MAGLEV Transit System

View of elevated guideway
As this issue of the Vehicular Technology Society newsletter crosses your desk, the 1982 Thirty-second Annual Vehicular Technology Conference will have (or just about) concluded. All indications are that this will be a bigger and better conference than those in the past but this is not to say that we should not continue to strive for even more successful conferences in the future. To this end I solicit comments directed to my attention so that the various views and opinions of our members can be consolidated and presented to the board and future conference committees.

YOUR valuable input is needed.

Elsewhere in this issue you will find a list of candidates for Director of the five positions which expired December 31, 1981. With the completion of this election we will be back on schedule and I trust that you will execute your ballot as soon as it is received. Roger Madden, our immediate past President has done an excellent job in selecting candidates for this most important election. It is not too soon to start thinking about the election that will take place for an additional 5 Members of the Board whose term expires at the end of this year and urge all of you to send your thoughts to Roger Madden (whose address appears on Page 3 of this issue).

If you have any other ideas about our Vehicular Technology Society, please pass them on to me so that they may be presented to the Board for consideration and action. Our First Board Meeting for 1982 is scheduled for May 26th in conjunction with this year’s conference. The second Board meeting of this year is scheduled to be held in conjunction with Convergence 82 which takes place October 4, 5, 6, at the Dearborn, Michigan, Hyatt Regency.

Sincerely,

STUART MEYER
President
IEEE-VTS

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Month of Issue

Final Copy

Target

To Be Rec'd

Mailing

Date

August
6-09-82
7-13-82

September
9-13-82
10-20-82

October
12-14-82
1-18-83

November
3-09-83
4-13-83

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

We would like to extend congratulations to seven members of the Vehicular Technology Society who were recently elevated to the most distinguished membership grade of the IEEE—that of IEEE Fellows. Fellows are named annually by the IEEE Board of Directors after election by a committee of peers. A mark of unusual distinction, Fellow grade is conferred only upon persons of outstanding qualifications and experience in their particular fields. Members of our society so honored this year are:

Shank B. Dewan for research and education in power electronics.

Roger R. Wicks for pioneering work in VHF and UHF mobile radio systems.

William J. Kerby for contributions to the theory and practical realization of active RC circuits.

William Chin-Hoi Lee for contributions to the analysis, modeling, and conceptual and practical design of mobile telephone systems.

Peggy M. Meyer for contributions to the theory of ferromagnetic and to the development of materials for the suppression of electromagnetic interference.

Michael E. Purcell for contributions to information theory and spread-spectrum communications.

Gary A. Sholes for contributions to computational methods in electromagnetic theory.

We also call to your attention the list of candidates for Director for the five positions which expired December 31, 1981. Study their qualifications so you can vote wisely when your ballot arrives. Any thoughts you have concerning future candidates should be sent to:

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Board of Directors Report

Samuel A. Leslie
VTS Secretary

IEEE VTS EXECUTIVE COMMITTEE MEETING
Washington, D.C.
February 28, 1982

The following Board Members were in attendance at the Executive Committee meeting:

Stuart Meyer - President
Roger Madden - Past President and Nominations Chairman
Bob Fenton - Treasurer
Kent Johnson - Newsletter Editor
Sam McConaughey - Charter Chairman
Sam Leslie - Secretary

The Executive Committee met to accomplish the following:


2. Explore solutions to a potential future income problem with the treasurer.

3. Propose a slate of officers to be elected by the Board for the 1982 calendar year.


Slate of Candidates:

The tentative list of candidates for election to the VTS Board (as of the newsletter publication date, and subject to Board approval) is as follows:

Transportation Systems:

John H. Ayer, Jr., General Railway Signal. Mr. Ayer is a new candidate for the Board.

Art Goldsmith, U.S. Department of Transportation, retired. Mr. Goldsmith is also a new candidate for the Board.

Ronald C. Rule, Boeing Aerospace Co. Dr. Rule is currently serving as chairman of the education committee, and is standing for re-election to the Board.

Automotive Electronics:

Robert A. Mazzola, TRW Automotive Worldwide. Mr. Mazzola is currently serving as chairman of the membership committee, and is standing for re-election to the Board.

