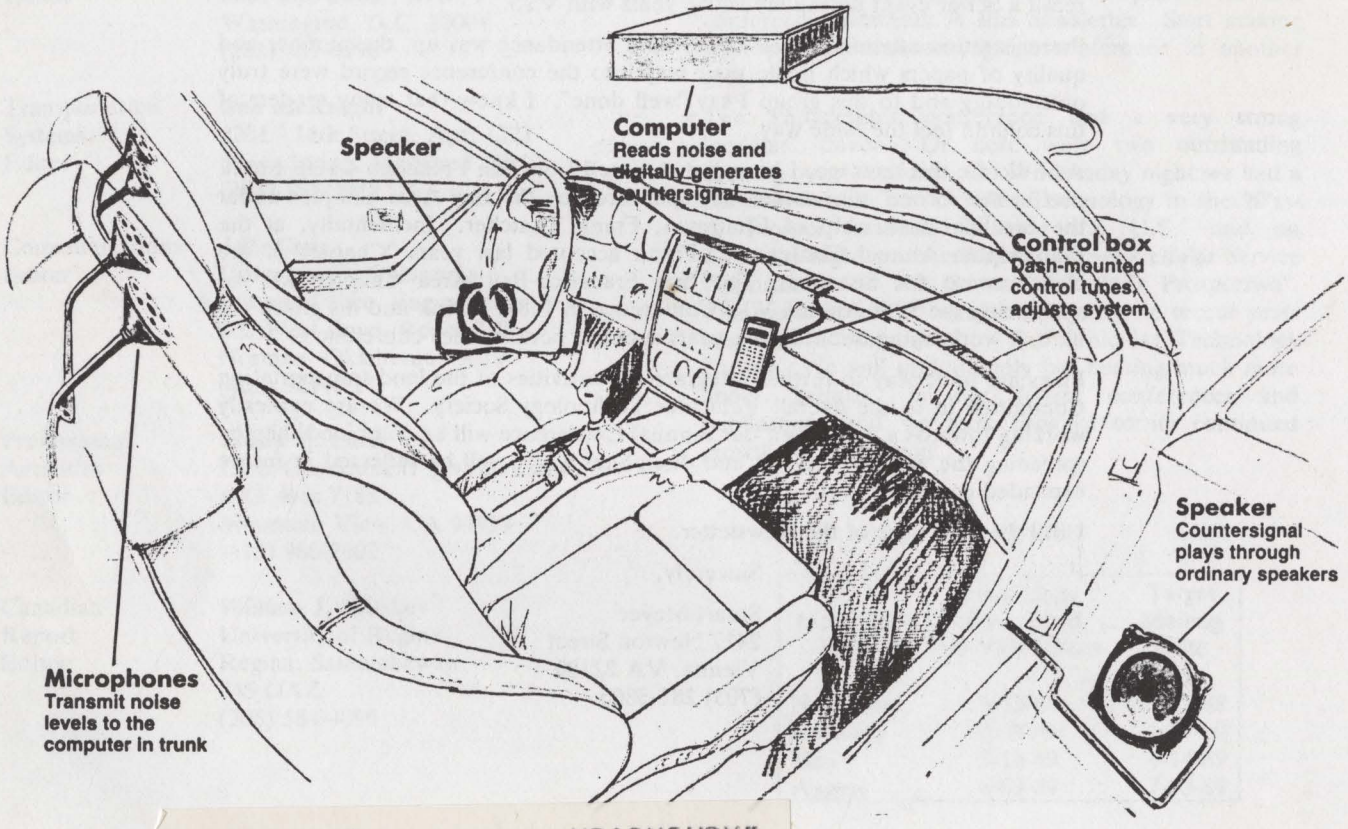
IEEE
VEHICULAR TECHNOLOGY SOCIETY
NEWSLETTER

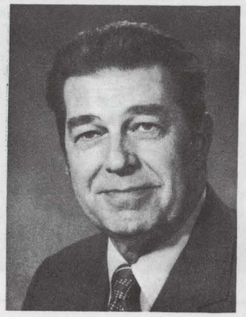
Vol. 35, No. 3, August 1988 ISSN 0161-7887 Editor: A. Kent Johnson

Essential Elements in Lotus Active Anti-Noise System



(see pages 17 and 18)

President's Message



Stuart Meyer
President
IEEE Vehicular Technology Society

If you did not attend the 38th IEEE Vehicular Technology Conference during mid-June in Philadelphia, you really missed a great one.

John Galanti and his staff did an outstanding job in providing our Society with a well planned and well executed event. A standing ovation was given this group during our Thursday "Awards Luncheon" and I must say that I cannot recall a better event during my active years with VTS.

Preregistration attendance was up, overall attendance was up, the number and quality of papers which made their way into the conference record were truly outstanding and to this group I say "well done". I know that many readers of this column feel the same way.

As I dictate this message, I have just returned from San Francisco where I took part in the second mini-conference sponsored by the Bay Area Chapter under the excellent leadership of Chairman, Frank Thatcher. Incidentally, at the Philadelphia Annual Conference, Frank accepted last years "Chapter of the Year" award for his area. The San Francisco-Bay Area Chapter will be sponsoring the 39th Annual VTS Conference in 1989. Frank and his group are hard at work trying to outdo this years superior performance conference.

Plans are underway to further integrate the activities of the land transportation Committee in to the overall Vehicular Technology Society. We are earnestly working towards a date when our Annual Conference will be combined thereby spreading the areas of interest and disciplines which will be reflected in future expanded conference activities.

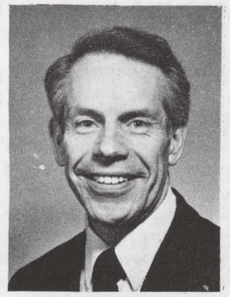
Until the next issue of the Newsletter.

Sincerely,

Stuart Meyer
2417 Newton Street
Vienna, VA 22180
(703) 281-3806

Newsletter Staff

Editor's Notes



A. Kent Johnson
Newsletter Editor

Our recently completed Annual Conference in Philadelphia was a huge success and John Galanti and his committee deserve a big vote of thanks from all of us. As Stuart Meyer points out in his column, attendance was up, the number of papers was up, and the quality of the papers and the overall quality of the conference was outstanding. I know that all of you who attended the conference will join me in applauding the efforts of those who arranged it.

The Philadelphia conference generated great enthusiasm for the upcoming conference in San Francisco. That conference will be held from April 28 to May 3, 1989 in the Sir Francis Drake Hotel in San Francisco. 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.

The Philadelphia conference had a very strong "cellular" flavor. Of note were two outstanding evening panel sessions. On Wednesday night we had a panel discussion on "Cellular Technology in the 90's - A Prospective from Outside the U.S." and on Thursday night we heard abut "Future Cellular Service Opportunities - The Service Provider's Prospective". The rapid growth of cellular technology in recent years has been a real boost to the Vehicular Technology Society. We will undoubtedly be hearing much more about "cellular" in our future conferences and publications and we look forward to its continued growth and expansion.

Month of Issue	Final Copy to be Rec'd By VTS Editor	Target Mailing Date
November	9-13-88	10-15-88
February	12-30-88	1-27-89
May	3-10-89	4-14-89
August	6-09-89	7-13-89

Society Officers and Board of Governors

SOCIETY OFFICERS

Society President	Society Vice President
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Society Secretary	**Society Treasurer**
SAMUEL A. LESLIE The Antenna Specialists Co. 99 Woodberry Lane Lynchburg, VA 24502-4453 (804) 385-7800 (804) 525-7589 Home	ARTHUR GOLDSMITH 4303 Wynnwood Drive Annandale, VA 22003 (703) 941-1323

BOARD OF GOVERNORS

NAME(Term thru)	RESPONSIBILITY
J.R. Cruz(90)	Newsletter, Communications Editor
Robert E. Fenton(88)	Junior Past President
Arthur Goldsmith(90)	Treasurer
Leo M. Himmel(89)	Chairman, Education Committee
A. Kent Johnson(89)	Newsletter Editor
Samuel A. Leslie(89)	Society Secretary
Fred M. Link(89)	Chairman, National Site Selection
Charles Lynk(88)	Chairman, Paper of Year Comm.
Roger Madden(90)	Chairman, Constitution revision
George F. McClure(88)	Vice President, Chairman of Publications Comm.and Transactions Editor
Samuel R. McConoughey(89)	Senior Past President
Stuart Meyer(88)	President
Evan B. Richards(90)	National Conference Coordinator
Eric Schimmel(88)	Chairman, Personal Radio Comm.
Raymond C. Trott(90)	

Board of Directors Report

Samuel A. Leslie
VTS Secretary

Institute of Electrical and Electronics Engineers
Board of Governors
March 3, 1988

Roll:

Raymond Trott*
Fred M. Link*
Robert A. Mazzola
Robert McKnight (with proxy from Leo Himmel*)
J. R. Cruz*
George McClure*
A. Kent Johnson*
Stuart Meyer*
Arthur Goldsmith*
Roger Madden*
Linda Boehmer*
Robert Fenton*
(* indicates member of Board of Governors)

In his opening remarks President Meyer discussed the status of the travel reimbursement program and the results of the executive board meeting in Washington in February. He then suggested that the board plan to return to the regular election schedule. Board members should be elected and the votes tallied in time to elect new officers on a calendar year basis. This will remove obstacles at IEEE headquarters and minimize confusion throughout the Institute because we will then be following the same schedule as every other IEEE society.

He then invited Robert Mazzola, the liaison between Convergence and VTS, to discuss progress toward the upcoming Convergence. Mazzola reported that the last general meeting was October 4, 1987, and that the next one was at 4:15PM that day. Pertinent information was that the preliminary program was due to be released within 4 weeks, that they had secured Hal Spuprlock as keynote suggested two sub-systems of general interest to the motoring public: cellular radio navigation systems.

Madden discussed the VTS/IES Workshop on Automotive Applications of Electronics, immediately following Convergence.

The acting secretary reported a quorum was present.

Link moved, McClure seconded of the minutes of the previous meeting.

Meyer invited modifications to the agenda. Suggestions were made to change the date in item -- of the agenda to October 27, and under NEW BUSINESS to add of "Restructuring".

The treasurer's report was submitted by Goldsmith and is attached to these minutes. He also reported that the initial budget would be received in April, and if any deficiencies are noted, to contact him for corrections. McClure moved, Mcknight seconded approval of the treasurer's report. Motion passed.

