSB "capture effect" is thus several dB better than FM's "capture effect."

Figure 2 shows the occupied bandwidth of typical ACSB radios. Use of 12 dB/octave preemphasis shapes the audio spectrum to help suppress out-of-band emissions due to intermodulation spreading. With spectrum shaping and good amplifier design, adjacent channel protection of 50, 60 or 70 dB is obtained, depending on the power level and isolation desired.

Figure 2 also shows the location of a pilot signal to the right of the audio spectrum. This pilot signal is a tone-modulated carrier just above the audio signal. It provides a reference for Automatic Frequency Control (AFC) and Automatic Gain Control

(AGC) circuits to eliminate the frequency drift and noise recovery problems that plague normal SSB radios. The AFC circuit corrects for up to +800 Hz offset between transmitter and receiver local oscillators, allows use of crystals easily available in the mobile radio industry. The pilot signal also carries selective call tones or other control signals used in typical applications.

ACSB Applications

Figure 3 illustrates perhaps the most important advantage of ACSB to today's mobile radio user. In a band currently using 30 kHz spacing for FM radios, there are six ACSB channels for every FM channel. Two of the channels, the positions "mid"-way between the current FM allocation, are essentially unused channels.

ACSB presents the user, say with 4 FM channels in the "High Band," the following opportunity: Right away the user can implement 8 additional ACSB channels without affecting his 4 FM channels at all. If his needs warrant more than a two-fold increase, he can begin to retire his FM equipment; for each of the FM channels he retires, he creates 4 additional ACSB channels. At a time that he has retired all his 4 FM channels, he will have 24 ACSB channels.

If more capacity is needed or if users geographically separated need more protection from each other, ACSB radios can be used with 2.5 kHz offset or "tertiary" channels. These have the same characteristics as the 15 kHz tertiary channels of current FM.

Industry Reaction

Some manufacturers have questioned the results of initial research on ACSB (Industrial Communications - February 13, 1981). In particular they questioned power levels used to compare ACSB and FM performance and the ability to make ACSB work on 5 kHz spacings.

The power reference used in the ACSB report is appropriate for considerations of interference and performance and was applied consistently in the tests. Labeling the power

reference level, however, is not the main issue. The important conclusion is that the ACSB user can achieve better area coverage with less interference to others. And he can do that with 5 to 6 times as many channels in the same frequency space.

Some manufacturers felt that amplifiers could not be built to give sufficient adjacent channel isolation at 5 kHz channel separation. That is definitely not the conclusion of the companies developing ACSB radios. ACSB radios, providing standard adjacent channel isolation at 5 kHz, will be reported on in upcoming meetings and demonstrated in large-scale field applications.