Communications:

V. Edgerton, JTR, Inc. Edgerton has served the Board previously as PAC chairman, and is a new candidate for the Board.

W. C. Y. Lee, ITT Defense Communications. Mr. Lee is currently serving as the Associate Transactions Editor, Communications, and is a new candidate for the Board.

Roger Madden, Federal Communications Commission. Mr. Madden is the past president of VTS, and is currently serving on the Board as the nominations chairman and as chairman of the constitution and bylaws committee. He is standing for re-election to the Board.

George Mitchell, Motorola. Mr. Mitchell is currently serving as the vice president of the Board, and is standing for re-election.

Carlos Roberts, Director of Land Mobile Development of Microwave Associates. Formerly Chief of the Private Radio Bureau at the FCC, Mr. Roberts is a new candidate for election to the Board.

Of these candidates, five will be elected for the 1982-1985 term. The attendance record for the above candidates who have been serving on previous VTS Board assignments is included with this report for your reference.
VTS DUES INCREASE

The VTS Treasurer, Bob Fenton, reported on an anticipated loss of approximately $7000 in cash position for the Society in 1982. The ensuing discussion indicated that most of the other IEEE Societies currently have higher rates, and that VTS has not had a dues increase in four years. Furthermore, a review of the financial data from the IEEE Headquarters indicated that the cost for printing and mailing the VTS Transactions and the VTS Newsletter is in the $25 to $30 range for each member. Providing inflation and increased operating expenses as a reason, Madden then moved, Fenton seconded, that the yearly VTS dues be increased ten dollars. This motion is subject to mail ballot approval by the elected board members.

EXECUTIVE COMMITTEE ELECTION

The nominations chairman Rosen Madden, proposed that the present executive committee continue for the 1982 year:

President – Stuart Meyer
Vice President – George Mitchell
Secretary – Bob Fenton

This slate is subject to confirmation by the elected members of the Board, which is to be accomplished via mail ballot.

RESULTS OF LAST MAIL BALLOT:

Since a quorum of elected board members was not present at the last Board of Director's meeting, a mail ballot was held on those motions which were made at the meetings and which required approval by a majority of the Board. The results are as follows:

1. 13 in favor; one not responding; to approve the minutes of the June meeting as published.

2. 12 in favor; one against; one not responding; to approve the purchase of transcribing equipment amount not to exceed $200.

3. 13 in favor; one not responding; to approve the placement of VTS funds not needed for general operation of the Society into IEEE's Option 2 money market fund.

4. 12 in favor; one against; one not responding; to approve an additional $1500 seed money for the San Diego Conference.

5. 13 in favor; one not responding; to approve $1000 seed money for the 1983 Toronto VTS Conference.

6. 13 in favor; one not responding; to approve Washington as the site of the 1984 Conference, and to consider a joint AFCEA/VTS Conference in 1985.

MISCELLANEOUS:

Never reported that the Pittsburgh VTS Chapter has asked to sponsor a VTS conference. The possibility of holding the 1984 conference in Pittsburgh instead of Washington was discussed, with the Washington conference possibly being moved to 1986. This matter will be explored further at the next Board of Director's meeting in San Diego.

McClure reported via a photo of the upcoming IEEE VTS book titled "Mobile Communications Engineering" should be ready for ordering by the end of May. Order blanks for this book will be prepared for distribution at the San Diego Conference.

The first Board of Director's meeting of the year will be held on Wednesday, May 26th at the San Diego Conference. The Executive Committee has tentatively recommended that the second board meetings be held at Convention '83, which is scheduled for October 4 through 6 in Dearborn.

Respectfully Submitted,

Samuel A. Leslie
IEEE VTS Secretary

Chapter News

Sam McConoughey
Chapter News Editor

Chapter Jims

MEETINGS

Cleveland

"Marine and Rescue Communications" by Lt. Fred Adamo, DECC 9th District Held on November 17, 1981 with 20 attending, including 12 guests.

"Technology briefing Session and Tour, NASA-Lewis Research Center" by Richard Atchay Held on December 9, 1981 with 25 attending, including 18 guests.

"Electronic Compatibility" by John Cunningham, (Chairman A-9). Senior Technical Director, Cleveland Institute of Electronics Held jointly with Audio-Broadcasting on March 3, 1982 with 19 attending, including 6 guests.

Washington, D.C.

