May 21-23, 1984
34th Annual Conference
President’s Message

Sam McConoughhey
President
IEEE Vehicular Technology Society

I hope that by the time you read this you will have completed your plans to attend our 34th Annual Vehicular Technology Conference in Pittsburgh. I look forward to seeing you there.

Your Board of Directors will be meeting a day prior to the conference to discuss some of the tasks assigned at our December meeting.

We should be hearing from STu Neyer, Jr., Past President regarding his recommendations for an enhanced Awards Program; and from Board Member Jim Mikulski regarding the Fellow Awards; Chuck Lyns regarding Paper of the Year Awards; and from AI Goldstein regarding the Dan Noble Fellowship award.

In addition we will be hearing from Sr.Past President, Roger Madden regarding his committee’s efforts at drafting a revised Constitution and By-Laws.

Board Member Fred Link and Al Goldstein will be reporting to us on future conferences of the VTS. In August, we expect to be participating, at the invitation of the ETS, in the Showcase for Land Mobile Communications to be held in Las Vegas where we will be responsible for a technical session. In October, it is our biennial sponsorship of Convention in Dearborn. The 35th VTC appears to be slated for Boulder, CO. Rumor have it, that Dallas-Ft.Worth is interested in sponsoring the 36th VTC.

We will also be receiving reports from other Committee Chairs; Bob Fenton, vp heads our Planning Committee; Gasper Messina, Chapter Activities; Bob Rezzolla, Membership; George McClure Publications and Kent Johnson, Regional Activities. Each has been asked to present their plans to improve and strengthen our Society. Each will be asked to present their plans to improve and strengthen our Society.

As part of our Centennial activities, we hope also to have available at the conference the first of the Society’s IEEE Press Books, “Land-Mobile Communication Engineering.” Our Ad Hoc Committee on Land Mobile Radio Propagation 806-947MHz is planning a second IEEE Press book, hopefully to be completed during the IEEE Centennial Year.

Another of our goals is to assist the IEEE in meeting its objective of enrolling 250,000 members. We have set a modest objective of a 5% increase in Society membership. But we need your help. Sign up any of your associates that may need that littleudge from you.

The IEEE Board of Directors has approved the realignment of its Divisional structure. The VTS is now in Division III as are the Communications Society, the Broadcast Technology Society, and the Consumer Electronics Society. Alan Culbertson heads our new Division.

Again, I wish to take this opportunity to invite each of you to let the elected officers of your Society hear from you. Also we need volunteers to serve on Committees; to run for vacancies on our Board. We are also asking that you nominate your colleagues for awards such as Fellow, IEEE Field Awards, or Society recognition. If you have views that you wish to express, send a letter to the Newsletter Editor. By all means, let us hear from you.

Best regards,

S. R. McConoughhey
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Month of Issue

Final Copy to be Ready
Mailing
Target
By VTS Editor
Date

August 6-09-84 7-13-84
November 9-13-84 10-13-84
February 12-21-84 01-27-84
May 3-10-85 04-14-84

Fred Childs Available to Speak at Chapter Meetings

Reprinted below are a Biographical sketch of Mr. Fred B. Childs and the abstract of a talk, "The Progression of Narrow Band VHF/UHF Technology" which Mr. Childs is willing to present to interested VHF Chapter meetings. Those interested in having Mr. Childs speak to their chapter are invited to contact Sam McConoughy to make the arrangements.