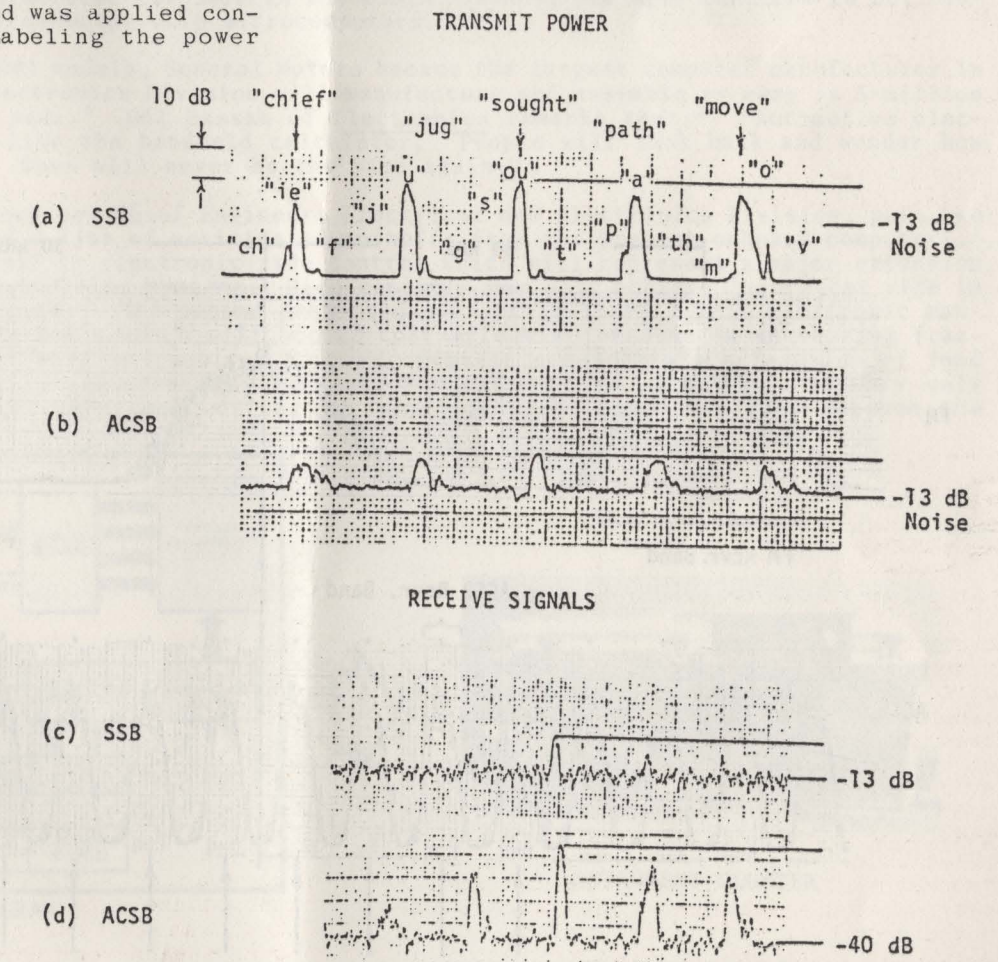


Figure 1. Performance of SSB and ACSB Radios on Test Words

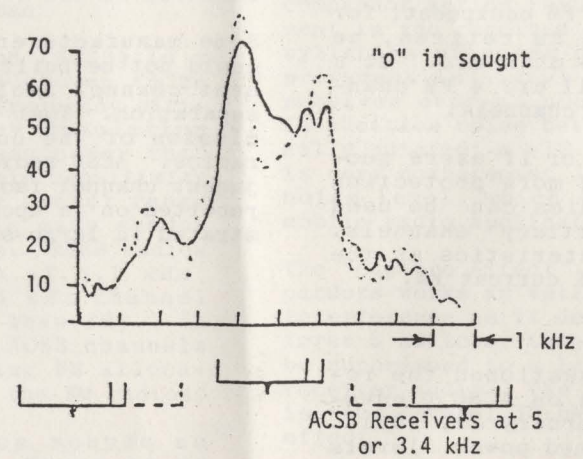


Figure 2. ACSB spectrum with and without spectrum control.