"Living with Lighting" by Mr. A. E. Guthrie, General Electric Co. Held on October 23, 1981 with 26 attending, including 6 guests.

"Current Status of International Mobile Radio Services" by Mr. Wendell R. Harris, Federal Communications Commission Held on December 11, 1981 with 22 attending, including 5 guests.

"Single Sideband for Land Mobile, Today, Tomorrow, the Future" by Mr. Niles L. Barlow, President Sideband Technology, Inc. Rochester, N.Y. Held on March 22, 1982 with 41 attending, including 10 guests.

By Samuel R. McConoughey, Editor & Sheila Parker c/o F.C.C., 1959 N Street, N.W., Room A-309 Washington, D.C. 20544

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Photograph of Throttle Body Fuel Injector Assembly

Schematic Diagram of Throttle Body Fuel Injector Assembly

For 1982, General Motors has introduced "cross-fire" electronic fuel injection on 5-liter V-8 engines available in newly designed Camaro 245 models. Two throttle body fuel injectors are mounted on a "cross-fire" intake manifold which has runners tuned to feed fuel to the cylinder banks farthest from the injectors. The engine produces 165 hp, 25 hp more than the carbureted version of the same engine.¹

The throttle body injector assemblies contain electronic fuel injectors, individual fuel pressure regulators, a throttle position sensor, and an idle air control motor. The fuel injectors open and close in response to signals from an electronic control module. The amount of fuel delivered depends on the length of time the injector is open. Pulse duration ranges from about one to six milliseconds, depending on engine operating needs.²

The EFI system on the "cross-fire" engine is considered to be an especially sophisticated version of black box electronic controls. Consequently, GM's Delco Electronics repair manuals for this version of Computer Command Control devote 70 pages to diagnosis-and-repair trouble trees to assure quality service for this high-tech car.³

Automotive Electronics

Dateline: Detroit

Bill Fleming
Automotive Electronics Editor

Chevrolet "Cross-Fire"
EFI V-8 Engine and Controls

¹ For 1982, General Motors has introduced "cross-fire" electronic fuel injection on 5-liter V-8 engines available in newly designed Camaro 245 models. Two throttle body fuel injectors are mounted on a "cross-fire" intake manifold which has runners tuned to feed fuel to the cylinder banks farthest from the injectors. The engine produces 165 hp, 25 hp more than the carbureted version of the same engine.

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**ELECTRONIC CONTROL OF TRANSMISSION SHIFTING GAINS INTEREST**

Toyota Motor Company and Renault join GM Detroit Diesel Allison Division, Borg-Warner Corporation, and Lyco-Ke-Oak announcing developments in electronically shifted transmission systems.¹

Toyota's system includes a microcomputer which replaces normal hydraulic-pressure values and which relies on sensors that monitor vehicle speed, throttle position, coolant temperature, etc. With these inputs, the microprocessor computes optimum shift points, gear changes, and lockup points; while sending signals to actuate these functions. Toyota provides a push-button choice of three shift patterns -- (1) normal, (2) economy shifting which broadens the direct drive lockup ranges, and (3) power shifting for faster acceleration or more effective engine braking.²

In Renault's system, the transmission and engine speeds are controlled by a microcomputer that matches the gear ratio to throttle opening to maximize fuel efficiency for any power demand. Instead of the usual mechanical linkage to the throttle, the throttle is positioned by a servo actuator controlled by signals from the microcomputer. The vehicle includes a steplessly variable ratio van Dongen transmission to permit a greatly expanded range of gear ratio selection. In this system, the driver sets the accelerator pedal position which determines only thecommanded rate of acceleration or desired road speed, but does not directly control the throttle position.³

---

**REFERENCES**


Transportation Systems

David B. Turner

The following news from England on a commercial MAGLEV project under construction shows that the driving force behind transportation system development is still strong. The upcoming Vehicular Technology Conference (May 23–26) in San Diego will showcase other work in progress in transit technology. See you there!

MAGLEV Transit System

View of elevated guideway

THE BIRMINGHAM MAGLEV TRANSIT LINK

GENERAL

The construction has recently started on the magnetic levitation (MAGLEV) transit link at Birmingham Airport, England. When the transit link is handed over to passenger service in June 1984, it will be the first revenue-earning MAGLEV system in the world. This follows more than seven years of research and development effort.