In his transactions editor's report, McClure noted that the 900 MHZ Propagation Committee report was about at the printer's, and would appear as the May issue. The press urn for this special issue is to be 5000 copies. He also reported that the February, '88 papers had been lost at IEEE and he was contacting the authors to obtain copies of the papers and artwork. The August issue will be larger than normal, due to the delayed publication of the February papers. Mcknight moved, Trott seconded approval of the transactions editor's report. Motion passed.

For the newsletter, Johnson reported the May issue was on schedule, and would be sent to IEEE within two weeks. Madden and Johnson discussed publication of the revised Constitution in the newsletter for member voting, with either a tear-off or blown-in card ballot. Johnson was to investigate and talk further with Madden. Madden was to prepare a version of the Constitution showing the delegations and additions for circulation to the members for voting. McKnight moved Cruz seconded approval of the newsletter editor's report. Motion passed.

Richards submitted a written report on conferences and meetings. The Board meeting was set for Thursday afternoon. Richards and Meyer to meet with Philadelphia conference staff to take care of any last minute problems.

The San Francisco conference committee was reported to be holding a mini-conference in May. Questions were raised regarding finances for the conference and the San Francisco Section participation. Meyer and Richards to work with Frank Thatcher to resolve any problems.

Orlando conference use of conference management services was noted. Meyer to discuss with Orlando committee. McClure reported he was attending an IEEE Workshop on Conferences and Financial Records. He indicated Orlando would need $1000 seed money.

Link discussed St. Louis as a possible site for the 1991 conference. More discussions with the Land Transportation Committee are needed and the site is to be firmed up at the June meeting.

The Joint Rail Conference in Pittsburgh was discussed. This year it is ASME - sponsored, and expected to draw 100-170 persons. The '89 conference will be in Philadelphia, and efforts are being made to combine in Orlando in 1990.

Goldsmith moved, Mcknight seconded that VTS sponsor an Automotive Electronics Workshop following Convergence, with a 50/50 co-sponsorship with IES. Motion passed. Madden moved, Fenton seconded that VTS provide $1000 seed money for the Workshop. Motion passed.

Johnson reported that a member of the AT&T labs would represent VTS at Eurocom '88, and noted that the dates conflict with the Philadelphia conference.

It was the feeling of the board that the Scandinavian Distinguished Speaker Tour should be held in abeyance until we hear from the Eurocom '88 arrangement.

The 2nd International Conference on Road Traffic Monitoring was mentioned but not discussed extensively. Johnson will place an ad in the Newsletter.

Meyer said he and Richards would follow up on the planned '89 Toronto Navigation Conference (Vehicle Navigation and Information Systems).

McConoughey suggested we co-locate workshops and/or conferences in conjunction with known industry conferences on same subject. McConoughey was tasked to prepare a letter for Meyer to use to approach industry groups for technical presentations or co-sited workshops.

McKnight reported that the end of year membership in VTS was 2632. He suggested VTS again approach the land transportation group, since the member increase did not reflect the number of participants in land transportation activities. Meyer will update Fenton's letter of invitation and mail to Boehmer in advance of the April Joint Rail Conference.

McKnight reported that he would accept suggestions for obtaining additional publicity for VTS and names and addresses of publications which might not now be on his mailing list.

Schimmel reported that joint USAB/TAB Committee on Communications and Information Policy was discussing whether comments should be filed on FCC rule makings on Part 15 and on Alternate Type Acceptance procedures.

Goldsmith reported that there were no issues significant to VTS under consideration by USAB committees in which he participates.

Madden reported that the IEEE Foundation had been queried as to the status of the Convergence fellowship. Dr. Robert Fenton was asked to chair the Convergence Fellowship Committee.

The Noble Fellowship was discussed. Goldsmith reported that the fund principal was earning enough to support the fellowship without decrementing the principal.

Gasper Messina submitted a written Chapter Activities Report.

Awards were discussed. Mazzola was asked to nominate persons for the Avant Garde Award. McClure moved, McKnight seconded that VTS present a special award, not to exceed $200, to Trevor Jones for his work in founding and encouraging Convergence. Passed unanimously.

Meyer reported that McConoughey has been elevated to Fellow.

Fenton reported he has solicited nominees for the upcoming term. The incumbents have indicated they will run for re-election, and he expects to have a full slate of candidates, although some have not yet responded. Fenton moved, Link seconded that the current slate of officers serve until the end of 1988 with the new slate to be elected to take office beginning in f1989. Motion passed.

Meyer reported that the recommendation of the Executive Committee was that a $20,000 fund be set aside for travel to Board of Governors meetings to pay up to $500 expenses for Board member attendance if a Board member does not have employer support. Link moved, Johnson seconded the motion to adopt the Executive Committee recommendation. Motion passed.

New Business

Meyer expressed concern about the failure of active individuals, who practice in a minority discipline of the Society, to attain a Board seat. Meyer requested that the Board discuss whether the Bylaws should be amended to set aside certain seats on the Board for each of the disciplines, or whether there was some other avenue to provide representation of the various disciplines. McKnight moved, McClure seconded that the VTS endorse the concept of representation at the Board level of all the disciplines of the Society. Motion passed unanimously. Boehmer stated that the Land Transportation Committee also endorsed the concept.

Meeting terminated at 4:00PM.

MINUTES OF THE IEEE VTS BOARD OF GOVERNORS MEETING

The IEEE VTS Board of Governors met on June 16, 1988 at the Holiday Inn Center City, Philadelphia, in conjunction with the annual Vehicular Technology Conference. The meeting was called to order at 2:00 PM. 1987 at the IEEE offices in Washington, D.C. The meeting was called to order at 9:20 AM.

ROLL CALL

The following were in attendance:

	Linda Sue Boehmer	88-89 LTD Chairman
#	J. R. Cruz	Assoc. Newsletter Editor
	Said Elnoubi	Assistant Trans. Editor
	Al Engel	87-88 LTD Chairman
#	Robert E. Fenton	Jr. Past President
	John Galanti	1988 VTC Chairman
#	Arthur Goldsmith	Treasurer
	Al Goldstein	Noble Scholarship Comm.
	David Goodman	
#	Leo M. Himmel, Sr.	Education Committee
#	Kent Johnson	Newsletter Editor
	W. C. Y. Lee	Assistant Trans. Editor
#	Sam Leslie	Secretary
#	Fred Link	VTC Site Selection
#	Roger Madden	Constitution. & Bylaws
#	George McClure	Vice President
#	Sam McConoughey	Senior Past President
#	Stu Meyer	President
#	Evan Richards	Natl. Conf. Chairman
#	Eric Schimmel	Assoc. Newsletter Editor
	Jim Sears	Membership Chairman
	Masa Shinji	Tokyo VTS Chapter
	David Talley	Financial Advisor
	Frank Thatcher	1989 VTC Chairman
#	Ray Trott	
	Jay Underdown	1991 VTC Chairman

(# denotes elected Board member)

Fourteen of the 26 present were elected Board members. A minimum of eight elected is necessary for voting on matters that come before the Board. Thus, a quorum was present.

Minutes of the March 3, 1988 Board meeting in Detroit were not ready for review due to a last-minute hardware glitch. These minutes will be reviewed and voted on at the next Board meeting.

The Board also noted that Neal Shepherd was in the hospital for emergency surgery. Sam McConoughey contacted Neal by telephone and expressed the Board's concerns and best wishes.

TREASURER'S REPORT

Arthur Goldsmith submitted his treasurer's report, and noted that IEEE Headquarters continues to be very conservative with our budget estimates. The Society has been well under the budget provided by Headquarters for the past five years.

Expenses this year are estimated to be as much as $20K higher due to the Board's recent adoption of a Board Member travel expense policy. However, this may be somewhat offset by the a recommended increase in non-member subscription rates to the VTS Transactions.

The Society's proposal for a Convergence Fellowship has been approved by Headquarters, and Art is to write a letter authorizing the transfer of Society funds into the Convergence Fellowship Fund.

Also, Stu Meyer discussed briefly Headquarters's requirements to value the Society's accounts at today's market rates, rather than at the value at maturity.

Sam McConoughey moved, Roger Madden seconded that the Treasurer's report be accepted. The vote was unanimous in favor.

PUBLICATIONS

George McClure reported that the publications of the Transactions is on schedule.

The Special Propagation issue published as the February issue of the Transactions will be archived by IEEE to assure availability after their normal 3-year limit for holding publications in stock.

Bill Misskey has relinquished his post as Associate Editor for Automotive Electronics due to a very heavy workload at his university and the recent addition of twins at his home. A search is under way to find someone who can take over the Automotive Electronics editorship for Bill.

The planned special issue on digital cellular is under way. Bill Lee is assisting with this project.

George discussed a proposal by Robert L. French to publish a tutorial to be titled "Vehicular Location, Navigation, and Route Guidance Systems", for possible co-sponsorship by AES and VTS. Fred Link moved, Roger Madden seconded that the Society is indeed interested in co-sponsoring such a tutorial. The vote was unanimous in favor.

George also discussed a related letter from Theresa Kirby of the IEEE Educational Activities Department in regard to a prospective land navigation system project. George is to write a letter indicating the upcoming activity on the above planned tutorial, and also to mention the upcoming 1989 Vehicular Navigation, Information and Systems conference in Toronto.

George further indicated that Sang Rhee has expressed a willingness to take over his Transaction Editor's post so that he may be able to devote more time to his new position as Society Vice President.

Roger Madden moved, Bob Fenton seconded that the Transaction Editor's report be accepted. The vote was unanimous in favor.

Kent Johnson reported on the Newsletter status, and indicated that the next issue will include a call for papers for the 1989 VTC in San Francisco. Also to be included is a call for papers for next year's Joint Railroad Conference. George McClure moved, Bob Fenton seconded that the Newsletter Editor's report be accepted. The vote was unanimous in favor.

CONFERENCES AND MEETINGS

38th VTC Philadelphia Conference

John Galanti provided a brief summary of the conference, indicating that this conference was the best attended to date. Over 360 were in attendance, and there was a 20 percent increase in the number of papers presented over last year. He noted that the recent surge in interest in cellular related topics has accounted for a large portion of this increase. Over 18 countries were represented at the conference. He expects a net surplus in proceeds from the conference, due to the large attendance.

39th VTC San Francisco Conference (1989)

Frank Thatcher reported that planning for this conference is proceeding on schedule. They are increasing their estimate of attendees from 200 to 250 based on this year's record turnout. Also, they have asked Dr. Tom Stanley from the FCC to be the keynote speaker.

40th VTC Orlando Conference (1990)

George McClure reported that the date selected for the Orlando conference is May 7-9, and that the conference will be held at the Crowne Plaza hotel. A conference management firm will be used to assist in the running of this conference.