If you would like to contact Mr. Fred Childs directly to obtain more details on his address and telephone number:

Fred B. Childs
2357 Fairmount Avenue
St. Paul, Minnesota 55105
(612) 699-8485

CONCLUSION

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1984 IEEE Vehicular Technology Society Directory of Chapters and Chairpersons

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1984 Conference Program

COMMUNICATIONS SESSIONS

C1. CELLULAR SYSTEMS

Session Chairman: Kent Johnson

- The Evolution of Cellular System Design* - J. D. Wells; GEC Systems Development Corp.
- Detachable Mobile Radio Units for the 800 MHz Land Mobile Radio System* - N. Kobayashi, S. Nishihata, T. Taga, A. Sasaki; Yokosuka Electrical Communications Lab, Japan
- Network and Bandwidth Considerations for High Power Antenna Systems* - P. Neville; Philips, Bury
- Mobile Antennas on Glass* - D. Horn; Antenna Specialists Inc.
- Measurements and Analysis of Corner Reflector Backside Leakage* - D. Davidson; Motorola

C4. COMMUNICATIONS SYSTEM DESIGN

Session Chairman: Sam Leslie

- Analysis of the Probability of Interference During a Telephone Interconnection Call* - G. Hess; B. Kohli, D. Green; Motorola
- Trunked Simulcast System Simulator* - G. Hess, B. Kohli, D. Green; Motorola
- Evaluation of Performance of a Proposed PTCIS* - Y. Kolyvas; R. Durston, H. Leader, C. Puckett; General Electric
- ACSB System Design* - R. Lapin; Contemporary Communications
- Audio Frequency and Amplitude Bandwidth Reduction Techniques* - G. W. Stone; Sachs/Freeeman

C5. COMMUNICATIONS SYSTEMS DESIGN

Session Chairman: Robert Janc

- Mobile Telephone Setup Channel Format for the MTS System* - J. Cevera, H. Hafes, S. Mahomed; Bell Telephone Laboratories
- A Proposed Architecture for a Mobile Telephone System Utilizing Multi-Beam Satellite Coverage* - R. Chaddock; General Electric
- An Improved Modulation Format and Signal Processing Scheme for ACSB Systems* - C. Stevenson; Jet Propulsion Laboratory
- High Performance Digital Communications in Mobile Channels* - F. Davari; Jet Propulsion Laboratory

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C6. DATA COMMUNICATIONS

Session Chairman: Charles Lynk

* "Multiple Tone Interferers in an FM-NRZ Spread Spectrum Communications System" - R. Agusti; University of Barcelona.
* "Co-Channel Interference Comparison of Conventional Land Mobile FM and 2400 BPS LPS-FSK System" - S. Carney; Motorola.
* "A comparison of Gaussian Minimum Shift Keying to FSK for Land Mobile Radio" - S. Goode; Motorola.
* "Comparison of Sub-Band Coder Designs for the Bayside Paging Channel" - R. Zinner, S. Silverstein; General Electric.

AUTOMOTIVE SESSIONS

A2. AUTOMOTIVE SYSTEMS

Session Chairman: Joseph Ziemek

This session will consist of presentations of five invited papers.
* "World Radio - Reality or Myth?" - C. A. Altsel; For Motor Corporation.
* "Microprocessor Instrument Cluster" - R. J. Danek, D. R. Buttle, D. J. Rote; TRW Transportation Electronics.
* "Application of Micro-Computers in Automotive Electronics" - J. Bereisa; Buick Div. General Motors Corp.
* "Fully Integrated Truck Information and Control System (TIACS)" - T. O. Jones, W. X. Tsou; TMS Transportation Electronics.

TRANSPORTATION SESSIONS

T1. TRANSPORTATION SYSTEMS

Session Chairman: Alan Punnery

* "ICTS, a Technology Whose Time Has Come" - R. Smith; Metro Canada Ltd.
* "The Detroit Downtown People Mover" - C. B. Morris; Metro Canada Ltd.
* "An Overview of the Lille Automated Transit System" - F. Treem; MAFTA.
* "Pittsburgh's Light Rail System" - R. Twilling; PYPH.

A3. AUTOMOTIVE SYSTEMS

Session Chairman: William Fleming

* "A Dedicated Cheap Speech Recognition System for On-Board Applications" - M. Junge, P. Andreas; Volkswagen.
* "Guidelines and Some Developments for a New Modular Driver Information System" - W. Sindahl; Volkswagen.