The project is a joint venture of the People Mover Group (PMG), West Midlands County Council (WMCC), British Rail (BR) and the British Government’s Departments of Trade and Industry.

The PMG consists of the following companies:

- Balfour Beatty Power Construction
- Brush Electrical Machines
- Metro-Cammell
- GEC Rectifiers
- GEC Hititton Kramer
- GEC General Signal
- GEC Transportation Projects

The overall project management and system engineering is by GEC Transportation Projects, with WMCC as the system operators.

The MAGLEV link connects the new airport terminal building with an station and the National Exhibition Centre by means of two independent tracks mounted on an elevated guideway 630 metres long.

Each track can accommodate a single, or a train of two, 8-metre-long vehicles. With a journey time of 90 seconds and a dwell time of 40 seconds, track capacity is 100 passengers/Direction/hour when a single vehicle is in operation. The second track and vehicle provide increased flexibility and availability.

TECHNICAL

The power supply is 600V DC from two trackside conductor rails rated 560A. An emergency consumption of 0.165kWh/passenger-km results in a very economical system. The operation is fully automatic, computer-controlled and monitored from a remote control centre.

Propulsion is by means of a linear induction motor with 4.4N thrust supplied by an on-board variable voltage and frequency transistor inverter. This provides smooth traction and braking forces without mechanical contact with the track. The reaction rail consists of a steel beam with an extruded aluminum cover plate.

Suspension and guidance are by means of de-controlled electro-magnets mounted in pairs under each vehicle corner. The magnets are fed by transistor chopper amplifiers so that an attractive force can be produced to lift the vehicle and keep it nominally 15mm from the two laminated steel suspension rails. Because the magnets uniformly distribute the load, in contrast to wheeled vehicles, the track design is relatively economical.

The vehicle chassis employs light-weight welded aluminum construction, supporting a moulded GRP body shell.

OPERATION

Since the system operates very few moving parts, the maintenance requirements are small, while a high reliability is assured.

Self-checking and diagnostic features are included in the design to facilitate trouble-shooting and repair. In case of power supply failure or major equipment malfunction, the vehicle comes into contact with two rails and gradually slows by means of gravity brake pads. Acceleration and deceleration are limited to ensure a high level of passenger comfort.

SAFETY

Fail-safe automatic train operation and protection are based on proven conventional railway engineering standards using the latest technology. Fire risk is minimized due to absence of frictions, moving parts, rubber tyres, lubricants, oil and fuel. Fire-retardant materials are employed throughout. For passenger security, facilities for TV surveillance and two-way speech communication with the vehicles are provided.

FUTURE

The Birmingham MAGLEV Transit Link will demonstrate the advantages of this advanced system over conventional people-movers, and allow other airports, seaports, and public facilities to confidently apply the MAGLEV solution to their traffic problems. The worldwide demand for efficient and environmentally acceptable transportation systems will increase in response to public concern for energy shortage and pollution control.
The FCC has released two proceedings which are of interest to the mobile land service community. One is an inquiry into "Future Land Mobile Telecommunications Requirements" and is reproduced in its entirety below. The other is a Notice of Proposed Rulemaking in Docket 79-164 and deals with 24 questions concerning the possible biological effects of electromagnetic radiation, and related FCC regulations. It is 43 pages long and too much to attempt to reproduce here, but for additional information, the FCC has prepared a digest by Dr. Robert S. Terman (2021) 632-7073. Comments and Reply Comments are due June 18 and August 18 respectively.

In the Matter of:

[Redacted]

NOTICE OF INQUIRY


By the Commission:

Purpose

1. The purpose of this proceeding is to solicit comments and obtain information regarding the current and future requirements of the Private Land Mobile Radio Service and the DoD Land Mobile Radio Service. The Commission will use this information to formulate a plan to accommodate the current growth of the private land mobile radio communications systems in this band. Further, it will provide a vehicle for establishment of communications standards between the Commission and the land mobile user community.

2. Land mobile radio is a term used to describe both voice and data communications between two or more moving vehicles or persons. Because of the characteristics of the vehicles or persons served by land mobile radio systems, there is no substitute for radio which can meet these communications requirements. Land mobile radio is an important service in all areas for the United States.