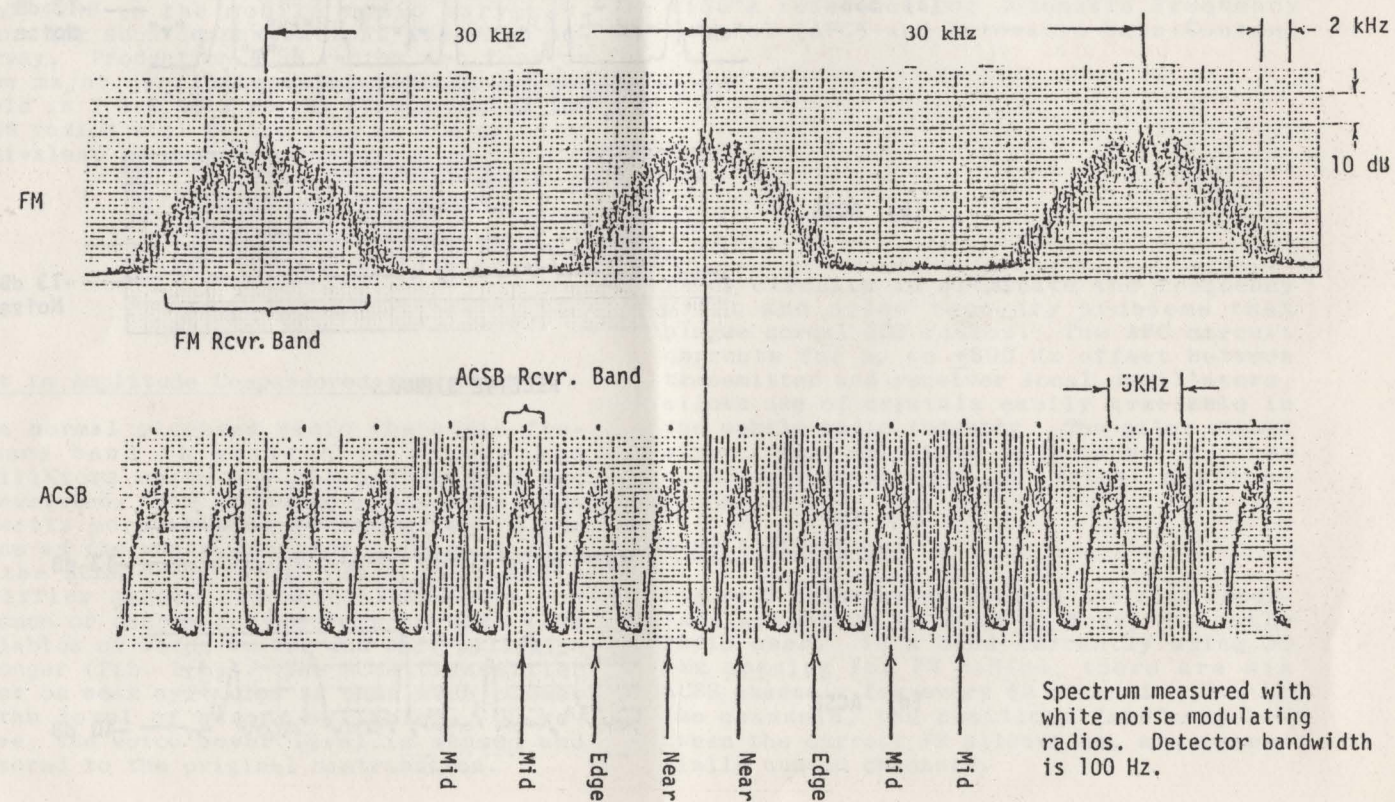
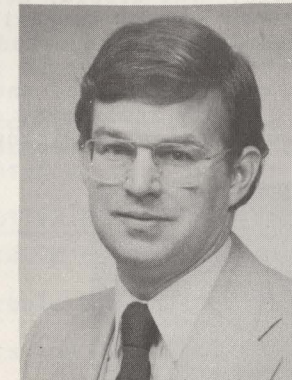


Figure 3. ACSB and FM Channels



Automotive Electronics

Dateline: Detroit

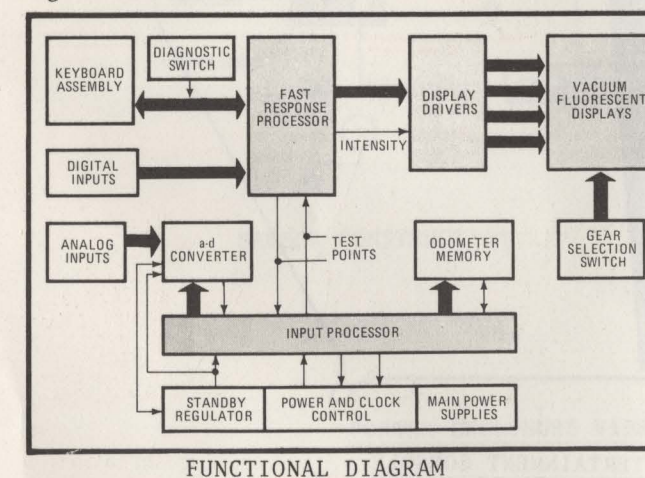
Bill Fleming
Automotive Electronics Editor