41st VTC St. Louis Conference (1991)

Fred Link reported that St. Louis is anxious to host the 1991 VTC conference. Jay Underdown reported on the conference facilities that are available in the St. Louis area. After discussion, Fred Link moved, George McClure seconded that the invitation from St. Louis to host the 1991 VTC be accepted. The vote was unanimous in favor.

42nd VTC Denver Conference (1992)

Likewise, Fred Link reported that Denver is again anxious to host a VTC conference. Fred reported that they are willing to host such a conference in either Colorado Springs, Boulder, or Denver proper. The Board discussed Denver's proposal, and felt that the Denver area rather than Colorado Springs or Boulder would be more preferable in deference to the Joint Railroad members of the Land Transportation Division of our Society. Roger Madden moved, Kent Johnson seconded that Denver's invitation be accepted, with Denver proper being noted as the preferred location. The vote was unanimous in favor.

Fred Link moved, Ray Trott seconded that Evan Richards's conference report be accepted. The vote was unanimous in favor.

Joint Railroad Conference

Al Engel stated that the 1988 Joint Railroad Conference was a success, and that expenses where near the break-even point. The 1989 Joint Railroad Conference will be held April 25-28 at the Hershey Hotel in Philadelphia. He noted that this conference will usually have from 120 to 160 attendees, and that about two-dozen papers are presented.

Al Engel also noted that the Joint Railroad Conference has tentatively been scheduled to be in St. Louis in 1990, and in Chicago in 1991. Since one of the goals of the Board is to get the VTC and Joint Railroad conferences in step, Al volunteered to investigate the feasibility of swapping the two locations proposed for the Joint Railroad Conference such that the two could coincide in St. Louis in 1990. If that is not feasible, then the proposed 1992 conference in Denver will be the next target for a combined VTC/JRC.

Convergence '88

Stu Meyer reported that the planning for the 1988 Convergence Conference is well under control by the Convergence committee. He also reported that the conference will run for two days this year.

Post-Convergence IES/VTC Workshop

Roger Madden reported that the joint IES/VTS workshop is scheduled to follow the Convergence Conference on Wednesday. Four sessions for the workshop are planned, with the first starting at 9:00 AM and the last ending at 4:30 PM. Thirteen papers have been submitted for this workshop.

EUROCOM '88, June 13-17, Stockholm

Kent Johnson reported that Ed Chien from AT&T Bell Labs is representing VTS at this conference, and that a report will be available at the next Board meeting.

Annual Conference on Road Traffic Data Collection

The secretary reported on a request to also co-sponsor with no financial interest the 1990 Annual Conference on Road Traffic Data Collection in London (the Society has already agreed to co-sponsor the 1989 conference). Roger Madden moved, Bob Fenton seconded that the Society accept the invitation to co-sponsor this conference. The vote was unanimous in favor.

1989 VNIS Conference

Stu Meyer indicated that no new information in regard to meeting dates for the 1989 VNIS Conference in Toronto was available.

Roger Madden moved, Ray Trott seconded that the remainder of the conference report be accepted as presented. The vote was unanimous in favor.

COMMITTEE REPORTS

Land Transportation

Al Engel reported on a request seeking the Society's endorsement to start an international program on linear electric motors. No financial support of such a program would be required. After discussion, Al Engel moved, Evan Richards seconded that the Society endorses the formation of an international program on linear electric motors, the purpose of which is to provide technical exchange at no financial exposure to the Society. The vote was unanimous in favor.

Constitution and Bylaws

Roger Madden reported that corrections to the revised constitution, as suggested by IEEE HQ, have been returned to HQ. A formal ballot to approve the new constitution should be in the mail to all VTS members within the next few weeks.

Membership Report

Jim Sears reported that membership is up by 130 over the past year, and that he has seen a few applications which were probably a result of the ads placed in the IEEE "Potentials" magazine last year.

Publicity

No report on publicity activity was available at this meeting.

CCIP Representative

Eric Schimmel reported that the CCIP committee is continuing its interest in high-definition television (HDTV). He reported that he is also attending another subcommittee on non-ionizing radiation. Bob Fenton moved, Roger Madden seconded that the CCIP representative's report be accepted as presented. The vote was unanimous in favor.

USAB Engineering R&D

Art Goldsmith reported that little activity has taken place with the USAB committee since the last Board meeting.

Coordinating Committee on Transportation

Art Goldsmith reports that this committee has been dissolved.

Transportation Electronics Fellowship

Bob Fenton reported that a committee has been formed whose primary function will be to select candidates for the Transportation Electronics Fellowship. They plan of selecting the first candidate in the spring of 1989 for a 1989-1990 academic year fellowship.

Noble Fellowship

Al Goldstein reported on this year's recipient for the Noble Fellowship.

Chapter Activities

A written report from Gaspar Messina indicates that more L-31 meeting report forms are being returned, but that several chapters still do not fill out the forms and return them.

Standards

No new information in regard to standards was available at this meeting.

Propagation Committee

A written report from Bob Eckert indicates that they have published their work in the February issue of the VTS Transactions, and that plans for further activity are still in the discussion stage.

Awards

Stu Meyer reported that one award will be made at the Convergence Tuesday night banquet.

Stu also discussed a potential "milestone" award for the first mobile radio repeater, which was believed to be first licensed for use in California.

The paper of the year award went to David Goodman and Adel Saleh for their paper on "The Near/Far Effect in Local ALOHA Radio Communication". The runner-up was a paper by Faramaz Davarian titled "Mobile Digital Communications via Tone Calibration".

Fellows Report

Bill Lee reported for Al Isberg that two of three very-qualified senior members nominated last year were elected. Two nominations have been made and submitted to IEEE HQ this year.

Nominations Committee Report

Bob Fenton presented a list of seven individuals who have agreed to run for the term starting January 1, 1989 to December 31, 1991, to fill five positions on the Board. These seven individuals are (in alphabetical order):

1. Linda Sue Boehmer
2. James R. Evans
3. Robert E. Fenton
4. Robert Mazzola
5. Stuart Meyer
6. George F. McClure
7. Eric J. Schimmel

Sam McConoughey moved, Leo Himmel seconded that the above list be approved. Friendly amendments to also add Jesse Russell and John Galanti to the slate was accepted. The vote was unanimous in favor.

Bob Fenton also noted that he is accepting nominations for the Board's executive committee for next year's term.

Stu Meyer discussed the possibility of having the Board elections by "discipline" to assure that the Board will always have representation from the vehicular electronics and land transportation divisions of the Society as well as mobile communications. Roger Madden is to look into including such a requirement in the Society's by-laws.

OLD BUSINESS

Stu Meyer posed a question in regard to free conference registration for life members. After discussion, Sam McConoughey was assigned to form a committee to look into the feasibility of developing a uniform life member conference registration policy.

NEXT MEETING

The next board meeting is scheduled for Tuesday, October 18 during the Convergence '88 Conference at the Hyatt Regency in Dearborn.

ADJOURNMENT

The meeting was adjourned at 6:22 PM.

Respectfully submitted,

Samuel A. Leslie

Samuel A. Leslie
Secretary

Chapter News

Gaspar Messina
Chapter News Editor

MEETINGS

Orlando (Comsoc/VTS)

History of Two-Way Radio, by:
Mr. Stuart Meyer, President, VTS
2417 Newton Street
Vienna, Virginia
Held February 18, 1988 with 8 attending, including 2 guests.

San Francisco Bay Area VTS

Mapping Radio Signals on the Computer, by:
Mr. Dick Biby, Communication Engineering Services
1600 Wilson Blvd. # 1003
Arlington, Virginia
Held May 12, 1988 with 34 attending, including 10 guests.

Toronto VTS

System Characteristics of FM Receivers, by:
Mr. Gene Dempsey, Threshold Communication Systems
P.O. Box 188, Brampton, Ontario, L6V2L1, Canada
Held January 20, 1988 with 17 attending, including 10 guests.

Principles of Error Analysis, by:
Mr. Gene Dempsey, Threshold Communication Systems
P.O. Box 188, Brampton, Ontario, L6V2L1, Canada
Held March 16, 1988 with 10 attending, including 4 guests.

Radio Traffic Models, by:
Mr. Norm Haslett, Metropolitan Toronto Police
Held April 27, 1988 with 25 attending, including 14, guests.

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

Additional Input from Montreal, Quebec VTS:

Montreal, Quebec VTS

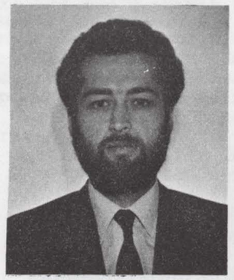
Artificial Intelligence and Knowledge Based Systems - An Air Traffic Control Algorithm for Conflict Resolution By:
Professor Archie Bowen, CompEngServ Ltd.
265 Carling Avenue #600
Ottawa, Ontario
Canada KIS 2E1
Held January 26, 1988 with 10 attending, including 4 guests.

Mobile Communications for Train Control Systems By:
Professor Bijay K. Bhargava, Binary Communications Inc.
2769 Arbutus Road
Victoria, British Columbia
Canada V8n 5X8
Held April 20, 1988 with 8 attending including 2 guests.

PLANNED MEETING
Computerized Integrated Radio-communication System in the Montreal Urban Community Police Service By:
Fernand Gagnon, Montreal Urban Community
2 Complexe Desjardins
P.O. Box 129
Montreal, Quebec
Canada H5B 1E6
To be held September 7, 1988.

Micha Avni, Chapter Chairman
(514)-283-0004

Communications



J. R. Cruz
Communications Editor

ABSTRACTS

"Characterizing the UHF Factory Radio Channel," T.S. Rappaport and C.D. McGillem, Electronics Letters, Vol. 23, No. 19, September 1987.

Portable UHF factory multipath measurement apparatus is being used to measure multipath delay profiles and narrowband fading at five large manufacturing sites in the midwestern U.S. Preliminary data indicate that typical RMS delay spreads range from 100 to 250 ns and that average CW path loss varies as distance to the power 2·2. This work is the first report of extensive multipath measurements in factory environments.

"Influence of Terrain-Induced Reflections on the Performance of High-Capacity Digital Radio Systems," M. Shafi, IEEE Trans., Commun., Vol. 36, No. 3, March 1988.

The performance of a high-capacity digital radio system is evaluated in the presence of ground induced reflections and atmospheric fading. Results indicate that ground reflections significantly contribute to outage even when their amplitude is 20-25 dB below the main signal. A three-path channel model is used to simulate reflections from the terrain and atmosphere. With this model, the group delay suffers extremely rapid phase transitions and the amplitude pattern shows the presence of minima deeper than that produced by either ray alone.