3. Private land mobile radio is used extensively by doctors, police, firefighters, utility crews, truckers, ambulances, taxis, railroads, newspapers, forestries, repair personnel, businesses, construction firms, small and large businesses, and countless others to maintain and improve the well being and prosperity of the nation.

4. Because of it:
- Business establishments can respond more quickly to service calls from customers.
- Police, fire and other emergency services are able to locate new make and mobilize at their destinations more promptly.
- Manufacturers can produce higher quality products at lower cost.
- Public utilities can respond more quickly to trouble calls.
- Forest crews can put out forest fires with less personal danger and reduced loss of valuable timber.
- Snow and other highway equipment can be utilized more effectively.
- Construction activities can be better coordinated.

5. In short, private land mobile radio has become a part of almost every facet of our daily activities. Because private land mobile radio performs such valuable services, its use will continue to grow. A public/private channel-sharing system is expected to continue to grow as fuel, labor and vehicle costs escalate and maintenance costs. For example, the 1976 Private Land Mobile Advisory Committee report (PLMARC) for the 1976 World Administrative Radio Conference (WARC) indicated that the number of private land mobile radios increased 43-fold between 1950 and 1975, and projected at least a 7-fold increase by 1990.

6. A continuation of this trend could result in a serious frequency congestion problem.

7. The most recent study which addressed the question of spectrum requirements for private land mobile communications was the one made by Private Land Mobile Advisory Committee in 1976, as part of the preparation for the 1976 WARC. The committee submitted a report which contained information regarding projected spectrum requirements for private land mobile communications. It has now been almost six years since that report was submitted. There is a need to review and update the projections developed for the WARC. In addition, while previous studies have concentrated on the question of spectrum requirements, the related impacts and critical questions of spectrum availability, technical, economic and legal, and regulatory structure were not addressed as part of these studies. These practical issues mean other than these in a single study. Therefore, the Commission is initiating this Inquiry in order to obtain information to aid in determining the best overall strategy for meeting the future communications requirements of the private land mobile user.

Discussion of Inquiry

1. The first major area of inquiry concerns the anticipated private land mobile radio communication requirements. The most recent Commission actions which resulted from an awareness of the increased need for spectrum for land mobile communications were Dockets 1821 and 18262. All of the channels being shared with UHF TV in the 470 - 512 MHz band (Docket 18261) have been assigned, except for those geographic areas in which the user agreements were not accepted. Most of the 800 MHz spectrum which was reallocated from UHF TV to land mobile communications (channels 70 - 83) has been, or is in the process of being reallocated to use of the above projections, except that the remainder of the 45 MHz of spectrum put into a reserve block. While spectrum may be required in addition to that which is eventually made available to land mobile from the 45 MHz reserve, a reasonably accurate estimate of how much spectrum will be needed is not available. One objective of this Inquiry is to solicit comments from the private land mobile user community on anticipated spectrum requirements through the end of this century. Projections should be made to allow for expansion of current communication requirements, as any additional communications requirements resulting from new technologies, new applications and possible relaxation of restrictive standards.

2. The second major area of inquiry concerns potential spectrum to meet future private land mobile communication requirements. As the anticipated communications requirements can be met in a number of ways: Allocation of additional spectrum, spectrum sharing with other services; and technological improvements in uses of the radiated spectrum. The Commission is seeking comments on the number of potential service sources, in terms of their desirability and for each technology.

3. Therefore, the Commission requests comments in the following areas:

Spectrum Requirements

1. What factors are likely to affect the growth of land mobile communications in the next 10 years?
2. What new land mobile communication applications do you anticipate over the next 10 - 20 yrs.? What will be the spectrum requirements?
3. What is the most appropriate unit for measuring spectrum use in the private land mobile service categories?

4. How many units would you project to be in use for each of the following land mobile service categories in 5 years? 10 years? 20 years?

a) Industrial Radio Services (Business, Special Industrial, Power, Petroleum, Forest Products, Motion Picture, Relay Transmission, and Telephone Maintenance)
b) Land Mobile Radio Service (Motor Carrier, Radio, Taxi, and Automotive Emergency)
c) Public Safety Radio Service (Police, Fire, Local Government, Highway Maintenance and Forestry Conservation)
d) Special Emergency Radio Services

5. In order to assist the staff in making needed estimates of the above projections, please provide the following additional information:

a) Major assumptions upon which each projection is based;

b) Sources of data used for each projection;

c) The methodology used to develop each projection;

d) The level of statistical confidence you have in each projection;

6. What would you suggest as reasonable channel loading levels for the possible sources above land mobile service categories in order to translate into channel demand projections?