AUTOMOTIVE ELECTRONICS: TEN YEARS AFTER

Ten years ago, the automobile industry concerned itself with the trials and tribulations of putting electronically controlled seat-belt interlock systems into mass production. Automotive electronics has come a long way in the past decade. Today, with few exceptions, every gasoline-powered passenger car manufactured for sale in the U.S.A. is now, and will continue to be, controlled by integrated semiconductor-chip microcomputers.^{1,2}

With the introduction of 1981 models, General Motors became the largest computer manufacturer in the world -- GM's Delco Electronics Division will manufacture and assemble as many as 5-million microcomputers this model year.¹ Gil Bassak of Electronics remarks that:² "Automotive electronics will be something like the handheld calculator. People will look back and wonder how they ever did without it. Cars will never be the same again."

Jerry Rivard, Ford Motor Company, Chief Engineer, Electrical and Electronics Division, puts two developments at the head of a list of anticipated spinoffs from the present onboard computers.¹ "First, one predicted spinoff is electronic ride control which will represent a major extension of today's elementary load-leveling systems. Ride controls may well achieve luxury-car ride in small, fuel-efficient vehicles." The second predicted spinoff is "intelligent electronic management of engine accessory loads which will become cost-effective because an increasing fraction of the engine's output will be required to power vehicle accessories." Examples of load management strategies are: high-capacity alternators programmed to charge the battery only during deceleration, and variable-speed drives for more efficient power transfer between the engine and accessories.¹

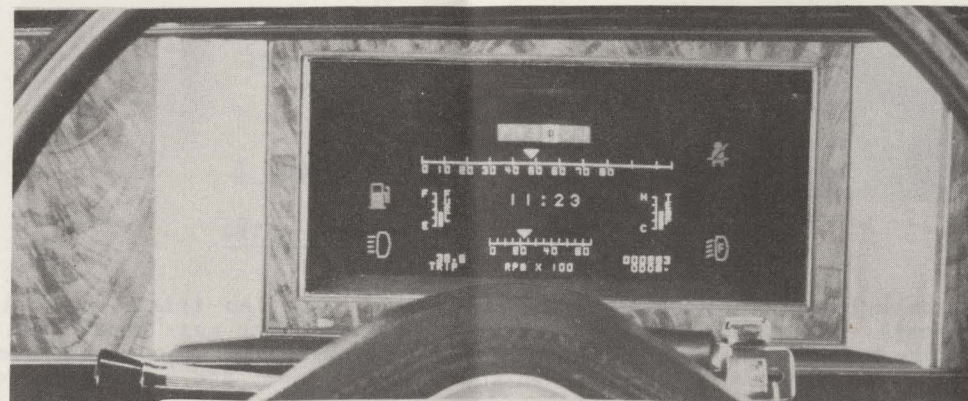


INSTRUMENT CLUSTER

CHRYSLER IMPERIAL GETS ELECTRONIC INSTRUMENTATION

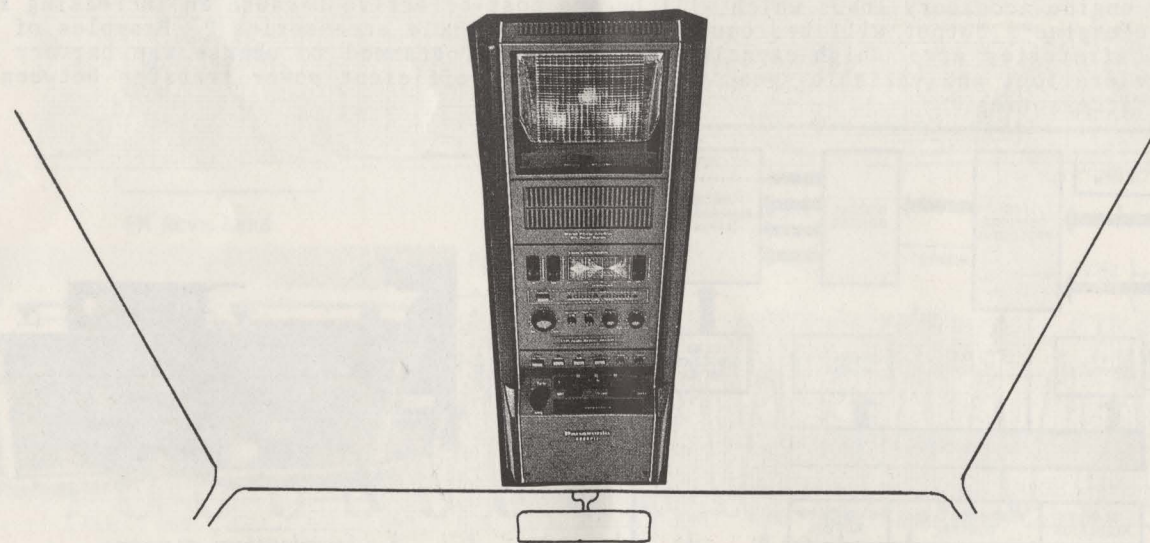
The 1981 Chrysler Imperial features a fully electronic instrument cluster which contains seven different display pods -- four digital panels, plus three vehicle condition status indicators.^{2,3} An electronic odometer readout is an industry first. Two 6801 microcomputers from