"Refinements on the Theory of Error Rates for Narrow-Band Digital FM," R.F. Pawula, IEEE Trans. Commun., Vol. 36, No. 4, April 1988.

The bit error rate performance of narrow-band digital FM with limiter-discriminator detection is considered for the cases of 1) integrate and dump postdetection filtering with partial-bit integration and 2) sample and hold bit detection at the discriminator output. Error rate curves are presented for Gaussian, six-element Butterworth and two-stage synchronously tuned IF filters. The calculations illustrate just how much more E_b/N_0 is required as the partial-bit integration time goes from 100 percent down to the limiting case of sample and hold. The results show that it is important to have a well designed IF filter especially if the entire bit time is not available for detection.

"Wide-Band Packet Radio for Multipath Environments," J.H. Fischer, J.H. Cafarella, C.A. Bouman, G.T. Flynn, V.S. Dolat, and R. Boisvert, IEEE Trans. Comun., Vol. 36, No. 5, May 1988.

A direct-sequence spread-spectrum packet radio is described which has versatile signal processing and local control capabilities designed to support the functions required of a robust mobile communications network. Noteworthy capabilities include 11 selectable data rates with accurate range measurements in a fading multipath channel. The radio employs a hybrid analog/digital signal processor and nonrepeating spreading codes for suppression of intersymbol interference and jamming. It incorporates two sets of monolithic surface-acoustic-wave convolvers as programmable matched filters with time-bandwidth products of 64 and 2000. The analog matched filters are coupled with binary postprocessing for the functions of detection, RAKE demodulation, and ranging measurements over a wide multipath spread. The data rate can be selected, in response to varying channel conditions, from 1.45 Mbits/s down to 44 bits/s with an almost ideal tradeoff in signal processing gain from 18 dB up to 61 dB prior to multipath combining.

"Outage Probability Calculation for Multiple Cochannel Interferers in Cellular Mobile Radio Systems," K.W. Sowerby, and A.G. Williamson, IEEE Proc., Vol. 135, Pt.F, No. 3, June 1988.

The calculation of outage probability is discussed in relation to cochannel interference problems inherent in mature cellular radio systems. Outage probability equations for coverage only and for single cochannel interferer situations are reviewed briefly, and examples of the application of these results to the estimation of the service area of a typical cellular base station are given. An analytical technique for multiple uncorrelated interferers in a Rayleigh fading environment is presented and the effect of several cochannel Rayleigh interferers on the service area of a cellular base station is examined.

"Performance Analysis of GMSK Frequency Detection with Decision Feedback Equalization in Digital Land Mobile Radio" F. Adachi, and K. Ohno, IEEE Proc., Vol. 135, Pt. F, No. 3, June 1988.

The bit-error-rate (BER) performance of premodulation Gaussian filtered MSK (GMSK) using frequency detection (FD) in conjunction with 1 bit decision feedback equalization (DFE) is theoretically investigated. The introduction of the premodulation filter causes severe intersymbol interference (ISI) in the waveform of the input to the FM modulator. DFE is used for reducing the ISI effect and therefore improving the BER performance. Applying the analysis to

for the premodulation filter bandwidth-time product $B_bT = 0.25$ (typical for mobile radio applications) when the receiver predetection bandpass filter bandwidth-time product BT is optimized. It is shown that the effect of error propagation due to DFE is negligible and the exact BER can be well approximated by the BER that is obtained assuming the decision 1-bit prior is correct. The analysis is then extended to the case of Rayleigh fading channels. Both predetection and postdetection diversity reception are considered. When two-branch predetection maximal-ratio combining (MRC) is used, the 1-bit DFE attains about 6.3 dB E_b/N_0 improvement at BER = 10^{-3} for $B_bT = 0.25$.

"Differential Detection of GMSK Using Decision Feedback," A. Yongacoglu, D. Makrakis, and K. Feher, IEEE Trans. Commun. Vol. 36, No. 6, June 1988.

Differentially detected Gaussian minimum shift keying (GMSK) suffers from significant intersymbol interference. We introduce differential detector structures which use decision feedback to partially remove the effect of destructive intersymbol interference. In comparison to the conventional two-bit differential detection of GMSK, the proposed structures provide about 4 dB E_b/N_0 improvement when the premodulation filter time-bandwidth product is 0.25. As the premodulation filter becomes narrower, the advantages of the proposed receivers are more pronounced. Thus, the bit error rate performance of differential detection is brought closer to coherent detection while avoiding the problems associated with the carrier recovery.

"Frequency Allocation for a Mobile Radio Telephone System," J. Denes and A.D. Keedwell, IEEE Trans. Commun., Vol. 36, No. 6, June 1988.

For optimal patterns of frequency allocation and minimum number of frequency applications, such as mobile radio or multibeam satellites, the use of latin squares is suggested.

Transportation Systems

Bob McKnight
Transportation Systems Editor

High tech and practical issues highlight AAR meeting on communications & signals

The 28th Annual Technical Conference of the AAR Communication & Signal Division will be held August 22-24, 1988 at the Washington Hilton. Technical paper presentations range from the latest in high technology-- satellite train tracking-- to maintenance free batteries and certified testing of cantilever structures for highway grade crossing warning devices.

The Monday morning session will have Dennis F. Sullivan, Vice President Operations & Maintenance, Amtrak, as the keynote speaker.

Federal Communications Commission activity will be related by Ralph A. Haller, Chief, Private Radio Bureau.

Federal Railroad Administration actions will be reported by Administrator John Riley.

As in the past, over $1 million in exhibits will be on display at the three-day technical conference. Walter Weeden, Jr., Chairman & President, Railway Systems Suppliers, Inc., will extend a hearty welcome to attendees to visit the exhibits where the latest in communication and signaling technology will be on display.

Concurrent sessions on Monday afternoon will cover communications and signaling subjects.

Communications topics will include the following:

- -- Report of Committee C- Telecommunications of the C&S Division.
- -- Technical paper covering Grand Trunk Western's Radio Control Block System for moving trains over a 190-mile line.
- -- Evolution of data radio technology since the Advanced Train Control System was born in 1984.
- -- Panel discussion converning FCC activity by several staff members.

Signal session on Monday afternoon will feature the report of Committee E- Signal Systems and a report of the Signal Liaison Subcommittee on activity with the Federal Railroad Administration.

FRA Association Administrator for Safety Joseph W. Walsh will be a key speaker at this afternoon session.

Four technical papers will be presented:

- -- Train-Wayside Informaiton Transmission for High-Speed Rail Lines
- -- Light Source Development Concept for Improved Signal Performance and Maintenance
- -- Nickel Cadmium Pocket Plate Batteries: Safety Features
- -- Maintenance Free Batteries- The Final Solution to the Battery Problem.

The Tuesday morning session will feature reports by Committee D- Highway Grade Crossing Warning Systems; and Committee G- Education & Labor.

A panel discussion will be about the use of 8 3/8-inch or 12-inch diameter lens in flashing-light signals.

Technical papers at this session include:

- -- Design Certification and Testing for Signal Cantilever and Bridge Structures
- -- Automatic Vehicle Identification- A Pilot Test on Burlington Northern
- -- Radio Electronic Token Block System in Service on British Rail
- -- A Computer Assisted Train Order System on Queensland Railways, Australia
- -- The New SNCF Driver Supervision System on the French Railways
- -- Technical Correspondence Training for Signal and Communication Personnel
- -- Training Program for Signal Supervisors

Advanced Train Control Systems will be featured at the Tuesday afternoon technical session. Technical papers include:

- -- System Integration and Simulation Requirements for ATCS
- -- Spacerail- from Concept to Reality
- -- Continent-Wide Train Management- It's Real
- -- Applications and Economic Justification for On-Board Locomotive Computers
- -- Plans to Implement ATCS on the nation's railroads
- -- Principal ATCS Decisions Made

The wrap-up session on Wednesday morning will feature defect detectors, yard controls and lightning protection factors.

The session will lead off with the report of Committee F- Special Applications which includes reports on new Signal Manual parts and railroad use of digital event recorders.

Technical papers include:

- -- Integration of an Acoustic Bearing Analyzer in a Defective Bearing Detection Program
- -- Acoustical Detection of Defective Roller Bearings
- -- Low-Cost Hot Bearing Detector
- -- Today's Hump Yard Control System- Philosophy and Design
- -- Grounding- Lightning and Surge Protection: Factors to be Considered

Florida East Coast to install automatic train control on its 350-mile main line

Florida East Coast Railway is planning to Spend $6 million over the next three years to install an automatic train control system on its mainline between Jacksonville and Miami.

In addition, FEC is embarking on an extensive program to install constant warning time devices at rail-highway grade crossings.

The automatic train control system will make use of Harmon Industries Ultra-Cab 40 system which uses an on-rail frequency of 40 Hz instead of the 60 Hz and 100 Hz frequencies used by other train control systems.

The FEC system will provide four cab signal aspects and seven speed control conditions.

The automatic train control system will automatically apply brakes and bring a train to a stop if the engineer feels to heed the aspects displayed in the cab.

According to Harmon staff engineers, the Ultra-Cab 40 system can distinguish between passing a permissive stop signal and absolute stop signals. Also, the cab signal decoder will recognize a change of conditions while a train is between signals and will display a new aspect.

A microprocessor on board the locomotive operates the train control sytems and makes use of braking curves for the various speeds and weights of train.

100 Years Ago

In 1888 Chicago, Burlington & Quincy Railroad operated trains by signal indication by means of a manual block system over approximately 5.5 miles of 4-track line between Canal Street, Chicago and Hawthorne, Illinois. This was extended in the next 7 years to cover all the 174 miles of double-track railroad from Aurora, Illinois to West Burlington, Iowa.

1988 ASME/IEEE JOINT RAILROAD CONFERENCE
April 12-15, 1988
Pittsburgh, PA

Summary by Linda Sue Boehmer

The annual Joint Railroad Conference, co-sponsored by the Rail Transportation Division of ASME and the Land Transportation Division of the Vehicular Technology Society of IEEE, we held at the renovated William Penn Hotel in Pittsburgh. The committee meetings began on Tuesday, April 12, with the four technical sessions running sequentially on Wednesday and Thursday. The tour Friday morning wrapped up the annual event. The conference experienced higher than usual attendance, with good local representation from ASME and IEEE.