T2. EQUIPMENT DESIGN AND SPECIFICATION

Session Chairman: Sam Lott

* "Solid Modeling and its Application to Transit Design" - D. M. Evans; Westinghouse.
* "Development of Coldway and Conductor Rail Protection for People Movers in a Winter Environment" - T. J. Burg; Westinghouse.

T3. PROPELLER SYSTEM TECHNOLOGY

Session Chairman: Rick McDonald

* "The VAL Metro de Lille, Traktion Equipment" - M. Passot; TCO.
* "Study of a Linear Synchronous Motor for High Speed Transport Applications" - S. Lahavani, G. Dawson; Westinghouse.
* "Choosing the Right Converter System for Electric Traction Units Equipped with Three-Phase Traction Motors" - H. Tessier, Siemens-Allis.
* "Comparative Evaluation of Thrystor Choppers for Railway Applications" - M. S. Rahman; Concordia University.

T4. COMMAND, CONTROL AND COMMUNICATIONS TECHNOLOGY

Session Chairman: Bob Disilvestro

* Design methodology for development of a computer-based automatic train control system" - M. W. Hey; Westinghouse.
* "A checked-redundant solid state track signal reception design" - B. Disilvestro; Westinghouse.
* "INTRAN, a universal train control system" - S. Allen; SEL Canada Ltd.
* "LILac Metro Control System Technology" - J. D. Darambu; MATRA.
* "New railway control system based on automatic decentralization concept" - S. Miyamoto, M. Suhoni, M. Yabushita; Hitachi.
* "Automatic Control of Making and Breaking the Train" - C. Loverde; Raymon Keiser Engineers.

C7. CELLULAR SYSTEMS

Session Chairman: Ed Weingart

* "Interference management in Cellular System design" - G. L. Shreken; COMCOM, Inc.
* "In-building signal correlation for an urban environment" - R. J. Piilmeier; Bell Labs.
* "Alternatives in Cellular System Design for Serving Portables" - J. W. Halpern; Bell Laboratories.
* "Cellular Mobile Phone System" - F. Frankenstein; G. E.

T6. MICROPROCESSOR APPLICATIONS

Session Chairman: Dave Turner

* "A microprocessor-based Vehicle Longitudinal Controller" - A. S. Saukkottila, R. E. Fenton; Ohio State University.
* "On the optimal design of a Vehicle Lateral Controller" - I. Belis, R. E. Fenton; Ohio State University.
* "Microprocessor-based Automated Mass Transit Test Equipment" - K. A. Karp; Institute of Transportation Technology.
* "Intelligent Automatic Train Control Operator's Console" - J. T. Ciocletti; Westinghouse.
* "Effects of System Architecture on Safety and Reliability of Multiple Microprocessor Control Systems" - R. C. Milnor, R. C. Washington; Boeing.
Professional Activities

Frank E. Lord
Professional Activities Editor

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May 1964

World competition, energy self-sufficiency, health care, defense and standard-of-living, as engineers do, we are dealing with urgent matters in today's world.

I have written these views to the USAB Committee that is revising this Position Paper. Members are encouraged to read the items on page 10 of the February 1984 issue of The Institute and express their own views directly, as the matter is still under consideration.

A classic example of hiding the real message occurred in connection with the attempt to have the U.S. Postal Service issue a stamp to commemorate the centennial of the Institute and its predecessor organizations. It was difficult to miss the announcement in IEEE publications of the se-tenant issue of four stamps honoring the American inventors, Stearns, Armstrong, Tesla, and Parnsworth. However, the real committee that IEEE had failed in an effort to have the Postal Service issue a stamp honoring the Institute, the many contributions of its members, and its 100 years of accomplishment, was issuing the inventors stamps as a sop. Although the headlines for these announcements used phrases such as, 'IEEE pioneers' and 'honoring electrical engineers' as you read on, you came to realize that the official name given to the issue by the Postal Service was American Inventors. Upon examining the stamps, one notes that only one of the four seems to refer to an electrical engineer. After viewing this issue, I cannot help but think that a more meaningful stamp might look like and found the answer in our centennial logo.