Motorola and a custom display driver chip make up the electronics package. The display utilizes blue vacuum fluorescent readout panels which have two levels of brightness -- high intensity for daytime and reduced intensity for night. Brightness levels are automatically adjusted by a photodetector which senses the ambient light level. Information -- such as vehicle speed, elapsed engine operating time, trip efficiency, fuel level, etc. -- can be selected and displayed in either English or metric units with the push of a button. Safety reminders, system self-diagnostic indicators, and engine function indicators, operate automatically without requiring driver input.^{2,3}



COLOR DISPLAY USES ZENITH CRT

An instrument panel display using a vehicular cathode ray tube (V-CRT) has been developed by Zenith Radio Corporation for dashboard installation in mid-1980's models of automobiles.⁴ Although similar to a small TV picture tube, the V-CRT display uses a tube with specially formulated phosphors and a unique electron gun. The result is a compact, flexible six-color display which presents data and graphics in a sharp, clear manner and which is easily readable in direct sunlight. Free-format, multi-function display is featured so that as-needed and on-command functions can be easily provided. The V-CRT display face measures three by eight inches and is only 7.7 inches deep.⁴



PANASONIC COCKPIT OVERHEAD ENTERTAINMENT CONSOLE

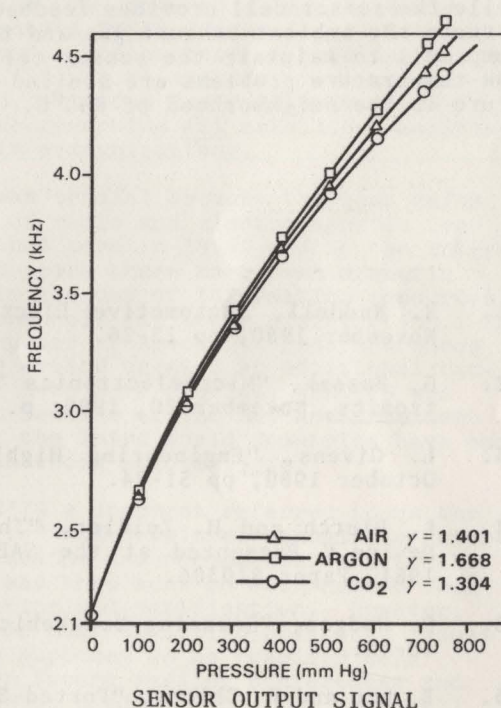
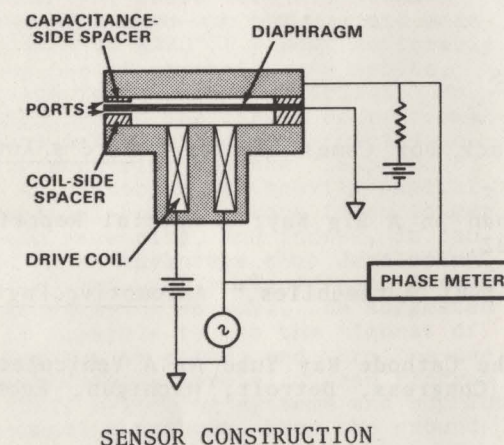
Panasonic continues to market products that are, so-to-speak, slightly ahead of their time with the introduction of its overhead entertainment console.⁵ The ceiling-mounted console (27" x 9" x 1-1/2") includes: Dolby cassette tape deck, FM stereo tuner, graphic equalizer, hi-fidel. 60-watt power amplifier (located under the front seat), and flashing red and green sound level indicator lights. Other features are: normal/CrO₂ tape selection, electronic FM tuning, muting control, and loudness switch to boost bass dynamics at low volume.⁵