The technical sessions were informative and well-attended. Five IEEE reviewers were on hand to rate each IEEE paper for evaluation in the annual Prize Paper contest and for consideration for Transactions publication. (See attached program for technical paper names.) The winners of the paper prizes from the 1987 conference were announced by outgoing Land Transportation chairman Al Engel at the IEEE luncheon on Thursday. They were:

First Prize ($150.00): R.M. Groh, Harmon Industries

Tools for Analytical Examinatin of Alarm Decision Algorithms for Hot Box Detectors

Second Prize ($100.00): G. Gagarin, Knorr Brake Corporation (U. Kroger & E. Schaumweber, Knorr-Bremse AG)

Eddy-Current Magnetic Track Brakes for High Speed Trains

Third Prize ($50.00): M.L. Long, Morrison-Knudsen Engineers (A. Ueno, Seattle Metro)

Traction Power System Design for Lines 15/18 - Seattle Metro Trolley Coach Expansion Project

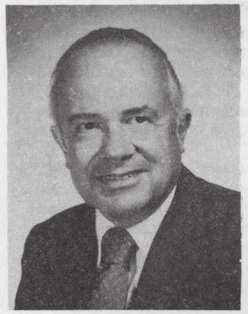
The Wednesday luncheon speaker, T.P. Smithberger, informed the assembled ASME and IEEE members about the American Railway Engineering Society (AREA), including what its committees do and how to join. AREA is open to future joint sponsorship of events.

The Thursday luncheon speaker, William W. Millar, gave an informative and entertaining overview of the Pittsburgh transit environment, past, present and future. It was excellent background for the Friday tour of PAT's rail line and new operation and maintenance facility.

The tour provided by the Port Authority of Allegheny County began in the subway station across the street form the conference hotel, on a chartered LRT, part of PAT's new light rail fleet (55 vehicles) purchased from Siemens-Duewag. It proceeded on a loop downtown and back through the subway, then across the river and through a tunnel to the South Hills suburbs, winding through dedicated rail right of way, paved right of way shared with buses and sections of street running. An informative running commentary was provided on board by PAT manager Norm Voigt. An hour was spent at the state of the art operations facility and the new maintenance building, where all rail maintenance, repair and rehab is performed. Several knowledgeable PAT supervisors and engineers were on hand to answer question. The tour group then boarded a rehabilitated PCC car for a slightly different route on the return trip, a satisfying end to the conference.

1987-88 Chairman of the Land Transportation Division, Al Engel passes on the gavel to 1988-89 Chairman Linda Sue Boehmer. Keynote Speaker William Millar (right), post Land Transportation Chairmen, other IEEE and ASME officers and conference attendees look on.

Professional Activities



Frank E. Lord
Professional Activities Editor

WHAT'S HAPPENING

1988 IEEE US MEMBER OPINION SURVEY

The 1988 IEEE US Member Opinion Survey has just been published. This survey included questions on such topics as standards for membership in profession, the condition of the profession, personal computers in the workplace, the influence of technology on public welfare, IEEE services, IEEE government, and demographics. Copies of the Survey report are available at $5.00 to IEEE members from the IEEE Service Center in New Jersey (Order No. UH0180-0). Two related documents, "Comments on the Survey," by the Opinion Survey Committee, and "Written Comments from the Respondents: A Compendium," are available at no charge from the IEEE/USAB Washington Office. Courtesy copies of all three will be sent to those who helped formulate the questionnaire, Section PACE leaders and Regional Directors.

1988 NATIONAL PACE WORKSHOP

The 1988 National PACE Workshop will be held over Labor Day weekend, September 2-5, at the Point at Squaw Peak, in Phoenix, Arizona. Announcements of the Workshop have been sent to all PACE Chairmen and other officers.

The theme of the 1988 Workshop is "IEEE/USAB Responds to the Changing Environment." Five half-day sessions will address different aspects of this theme. Three of the sessions (Employment Strategies, Specialty Certification, and discussion, followed by breakout discussion groups, capped by reports back to the plenary. The other two sessions (Financial Matters and USAB Member Surveys) will be tutorials.

A special effort is being made this year to facilitate two-way communication between PACE leaders and other IEEE/USAB volunteers. It is hoped that PACE representatives attending the 1988 Workshop will return home feeling that their voices have been heard and that they have contributed to the decision-making process in IEEE/USAB.

NEW USAB POSITIONS

At its May 8 meeting in Boston, Massachusetts, the United States Activities Board approved the following USAB Entity Position Statements:

- Independent Research and Development Funding, which states that "current governmental methodology of handling IR&D fundings for national security contractors is detrimental to investment in R&D and threatens the future of U.S. leadership of advanced technology." The statement includes suggestions for change in the methods currently used.
- The Role of Engineers in Restructuring the Electronic Power Systems in the United States, which recommends that full consideration be given by public policy makers to technical and safety factors, theoretical economic factors, and reliability of service when evaluating restructuring proposals for the electric power industry.
- Photovoltaic Technology Development, which calls photovoltaic systems a "technically viable energy source for U.S. electric utilities." The statement recommends that Federal government and private research and development support should be increased to maintain the momentum of technology advancement; that a broad-based photovoltaic development strategy should be developed and implemented; that public awareness of such alternative energy options as photovoltaic industry in both domestic and international markets should receive increased Federal support.
- In additions, USAB reaffirmed its 1983 Position on Advanced Scientific Computing Capability Requirements with minor revisions and withdrew its 1983 Position on Telecommunications Network Standards Under Deregulation. Copies of all IEEE and USAB Positions are available from the IEEE Washington Office.

UNCOMPENSATED OVERTIME

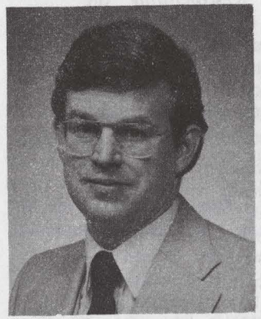
In a letter to Robert P. Bedell, Administrator of the Office of Federal Procurement Policy, USAB Chairman Edward C. Bertnolli explained IEEE's opposition to a wage-busting practice that has surfaced recently in Federal contracting "We are opposed to the practice of bidding mandatory uncompensated overtime and support legislative or regulatory means for prohibiting continuation of this practice," Dr. Bertnolli wrote.

He cited a Senate Armed Services Committee report on defense acquisition problems and suggested resolutions that included a section on mandatory uncompensated overtime, and highlighted IEEE concerns. "The practice of mandatory uncompensated overtime is having a negative impact on the government's ability to obtain quality professional services", the report stated. "The minimum foreseeable results are a reduction in the quality of work, with serious impacts in safety and reliability areas, and a migration of highly skilled professional away from the defense mobilization base."

On behalf of IEEE, Dr. Bertnolli asked Mr. Bedell for assistance "in eliminating this undesirable practice by modifying the Federal Acquisition Regulations to require bidding based on a 40-hour work week/2080 person-year standard as the basis for cost analysis and bids."

The Institute's firm stance as expressed by Dr. Bertnolli was given prominent coverage by Electronic Engineering Times in their May 23 issue.

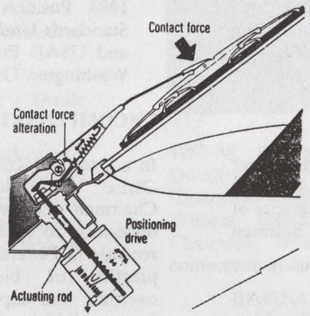
Vehicular Electronics



Bill Fleming
Vehicular Electronics Editor

ELECTRONIC CONTACT-PRESSURE CONTROL OF WINDSHIELD WIPERS

Robert Bosch GmbH recently introduced an electronic contact-pressure control system for windshield wipers. Wiper blade force is automatically adjusted, as vehicle speed and/or rainfall intensity increase. This not only gives better wiping action at high vehicle speeds and at high rainfall rates, but also protects wiper blades by reducing contact pressure under light duty conditions [1].



Bosch Electronic Contact-Pressure Control Wiper System [1]

HIGH-TECH WRECKS ARE PREDICTED

NHTSA fears that active suspension, ABS (Anti-skid Braking Systems), on-board navigation, collision avoidance, radar, and vision enhancement systems may make drivers either overconfident or inattentive. "If an individual can drive a rough road comfortably at 50-60 mph when only 35-40 mph would have been possible in the absence of active suspension systems, will that make a safer driver?" Moreover, on-board navigation and/or heads-up displays may only distract drivers. NHTSA concludes that the advance technology of today appears to be far ahead of the science of human factors engineering that should be accompanying it [2].

DOES LOSING CONTROL, LEAD TO CONTROL?

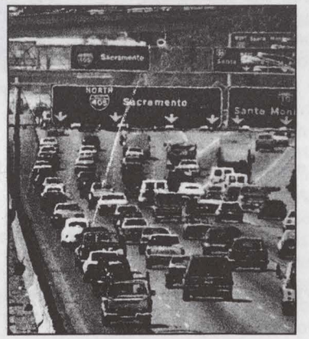
Come February 1990, some 25 Oldsmobile Delta 88s equipped with ETAK on-board navigation systems, and linked via cellular telephone with a 24-hour information center will take to the Santa Monica Freeway in Los Angeles [3]. For a year, the cars will test whether "real time" information -- virtually instantaneous notice of traffic congestion -- can significantly cut the time wasted daily in L.A. freeway traffic jams. For example, if analysts in the CalTrans' (California D.O.T.) offices figure bumping cars off the freeway onto parallel surface streets will help, messages advising the 25 drivers will appear on cockpit computer screens with maps displaying car's location and surrounding streets.

The above CalTrans program is called Pathfinder, whereas a more ambitious, but similar program underway in Europe is called Prometheus [4]. Prometheus came out of Daimler-Benz research into causes of accidents. The company found that with only an extra half-second warning, drivers could avoid half of all rear-end collisions and accidents at intersections, and could reduce head-on accidents by 30 percent. If drivers reacted a full second earlier, they could drive around 90 percent of those accidents. "The ultimate vision of the Prometheus program is to create literally the undriven car of the future."

If Prometheus succeeds, major advancements in under-the-hood electronics and control systems will be required on European-market cars. If U.S. carmakers aren't in on the technology Prometheus is developing, they will suffer a sales disadvantage of having cars that don't work in the European-market New Age system [4].

And the latest story on this subject describes sensors embedded in the San Diego Interstate 405 freeway [5]. Ultimately, the car will talk to the road and traffic congestion will be avoided by all possible means. CalTrans will take control of on-ramps through use of existing stoplights. In times of greater congestion, "two-way surface streets will be turned into one-ways; and CalTrans might even find it necessary to do the same with the Great Slabs."