7. Do you foresee specific system requirements that would be necessary to meet projected spectrum configurations such as:

a) Unpaired channels for 1-way communication;

b) Paired channels for 2-way communication;

c) Data only channels;

d) Contiguous channels for wideband systems, including spread spectrum;

e) Other (please specify);

8. Do you see a need to make special allocations to accommodate any of the above, if so, what would be the range of channel availability and how large would you suggest these allocations be?
Spectrum Availability/Suitability

1. How would you rank the following approaches for obtaining additional spectrum for private land mobile use: drift and predictable bands?
   a) Possible new exclusive or shared allocations
   b) Increased sharing between land mobile and other services (e.g., cellular, cable TV, microwave)

2. How much additional communication service might be accommodated under each approach in various geographic areas?

3. What problems are associated with each approach (e.g., interference, spectrum management delays)?

4. Are there other approaches that should be considered? What are their advantages or disadvantages?

5. How might the various approaches interact with each other (e.g., possible trade-offs in system design)?

6. Should the current private land mobile frequency bands be reorganized, redyned, or ranked?

7. To what extent can technical improvements be expected to substitute for additional spectrum requirements in the various services? When do you expect these technical improvements to be available?

8. To what extent can new carriers (e.g., cellular substitute for additional private land mobile spectrum?)

9. How is current spectrum availability/suitability affected by governmental standards? Can these standards be modified to increase spectrum availability/suitability? If so, how?

10. What approaches to establishing technical standards will provide maximum spectrum availability/suitability for new applications and new technologies? What approaches would provide maximum benefits from utilization of new technologies?

The Commission recognizes the broad scope of the Inquiry into the technical difficulties in projecting private land mobile communication requirements for the future.

However, the information obtained in this Inquiry will be useful in determining that it is specific and comprehensive. Consequently, this Inquiry has encouraged the collection of detailed information about the future requirements for private land mobile communications, and the availability of suitable radio spectrum so that the Commission staff can evaluate all possible regulatory alternatives.

Administrative

10. Accordingly, the Commission adopts this Notice of Inquiry, under the authority contained in Section 303 of the Communications Act of 1934, as amended, 47 U.S.C. 303(e)(1) and 303(r). Pursuant to the procedures set out in Section 1.415 of the Commission's Rules, 47 CFR 1.415, interested persons may file comments on or before June 9, 1982 and reply comments on or before July 7, 1982. All relevant and timely comments will be considered by the Commission before final action is taken in the Inquiry. In reaching its decision, the Commission may take into consideration information contained in the comments, provided that such information is a writing, the origin and source of such information is placed in the public file and the fact that the Commission's reliance on such information is noted in the Report and Order.

11. In accordance with the provisions of Section 1.419 of the Commission's Rules, 47 CFR 1.419, formal participants shall file an original and five copies of their comments and other materials. Participants wishing each Commission to have formal participation in the Inquiry should file comments and all materials in triplicate.

12. Points of contact on this matter are:

- Joseph A. Levin and Arthur J. Radice (202) 254-3301
- More Spectrum

- The Commission encourages interested parties to submit comments on the Inquiry.

- A number of readers of our November issue, in which we reprinted FCC Docket 81-413 (Notice of Inquiry into Spread Spectrum and other wideband emissions), have requested references on that subject. In response, we are reproducing below, those which appeared in various footnotes.

Footnotes from FCC Spread Spectrum Docket 81-413

- Although there is no universally accepted measure of spectrum efficiency, it can be defined in general terms as the ability of communications accomplished to spectrum used. These terms as the ratio of communications accomplished to spectrum used. These terms are usually difficult to quantify, but they may involve parameters such as information delivery, users satisfied, radio frequency
The 33rd Vehicular Technology Conference: 1983
25/27 May 1983

The Prince Hotel
TORONTO

- The 1982 Conference is in San Diego, California, but the 1983 Conference will be right here in Toronto.

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