AUTOMOTIVE ELECTRONICS AT THE SAE INTERNATIONAL CONGRESS

The Society of Automotive Engineers (SAE) attracts a large active group of engineers concerned with automotive electronics. This year, at the 1981 Congress in Detroit, there were 72 papers presented on this subject -- the papers can be categorized as follows:

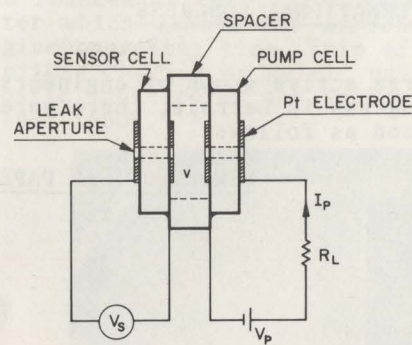
<u>AUTOMOTIVE ELECTRONICS SUBJECT</u>	<u>NUMBER OF SAE PAPERS</u>
Electronic Engine Management and Driveline Control Systems	23
Electronic Displays and Information Systems	25
Sensors and Actuators	15
RFI and Electromagnetic Compatibility	5
Microcomputer Instrumentation for Automotive Text Applications	4
TOTAL	72

A number of innovative papers were presented on the subject of sensors -- see SAE Special Publication SP-486, "Sensors," a 66-page collection of nine of the sensor papers. Two interesting new sensors, described at the SAE Congress, are briefly described below.



PORTED-ENCLOSURE VIBRATING-DIAPHRAGM PRESSURE SENSOR

A new type of absolute pressure sensor has been developed for use in engine control systems.⁶ Acoustic low-pass frequency characteristics of ducting ports permit equilibrium of static pressure between outside air and air inside chambers of the sensor. High frequency acoustic waves due to a vibrating diaphragm are trapped inside the sensor. The resonant frequency of the vibrating diaphragm gives the desired pressure measurement. This sensor does not require a hermetically sealed reference cavity and is, therefore, potentially a low-cost device. The sensor also features a frequency signal output which is compatible with modern digital circuitry.⁶



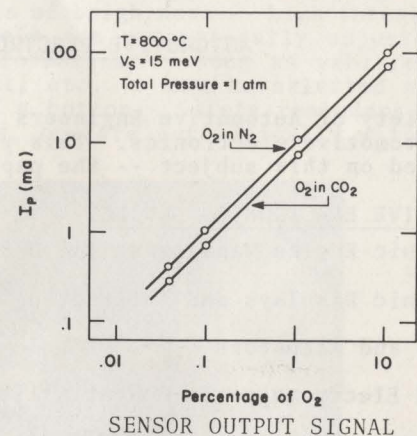
SENSOR SCHEMATIC

LEAN AIR-FUEL RATIO EXHAUST GAS SENSOR

A zirconia-based sensor has been developed to provide a linear output signal proportional to lean air-fuel ratio oxygen content.⁷ As compared to previous zirconia and titania sensors used for this purpose, the present sensor features higher oxygen sensitivity, greater output signal, and reduced temperature sensitivity. The pump cell removes oxygen from the measuring volume, while the sensor cell provides feedback information on the difference in oxygen partial pressure between the ambient exhaust gas and the measuring volume. The amount of current required by the pump cell to maintain the sensor cell voltage constant gives the desired indication of oxygen. Low-temperature problems are avoided by use of a heater which keeps the sensor operating temperature in the neighborhood of 800°C.