The next step is for CalTrans to regulate your ability to use your car when city arteries become so clogged that national gridlock is occurring [5]. Is this where we're headed? Is technology about to endow the State with the ability to communicate with your car and disable your ignition in times of region-wide gridlock?



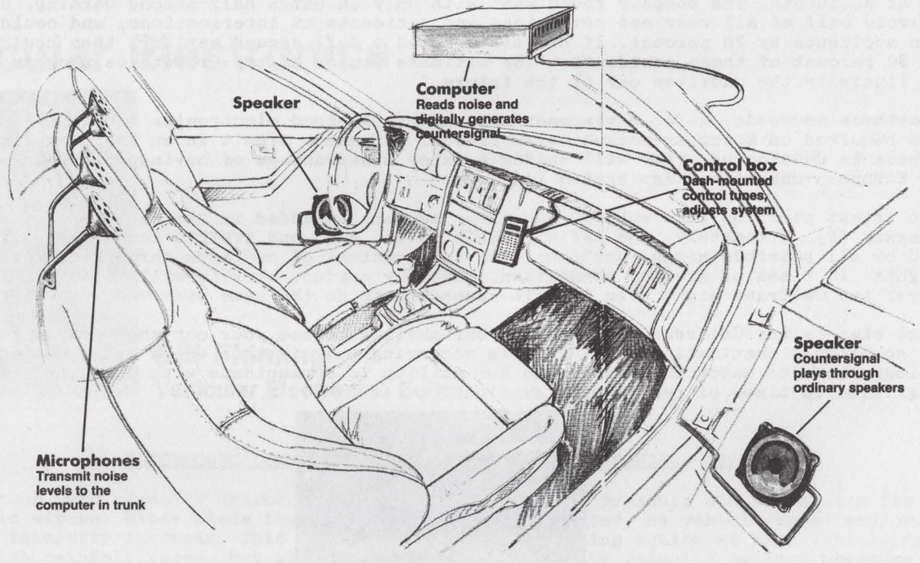
Losing Control [5]

LOTUS ENGINEERING ADAPTIVE NOISE CONTROL SYSTEM

A new development in "anti-noise" -- the cancellation of sound by generation of an out-of-phase noise signal of identical frequency -- was demonstrated by Group Lotus [6-8]. The system presently consists of four microphones, two loudspeakers, and a 40-W power amplifier. Improvements, often in excess of 10 dB, in reduction of noise inside a vehicle have been demonstrated.

Lotus claims a major breakthrough in response time because their system is fast enough (convergence time of 0.1 s) to track throttle opening during rapid vehicle acceleration. Future efforts at Lotus will focus on the addition of active vibration controls that damp vibrational sources of noise, using accelerometers to detect it and actuators ("shakers") in the engine mounts to produce "anti-vibration." In this way, noise will be eliminated both at its source (by vibration control) and at the occupant (by anti-noise control).

Interestingly, there is a lot of other activity in the field of active noise-control technology. Reference 9 lists five other companies now working on this technology, and it also cites a joint venture between General Motors and Boeing on this. Then, finally, there is the reader who wrote: "Lotus's Rube Goldberg approach to quieting engine noise give me a pain...has anybody heard of building an engine that is inherently balanced? Get serious. This is a ridiculous misapplication of technology [10]."



Essential Elements in Lotus Active Anti-Noise System

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2. "NHTSA: High-Tech Wrecks May Be On the Horizon," AutoWeek, May 30, 1988, p. 10.

3. "Unlocking the Grid in L.A.," AutoWeek, April 25, 1988, p. 10.

4. T. Lankard, "When Losing Control Leads To Control," AutoWeek, April 4, 1988, pp. 36-38.

5. L. Mandel, "Congestion -- and the State -- Threaten Our Mobility," AutoWeek, June 6, 1988, p. 17.

6. "Adaptive Noise Control: Cure for Cavity Resonances?," Automotive Engineer, February/March 1988, pp. 24-25.

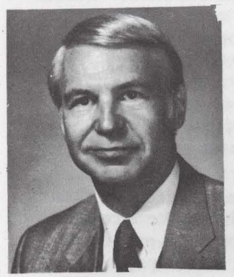
7. S. Birch, "Noise Control," Automotive Engineering, February 1988, pp. 169-170.

8. S. Cropley, "Noise + Noise = Silence," AutoWeek, April 25, 1988, pp. 32-33.

9. F. Lunzer, "Companies Profit From Sounds of Silence," High Technology Business, April 1988, pp. 39-42.

10. F. Praisell, "Painful Solution," AutoWeek, May 16, 1988, p. 19.

News From Washington



Eric Schimmel
Washington News Editor

AN ALTERNATE ALTERNATE

As indicated by the docket number, this proceeding was initiated in 1985 and will be familiar to some readers. The first time around, the proposal met with considerable resistance from the traditional land mobile radio manufacturers. Apparently believing that the concept of "alternate type-acceptance" is a good thing, the FCC has substantially modified its proposal in the hope of mitigating the objections voiced to the original scheme. Check it out, and let the Commission know what you think by June 20. [At press time, it is expected that the reply comment due date will be extended.]

GEN. Docket No. 85-171

In the Matter of

Technical Flexibility in the
Mobile Communications Services,
Rules Parts 2, 22, 74, and 90.

FURTHER NOTICE OF PROPOSED RULE MAKING

Adopted: February 25, 1988; Released: March 22, 1988

By the Commission:

INTRODUCTION

1. By this action, the Commission seeks further comment and information on a proposed equipment testing and authorization procedure for land mobile transmitters, called alternative type acceptance (ATA). The principal goal of this proceeding is to encourage the introduction of new equipment and technology into existing land mobile radio bands in the most efficient manner. To accomplish this goal, adoption of the proposed rules would eliminate the need for lengthy rule making proceedings that are presently required to establish new technical standards. In addition, an applicant does not have to reveal the technical details of proposed equipment as would occur in a rule making proceeding. This confidentiality may be a significant factor in obtaining venture capital for the development of new technologies.

BACKGROUND

2. On May 31, 1985, the Commission adopted a *Notice of Inquiry and Proposed Rule Making* (*Notice*) in this proceeding.[1] In this *Notice*, the Commission proposed establishing an equipment testing and authorization procedure, called ATA, for transmitters that did not meet existing land mobile technical requirements. The ATA procedure would allow the use of new technology without the need for lengthy rule making. In addition, applicants for equipment authorization would not have to reveal the technical details of their proposed equipment as they would in a rule making proceeding. The ATA procedure would ensure that such new technology would not cause more interference than equipment that met the existing land mobile technical requirements.

3. Under the present procedure, accommodation of new technology necessitates amendment of appropriate rules through a rule making procedure. In order to give adequate background for the rule making, the applicant must provide full supporting documentation and explanation of the technology, that is then made available to the public. This may expose concepts or other information that the applicant might wish to remain proprietary. Under the ATA methodology originally proposed in the *Notice*, the manufacturer or distributor of the equipment employing new technology would be required to perform specific tests to determine its interference potential to the FM land mobile service. The characteristics of a "standard" FM Notice along with specific test methodology to determine the interference potential of the new technology equipment. This test methodology would determine a "power derating factor." The power derating factor would determine the transmitter output power that would be permitted under the ATA procedure to ensure that the new equipment did not cause more interference than conventional FM transmitting equipment.[2] The results of these tests would be included in the equipment authorization application and would be reviewed by the Commission.

4. Eight parties filed comments in response to the *Notice*. The commenters supported the ATA concept. They believed that such a procedure would be beneficial and could foster the introduction of more efficient radio equipment. At the same time, however, the commenters indicated that the ATA proposal did present a number of technical and operational problems. Commenters cited technical problems with realizing a standard test receiver, problems with determining an appropriate modulating signal for the equipment under test, and problems associated with using the proposed SINAD ratio.[3] Commenters also cited operational problems in coordinating frequencies for systems using ATA equipment.

DISCUSSION

5. The comments support the concept of ATA, and we are convinced that it has considerable merit. We do find, however, that the commenters have raised some valid concerns with regard to our proposed test methodology and frequency coordination. Therefore, we are proposing a different methodology for ATA that we believe addresses the technical and operational concerns raised.

6. The original ATA proposal was based on developing a model for a standard receiver. The standard receiver would be used to gauge the interference potential of the new equipment and to develop the power derating factor. However, as pointed out by the commenters, receiving equipment designers make a number of design trade-offs. For example, some of the factors that are taken into account are receiver bandwidth, sensitivity and selectivity. Since receiver designs have generally not been subject to Commission regulation, designers have taken a number of approaches to the problem of receiver designs. Accord-

ingly, the choice of a standard receiver that does not unfairly prejudice any existing equipment and still provides the benefits of the ATA procedure becomes very difficult.

7. We are therefore modifying our original ATA proposal to use a methodology based on transmitter characteristics rather than standard receiver characteristics. This methodology compares the characteristics of a transmitter or multiple collocated transmitters using new technology to the characteristics of a conventional FM land mobile transmitter. The transmitter characteristics of FM land mobile equipment are well known and have been regulated by the Commission for many years. This new ATA approach is premised on the fact that if the key technical parameters of the transmitted signals (such as bandwidth and power) are controlled appropriately, the interference potential of an ATA-type transmitter or multiple collocated transmitters should be no greater than the interference potential of a conventional FM transmitter. While this new methodology limits usable bandwidth more than our original proposal and thus restricts somewhat the possible technologies that may take advantage of ATA, we believe that ATA will be extremely valuable for the introduction of new technology. There are still considerable benefits to be gained under this new ATA proposal.

8. We believe that this modified procedure will eliminate the frequency coordination problems raised previously by the commenters. Frequency coordination of ATA equipment will require no more effort than a conventional FM transmitter with equivalent transmitted power. In order to keep the coordination process simple for multiple transmitters in the same FM channel, we are requiring that such transmitters be collocated.

ALTERNATIVE TYPE ACCEPTANCE TESTING

9. All existing administrative procedures and other requirements for equipment authorization remain in effect. With the exception of the test procedure described below, type acceptance for equipment under the ATA procedure will be the same as for conventional FM land mobile equipment.

10. The proposed ATA test procedure will require that emissions fit under a "spectrum signature mask."[4] A spectrum signature is defined as an amplitude versus frequency display of a signal. A "mask" is a graphic approximation of such a spectrum signature. Figure 1 of Appendix A shows the "ATA mask." The shape of the mask was generated using an FM signal modulated with a 1.5 kHz bandwidth Gaussian noise source. This provides a good approximation to voice-modulated signals as observed off-the-air.