Imagine how my disappointment was heightened to discover that the American Chemical Society was commemorated with a stamp which included their logo (1002), and the stamp honoring the inventor, Tesla, included the logo of the American Society of Civil Engineers (1012). Other organizations honored with stamps which included their logo were the American Veterinary Association (1421), Veterans of Foreign Wars (1925), and the Veterinarians Administration fifty years (1885) and others. Examples of other groups honored over the years include the Galileo Society (1993), American Institute of Architects (1888), National Geographic (1849-1849), Horse Racing (1528), and Organized Labor (1885). Not only is it difficult to erase from one's mind the ugliness of 1984, it is another 100 years of Civil Society (2035), especially in view of what we have an IEEE commemorative could have been.

I have not written of anything remote or obscure. Of course, this material I have referred to has been presented to you by our Institute.

It is certainly easy to imagine how the words 'Institute of Electrical and Engineers' and 'USA 204' could be added to create a more attractive looking horizontal format. Rendered in black and two tones, stronger, there are certain words in language could be most appropriate and attractive.

If I were to have a profession that can maintain technical leadership in world competition, the one I would choose was function at the level that Maslow describes as "self-actualisation". If we are to attract and retain the most talented electrical engineers and professional managers, it must be apparent that it is a profession that is satisfying, entry into it is for hard work that is required to enter it and to maintain it, and finally, there is something nothing but "Inspec" and "Spectrusspeak".

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Frank E. Lord
Professional Activities Editor

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May 1964

It's 1984

George Orwell, in his novel "Nineteen Eighty-Four", visualized a society in which individuality was manipulated and misused. One technique that was extensively used was a mythical and language called "Newspeak", which was full of euphemistic, common-sense words that were designed to confuse, pacify and hide the real message. Independent thinking was discouraged. Have you noticed that tax increases are now often referred to as "revenue enhancers" and that "negative publicity" means the bureaucratic way of referring to death?

If you wanted to find out what our members thought about the goals that the Institute should focus on this year, how would you go about it in such a way as to provoke thought? How many different ideas do you think members might have? Did you notice that there was a survey card included with your dues acknowledgment that made this inquiry as follows?

10. What do you believe should be IEEE's goals in this Centennial Year?

- Foster public awareness of the role of the engineer
- Emphasize importance of education for engineers
- Encourage open exchange of scientific and engineering information
- Encourage greater participation in meetings

If you had expressed other ideas there was no room to do so. Someone may have wanted to attempt to develop or engineer into a profession from which members do not defect in large numbers, one which had a respected place in and a responsible influence on national life. Someone else may have wanted to talk about the importance of employer support. Do you know what happens when this "survey" with only four yes/no answers is mailed out?

It will be impossible to ever obtain an answer to this question, but it will be interesting to see how the results of this "survey" are presented.
Transportation Systems

David B. Turner
Transportation Systems Editor

We have problems. We have the problem of complexity, where our works become knotted endlessly. We see the problem of proliferation, where we have not considered questions which are crucial to the matter at hand. Then there is the problem of costs, rocketing out of sight, and the problem of generating a response to the task at hand. There is the problem of overwhelming, dominating, and getting lost in the overwhelming, dominating, and getting lost in the problem of complacency. We are troubled by a world where everything is happening, and by a world where nothing ever changes, no matter what we do.

Frank Sprague's fascinating paper "The solution of Municipal Rapid Transit," first presented in June 1886, is reprinted in the February issue of the Proceedings of the IEEE. It reminds us that only some elements of a solution to a past problem survive to the present, but Sprague's innovative power collection devices and double-reduction gearboxes are still with us, but his eloquent arguments against the horse-drawn streetcar are no longer relevant.