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SENSOR OUTPUT SIGNAL

A two-day symposium, organized by Dr. William C. Y. Lee, VTG Chairman and jointly sponsored by the IEEE and AIAA New York Chapters, was held on January 26 and 27.

The objectives of the symposium were not only to review the issues that were confronted at the 10-week World Administrative Radio Conference (WARC) in Fall 1979, but also to identify technically unresolved matters, so we may begin to contribute towards resolution. It was a forum for representatives of differing viewpoints from various technical, government and international communities to discuss and debate the issues.

The keynote address was given by Kalmann Schaefer, Foreign Affairs Advisor, FCC. Session 1 "US Government Position" was given by Stephen Doyle, Office of Technology Assessment, U.S. Congress, followed by the luncheon address "The Impacts of WARC on Industry" given by Howard White, Senior Vice President, ITT. The closing session "US Industry Views" was chaired by George Jacobs, P.E. Radio Engineering Consultant. Session 3 on Tuesday was chaired by Marvin Robinson, Director, Outer Space Affairs Division, United Nations; the luncheon address "Telecommunications and the Third World Nations" was presented by Richard E. Butler, Deputy Director General, International Telecommunication Union (Geneva).

In terms of industrialized versus developing countries, there were many issues which were of a zero-sum nature, and were not addressed by WARC'79 - most noticeably the future use of geostationary orbits, and requests for reversed positions. Mr. Butler highlighted the issues of telecommunications information dissemination to developing countries and the "leap frog" effect. An elaborate and heavily capitalized terrestrial-based network is no longer an absolute necessity, and indeed, it can be viewed as an advantage that developing countries do not have a significant investment in an existing network. He suggested that it is possible to use the highest of high-technology in space, and thru the use of microprocessors, special Stored Program Control (SPC) switching systems and sophisticated accounting methods, keep the ground user-equipment as simple as possible. He mentioned low cost radio feeder links to serve areas of priority need the space and support being cost-independent of distance. He suggested that, rather than trying to get new policies and agencies to give specific gear away - that we keep everything just as it is today - there are programs to give aid, are there not? So then, make it absolutely mandatory, that any and all aid programs MUST include telecommunications as part of the package.

There were areas of disagreement during the closing panel discussions on conflict-of-interest issues which were not resolved by WARC'79, but it was agreed that there were serious unresolved technical issues which involved no conflict whatsoever. There were issues that unite us as human beings working towards a better world. As practitioners of electronics, seeking to improve the quality of life, how can we provide good communications through sound broadcasting, while insuring safety? Many of these latter technical issues were not resolved. WARC'79 identified many new possibilities for technical application over the next decade, such as opening up earth application services through remote sensing. However, it is indeed regrettable, for example, that when we are technically able to design aircraft collision avoidance systems, that WARC'79 did not provide the required collaboration, operational parameters, and simple assignment of a few frequencies.

*****BACKGROUND NOTES

The International Telecommunications Union (ITU) is the formal international agency that governs and regulates the allocation of frequencies, the standards, and the operating procedures for all the world's telecommunication systems. In the Fall of 1979, from late September to early December, the ITU convened a General World Administrative Radio Conference in Geneva, Switzerland. The purpose of this 10-week long WARC'79 was to address, review, and recommend revisions for regulations and procedures governing all satellite, maritime and mobile communications.

WARC'79 was crucial because the last major revision of radio and electromagnetic frequencies had been in 1959, and in the intervening 20 years there have been dramatic changes in the use of information resources, and the channels for their distribution. The limited number of spaces in geosynchronous satellite orbits creates an additional constraint. Even more crucial, WARC'79 was important because of the new and prominent role that the Third World Countries have come to have in those negotiations.

From WARC'79 a document referred to as the "Final Acts" was developed containing numerous resolutions and recommendations to the ITU. It was then sent to each nation for consideration and ratification. However, many of the most explosive political issues that were supposed to be resolved were tabled for future smaller conferences and miscellaneous studies. Dr. Lee urges all readers who have the appropriate technical expertise, to write to their Senators - only we can provide the technical expertise they require for their work toward ratification of that Treaty. If it is ratified, it becomes effective January 1, 1982.

Material gathered and assembled by:
V. Edgerton