11. The spectrum signature of the equipment under test is measured with a spectrum analyzer. The spectrum analyzer's resolution bandwidth is set to 300 Hz, its video bandwidth is set to 30 Hz, and its display is set to hold peak amplitudes of the input signal(s). The emissions from the transmitter or multiple collocated transmitters shall be shown to be contained within the mask. The transmitter(s) shall be modulated so as to display maximum operational amplitudes and bandwidth.

12. The maximum emission from the transmitter, or each transmitter in the case of multiple collocated transmitters, is used to determine the derating relative to the ATA mask. This derating is the difference in decibels between the amplitude of the ATA mask at its center and the maximum emission from each transmitter.[5] The ATA grant will indicate the number of Minuiple collocated transmitters permitted in an FM land mobile channel. Comments are invited about the derivation and methodology of the ATA mask.

13. The total average power of the applicant's transmitter(s) is measured with a power meter. The combined power cannot exceed the power allowed for an equivalent FM transmitter. As required for determining the derating, the transmitter(s) shall be modulated so as to display maximum operational amplitudes and bandwidth. We solicit comments about the measurement and derating of transmitter power.

14. The ATA test procedure utilizes specific spectrum analyzer and power meter characteristics. We recognize that test instruments with these characteristics may not be owned by some applicants. However, such equipment is readily available at equipment rental companies and is relatively easy to use. Tests with the instruments as described are believed to be sufficient for the purposes of ATA. For example, the specified spectrum analyzer settings depict emission bandwidth satisfactorily for a wide range of signal types. These settings, however, do not represent the power of complex emissions in an FM receiver's passband, hence the requirement for measurement of power with a meter that measures the average power of complex emissions.

15. With the showing of conformance to the ATA mask and the limitation of total average power, the applicant may omit showing compliance with Sections 2.985 (Measurements required: RF power output) and 2.989 (Measurements required: Occupied bandwidth) of the Rules and proceed to the other requirements for type acceptance. Comments are invited about the adequacy of the ATA showings for the protection of existing licensees.

16. From a type acceptance applicant's perspective, the ATA test procedure focuses only on transmitter characteristics. The applicant does not have to determine effects of his equipment on FM receivers. The FCC Laboratory used FM receivers to compare FM interference with interference from ATA-type signals. A variety of simulated ATA-type signals were employed such as noise and tone modulated double sideband suppressed carrier, and noise modulated amplitude compandored single sideband. On the basis of the interference tests, described in Appendix B, we are confident that this new approach will ensure that equipment approved under the ATA procedure does not cause more interference than existing FM equipment.

ELIGIBILITY

17. Except as noted below, we propose that permission to use ATA equipment be given to: 1) licensees in the Public Mobile Service 2) Broadcast Remote Pickup licensees; and 3) Private Land Mobile Radio Service licensees (Part 90). ATA users would receive protection as if they were conventional FM land mobile radio licensees. However, we do not propose to relieve ATA users of compliance with existing operating regulations of these services. For example, ATA users would remain subject to existing requirements, such as those in Sections 90.173 (a)(b), 90.233 (a) and 90.403 (e), to cooperate in avoiding interference in the use of shared channels.

18. We are not proposing ATA for the Domestic Public Cellular Radio Telecommunications Service, for Personal Radio Services (Part 95), or for land mobile frequencies shared with UHF television. The engineering model used to develop ATA appears inadequate for authorization of

advanced technology transmitters in cellular radio. It does not take into account technical factors occurring in the cellular environment. These factors include automatic power adjustment of mobile units, handoff of mobiles from one cell to another, and control signalling. However, the Commission recently issued a proposal in General Docket No. 87-390 to permit alternative technologies to be introduced in the cellular service based on a detailed interference study as required by Section 22.903 (c) of the Rules.[6] Type acceptance would not be required in such instances. We are inviting comments in this item as to whether ATA could be made applicable to cellular in order to reduce the need for separate analyses.

19. We also are not proposing ATA for Personal Radio Services (Part 95) due to concern about interference in this service. With respect to use of ATA transmitters on shared UHF television channels, there is a possibility that equipment authorized under ATA would cause more interference to television than would FM land mobile radio.

PROCEDURAL MATTERS

20. In view of the foregoing and pursuant to Sections 4(i), 4(j), and 303(r) of the Communications Act of 1934, as amended, 47 U.S.C. Sections 154(i), 154(j) and 303(r), it is proposed to amend Parts 2, 22, 74, and 90 as set forth in the APPENDIX A below.

21. In accordance with the procedures set forth in Section 1.415 of the Commission's Rules, interested persons may file comments on or before **June 20, 1988,** and reply comments on or before **July 20, 1988.** All relevant and timely comments will be considered by the Commission before final action is taken in this proceeding. In reaching its decision, the Commission may take into consideration information and ideas not contained in the comments, providing that such information or a writing indicating the nature and source of such information is placed in the public files, and provided that the fact of the Commission's reliance on such information is noted in the *Report and Order*.

22. In accordance with the provisions of Section 1.419 of the Commission's Rules, formal participants shall file an original and five (5) copies of their comments and other materials. Participants wishing each Commissioner to have a copy of their comments should file an original and ten (10) copies. Members of the general public who wish to express their interest by participating informally may do so by submitting one copy. All comments are given the same consideration, regardless of the number of copies submitted. All comments should be clearly marked General Docket No. 85-171, and will be available for public inspection during regular business hours in the Commission's Public Reference Room at its headquarters at 1919 M Street, N.W., Washington, D.C. All written comments should be sent to: Secretary, Federal Communications Commission, Washington, D.C., 20554. For general information on how to file comments, please contact the FCC Consumer Assistance and Small Business Division at (202) 632-7000.

23. For purposes of this non-restricted notice and comment rule making proceeding, members of the public are advised that *ex parte* presentations are permitted except during the Sunshine Agenda period. *See generally* Section 1.1206(a). The Sunshine Agenda period is the period of time that commences with the release of a public notice that a matter has been placed on the Sunshine Agenda and terminates when the Commission (1) releases the text of a decision or order in the matter; (2) issues a public notice stating that the matter has been deleted from the Sunshine Agenda; or (3) issues a public notice stating that the matter has been returned to the staff for further consideration, whichever occurs first. Section 1.1202(f). During the Sunshine Agenda period, no presentations, *ex parte* or otherwise, are permitted unless specifically requested by Commission or staff for the clarification or adduction of evidence or the resolution of issues in the proceeding. Section 1.1203.

24. In general, an *ex parte* presentation is any presentation directed to the merits or outcome of the proceeding made to decision-making personnel which (1) if written, is not served on the parties to the proceeding, or (2), if oral, is made without advance notice to the parties to the proceeding and without opportunity for them to be present. Section 1.1202(b). Any person who submits a written *ex parte* presentation must provide on the same day it is submitted a copy of same to the Commission's Secretary for inclusion in the public record. Any person who makes an oral *ex parte* presentation that presents data or arguments not already reflected in that person's previously-filed written comments, memoranda, or filings in the proceeding must provide on the day of the oral presentation a written memorandum to the Secretary (with a copy to the Commissioner or staff member involved) which summarizes the data and arguments. Each *ex parte* presentation described above must state on its face that the Secretary has been served, and must also state by docket number the proceeding to which it relates. Section 1.1206.

INITIAL REGULATORY FLEXIBILITY ANALYSIS

25. Pursuant to the Regulatory Flexibility Act of 1980, 5 U.S.C. Section 603, the Commission's initial analysis is as follows:

I. Need and purpose of this action:

The Commission believes that its rules and policies should be reviewed in the context of current social, technological, and financial environments in which licensees and applicants operate, so that service to the public may be facilitated while the least regulatory cost is imposed. It is in this light that it is considering modification of its rules, Parts 2, 22, 74, and 90.

II. The objectives:

The Commission proposes to accommodate new mobile radio technology systems by reducing regulation to the maximum extent feasible. The Commission believes that such action will lead to a more rapid development of mobile radio technology.

III. Legal basis:

Action proposed herein is taken pursuant to Section 4(i) and 303 of the Communications Act of 1934, as amended.

IV. Description, potential impact and number of small entities affected:

We do not believe that this *Further Notice* will have a detrimental impact upon small entities in light of steps we have taken to control interference. Operation of current licensees should not be affected. Indeed, insofar as our action permits new technology, it is likely that it will benefit all licensees whether small or large, because it will provide them with additional equipment and services that

seek to enter the new markets that this action will create. Also, since the action is deregulatory in nature, it should provide expanded business opportunities for all vendors and users of communications equipment, both small and large. Beyond this, we are unable to quantify the potential effects of this action on small entities. Comments are requested on this point by interested parties.

V. Recording, record keeping and other compliance requirements:

The proposed modifications to Part 2 of the Rules would require only record generation by the manufacturer sufficient to meet type acceptance standards for the equipment. The option of using existing procedures is retained.

VI. Federal rules which overlap, duplicate or conflict with this rule:

None.

VII. Any significant alternatives minimizing impact on small entities and consistent with the stated objective:

None.

PAPERWORK REDUCTION ACT STATEMENT

26. The proposal contained herein has been analyzed with respect to the Paperwork Reduction Act of 1980 and found to impose a modified information collection requirement on the public. Implementation of a modified requirement will be subject to approval by the Office of Management and Budget as prescribed by the Act.

27. For further information on this proceeding contact Hector Davis, FCC Laboratory, Office of Engineering and Technology, 7435 Oakland Mills Road, Columbia, Maryland 21046, (301) 725-1585.

FEDERAL COMMUNICATONS COMMISSION

H. Walker Feaster III
Acting Secretary

APPENDIX A

PROPOSED CHANGES FOR FCC RULES AND REGULATIONS

PARTS 2, 22, 74, and 90

1. In 47 CFR Part 2, Subpart J - Equipment Authorization Procedures, Section 2.990 is proposed to be added to read as follows:

Section 2.990 Alternative type acceptance (ATA) grant.

(a) In lieu of the measurements required in Sections 2.985 and 2.989 of this part, an applicant may elect to apply for an equipment authorization grant under alternative type acceptance (ATA) as contained in this section. ATA is intended as an expeditious alternative for applicants who wish to market new mobile radio transmitter technologies that will coexist with conventional FM land mobile systems in the land mobile bands. Under ATA, licensees have an option to use new technologies with the understanding that their transmitter power has been derated in order to prevent interference to other licensees. Note that an applicant electing to use ATA shall comply with the other requirements for type acceptance.

(b) An applicant for an ATA grant shall derate the emissions of the proposed equipment compared to the transmitter power allowed for conventional FM land mobile radio equipment. The proposed equipment may consist of multiple collocated transmitters in an FM land mobile channel.

(c) The applicant shall perform the following tests in order to determine the derating with respect to the transmitter power permitted for conventional FM land mobile radio equipment:

(1) The operating conditions for the transmitter or multiple collocated transmitters under test are established so that the maximum bandwidth in channel is displayed. These conditions include modulation, all transmitters operating, all hopping frequencies shown, pulsed operation shown. This bandwidth shall be contained within the ATA mask defined as the following straight line approximation of a conventional FM emission (*See* Figure 1.):

Frequency Rel. to Center of Channel	Amplitude
<-35 kHz	-70 dB
-25 kHz	-70 dB
-25 kHz	-60 dB
-11 kHz	-60 dB
-4 kHz	-7 dB
0 kHz	0 dB
+4 kHz	-7 dB
+11 kHz	-60 dB
+25 kHz	-60 dB
+25 kHz	-70 dB
>+35 kHz	-70 dB

The measurements shall be made with a spectrum analyzer with the following settings: 300 Hz resolution bandwidth, 30 Hz video bandwidth, and peak hold. The maximum emission from the transmitter or each transmitter in the case of multiple collocated transmitters shall be plotted so as to touch the ATA mask. The derating of each transmitter is the amplitude of its maximum emission relative to 0 dB at the center frequency of the ATA mask.

(2) The power of the transmitter(s) is measured to assure that the combined power is no greater than the allowable FM transmitter power. A power meter that measures average power shall be used. The transmitter(s) shall be modulated and operated as described for determining the derating. No adjustments for duty cycle will be made. Therefore 100% duty cycle will be required for the purposes of this test.

(d) The applicant for ATA shall submit a description of the above test results with his application, including a graph showing the ATA mask with the emissions from the transmitter(s).

(e) The Commission staff will review the application and may request the applicant to furnish a representative transmitter(s) in order to reproduce the tests. If the equipment meets the basic requirements it will be type accepted under an ATA grant, that specifies the transmitter(s) power as derated for the grant.

2. In 47 CFR Part 22, Subpart C - Technical Standards, Section 22.120 is proposed to be amended to add paragraph (e) to read as follows:

Section 22.120 Type acceptance of transmitters.

* * * * *

(e) In addition to type accepted transmitters employing conventional modulation, a licensee of a land mobile radio channel, except those in the Cellular Radiotelephone Service and those in shared UHF television channel, may use transmitters granted alternative type acceptance (ATA) under Section 2.990. These transmitters will be licensed on channels where authorized bandwidths of 25 kHz or greater are allowed. Sections 22.507 and 22.508 do not apply to these transmitters.

3. In 47 CFR Part 74, Subpart D - Remote Pickup Broadcast Stations, Section 74.451(a) is proposed to be revised to read as follows:

Section 74.451 Type acceptance of equipment.

(a) Applications for new remote pickup broadcast stations or systems or for changing transmitting equipment of an existing station will not be accepted unless the transmitters to be used have been type accepted by the FCC pursuant to the provisions of this subpart, or have been type accepted for licensing under Parts 21 or 90 of the FCC rules and do not exceed the output power limits specified in 74.461(b), or have been granted alternative type acceptance (ATA) under Section 2.990. In addition to the requirement to maintain the power derating established for the ATA grant, a licensee will be required to operate in accordance with the limits given in 74.461(b). Subsection 74.461(a) and Section 74.462 do not apply to transmitters granted ATA. These transmitters will be licensed on channels where authorized bandwidths of 25 kHz or greater are allowed.

* * * * *

4. In 47 CFR Part 90, Subpart I - General Technical Standards, Section 90.203(a) is proposed to be revised to read as follows:

Section 90.203 Type acceptance required.

(a) Except as specified in paragraph (b) of this section, each transmitter utilized for operation under this part and each transmitter marketed as set forth in Section 2.803 of Part 2 shall be of a type that is included in the Commission's current Radio Equipment List as type accepted for use under this part; or, be of a type that has been type accepted by the Commission for use under this part in accordance with the procedures in paragraph (a)(2) of this section, or be of a type that has been granted alternative type acceptance (ATA) under Section 2.990. (*See* also Section 90.217.) ATA equipment will not be permitted in a shared UHF television channel.

* * * * *

5. In 47 CFR Part 90, Subpart I - General Technical Standards, Section 90.217 is proposed to be amended to designate the existing language as paragraph (a) and add new paragraph (b) to read as follows:

Section 90.217 Exemption from technical standards.

(a) * * *

(b) Transmitters authorized under alternative type acceptance (ATA), Section 2.990, are exempt from the restrictions on types of emissions and bandwidth limitations set out in this subpart. Such transmitters may not operate in the continuous carrier transmit mode. They will be licensed on channels where authorized bandwidths of 25 kHz or greater are allowed.

6. In 47 CFR Part 90, Subpart J - Non-Voice and Other Specialized Operations, Section 90.231 is proposed to be amended to add the following sentences:

Section 90.231 Scope.

* * * * *

Transmitters authorized under alternative type acceptance (ATA), Section 2.990, are exempt from the restrictions on types of emissions set out in this subpart. Such transmitters may not operate in the continuous carrier transmit mode. ATA equipment will not be permitted in a shared UHF television channel, or in fixed or telemetry services.

APPENDIX B

COMPARISONS OF FM INTERFERENCE WITH INTERFERENCE FROM ATA - TYPE SIGNALS

1. Two typical FM land mobile receivers were used for comparisons of FM interference with interference from ATA-type signals. One receiver was a relatively inexpensive FM transceiver, while the other was a more expensive base station transceiver. These receivers were tested with several emission combinations typifying transmitters that might be authorized under ATA.

2. The tests were based on procedures for adjacent channel selectivity given in Electronic Industries Association Standard RS-204-C, January 1982. First, the reference sensitivity of the receiver under test was determined. This is the tuned signal level resulting in a 12 dB SINAD. Then, the level of the tuned desired signal was increased 3 dB, resulting in an improvement (increase) of the standard 12 dB SINAD. Next, the level of an interfering undesired cochannel FM signal was found that decreased the SINAD to 12 dB again. (The modulations of the desired and undesired FM signals were found from the EIA Standard 1 kHz at 3 kHz deviation and 400 Hz at 3 kHz deviation, respectively.)

3. The undesired cochannel FM signal was replaced by a simulated cochannel ATA-type signal, derated with respect to the previously measured undesired cochannel FM by using the proposed ATA mask and power measurement. If the resulting receiver SINAD was 12 dB or more, ATA was judged to be satisfactory, resulting in "no more harm" than the undesired FM signal.

4. The two FM receivers were tested with the following ATA-type signal configurations:

Two carriers with center frequencies at the channel center frequency plus or minus 1.5 kHz, each double sideband suppressed carrier amplitude modulated with 1.5 kHz bandwidth Gaussian noise.

One of the above signals, centered in the channel.

Two carriers, one centered in the channel, one at the center frequency less 1 kHz, both double sideband suppressed carrier amplitude modulated with 400 Hz.

One of the above signals, centered in the channel.

Two amplitude compandored single sideband transmitters with their center frequencies at plus and minus 2.5 kHz with respect to the center frequency of the FM channel and modulated with 1.5 kHz bandwidth Gaussian noise.

5. For each of the above configurations, a SINAD of 12 dB or higher was measured validating ATA. In general, the higher the SINAD ratio is, the better is the quality of a communications channel. Note that the use of a 12 dB SINAD for the purposes of evaluating ATA was only relative. It was used as a reference point for comparing the effects of an interfering undesired cochannel FM signal with those of an interfering undesired cochannel ATA-type signal. In practice, a 12 dB SINAD due to interference from an ATA-type signal should be no more likely than a 12 dB SINAD due to an interfering FM signal.

6. According to the laboratory tests, interference from ATA-type signals is relatively independent of the characteristics of individual receivers typical to the FM land mobile service. The skirts of the ATA mask are intended to preclude slope detection of signals that might otherwise be outside of a receiver's passband.

FOOTNOTES

[1] *See Notice of Inquiry and Proposed Rule Making*, General Docket No. 85-171; 50 FR 25274, June 18, 1985.

[2] For example, the ATA test procedure could be used to permit multiple channel narrow band equipment to operate within a conventional land mobile channel. Since conventional land mobile systems operate with 25 kHz channel spacing and frequency modulation, it might be possible to operate multiple channel narrow band equipment, such as 5 kHz amplitude compandored single sideband (ACSSB) equipment in an FM channel, without causing additional cochannel or adjacent channel interference. This would be accomplished by attenuating or reducing the power in some or all of the 5 kHz channels. The amount of attenuation would represent the power derating factor and, theoretically, the multiple 5 kHz channels would represent the equivalent interference potential of a conventional 25 kHz FM channel transmission.

[3] SINAD is a ratio of signal plus noise and distortion to noise and distortion. SINAD is defined in Electronics Industries Association Standard RS-204-C, January 1982, p. 3.

[4] We are proposing to limit the applicability of ATA to those land mobile channels where the channel bandwidth is 25 kHz or greater, including 25 kHz FM channels at a center frequency spacing of 12.5 kHz. While the ATA concept is applicable for FM channels less than 25 kHz in bandwidth, the present proposal was developed and tested assuming a channel bandwidth of 25 kHz. It is applicable to channels of 25 kHz bandwidth and wider. Interference could be expected if it were employed for narrower channels, since the emissions within adjacent channels may be excessive. However, appropriate conditions for ATA could be developed for such channels. This development may follow successful implementation of the present proposal.

[5] As an example, let us assume an applicant chooses to implement two transmitters with their peak emissions at plus and minus 4 kHz from the center of the channel. To ensure that the transmitters comply with the frequency roll-off characteristic of the ATA mask, each transmitter should be reduced in power by 7 dB, as required by the mask. Therefore, for the typical case of an FM transmitter with a power of 17 dBW, each of the applicant's transmitters should be attenuated so that they do not exceed 10 dBW. Be aware that the applicant may have to reduce the combined power of the two transmitters an additional amount to ensure compliance with the combined power requirement discussed in paragraph 13.

[6] *See Notice* of Proposed Rule Making, General Docket No. 87-390; 2nd FCC Rcd 6244 (1987).

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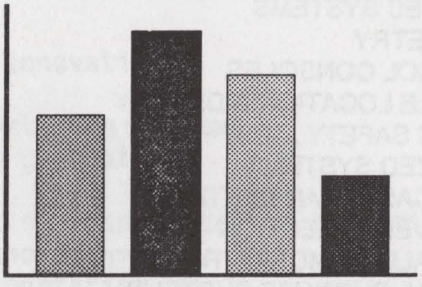

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