Neil Rumberger, Manager of the Train Control Division for the Bay Area Rapid Transit District, has sent the following report on the solution of a key problem by the application of new technology, and the costs that must be put to use that solution.

******

Within the next year, the Bay Area Rapid Transit System will have a new and very special passenger on its trains; the microprocessor. What makes this new passenger so special is that it is in full control of the sleek, 80 mph trains.

When BART was completed in 1972, it was the first new major rapid transit system built in the United States in 60 years. Rebuilding the era's infrastructure of railroads, which had incorporated a number of technological innovations never before tried in rapid transit, the most notable was the sophisticated automatic train control (ATC) system. This relatively safe and reliable system, operating at 80 mph with 90 second headways, the ATC system was years away from the new era of rapid transit that BART represents.

BART's startup was far from perfect. Many of the initial performance objectives were never achieved in nine years time. The most notable was the sophisticated automatic train control (ATC) system. This relatively safe and reliable system, operating at 80 mph with 90 second headways, the ATC system was years away from the new era of rapid transit that BART represents.

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New problems. BART's new on-board ATC system departs from traditional fail-safe design techniques. Traditionally designed systems were selected components and circuit designs in which the individual failure modes of components and their effects on safety critical functions could be controlled. Unfortunately, these techniques can only be applied to discrete component, hardwired systems.

The very complexity of general purpose large scale integrated circuits means that traditional Failure Modes, Effects, and Criticality Analysis techniques for demonstrating the fail-safety of a circuit or system can no longer apply. Having exceeded the scope of traditional tools, BART has adopted strict new safety criteria and analytical methodology as advanced as the hardware it evaluates. Instead of striving for absolute safety, BART recognizes that all systems, including the revered "vital relay," have some finite probability of unsafe failure.

By employing the principles of checked redundancy, the system is designed so that at least two independent computers must be operating and in full agreement on all critical inputs and outputs in order for the train to proceed. Any failure, in which the two systems disagree, will force the train into an emergency stop. These cross-checks are typically performed many times each second.

Using structured software design principles, extensive internal diagnostics, wrap around of critical inputs and outputs, and cross checking of all critical functions and parameters, and the probability of unsafe failures within a single computer can be evaluated. Then, by insuring that the two microcomputer channels are truly independent and not subject to common mode failures, the probability of concurrent and compensating failures in both channels can be predicted.

The safety criteria for the ATC system is not more than one unsafe failure in 250,000 years. This is equivalent to a maximum time between unsafe failures (MTBF) of approximately 2 billion hours per car-set. This is a stringent criterion, one that a traditional vital relay can not meet. This stringent criterion can be met without sacrificing design simplicity and efficiency. It has been claimed that a traditional vital relay has a MTBF of approximately 1,000,000 years only when properly maintained. By way of comparison, this new BART ATC system will be as safe as a single fail-safe circuit using four vital relays.

Work on the prototype development program is proceeding, and final design reviews should be completed in the next few months. Following fabrication of the prototype car-sets, extensive factory testing will be conducted to demonstrate the equipment meets the functional, environmental and safety criteria of the specifications. By the end of this year, the prototype car-sets will be installed in revenue trains for extensive in-service testing. Production units are scheduled to arrive in early 1986 with full conversion of the fleet complete in late 1987.

BART is committed to taking full advantage of the technology developed by the microprocessor, its automatic train control system. Power, versatility, reliability and economy are all well known forces propelling the microprocessor into so many applications. These same forces apply in modern rail transit systems. With the marriage of checked redundancy for safety, and operational redundancy for reliability, the microprocessor will be the major force in the first major rapid transit system in this country to fully implement a computer based automatic train control.
Automotive Electronics

Dateline: Detroit

Bill Fleming
Automotive Electronics Editor

GENERAL MOTORS MULTI-PORT FUEL INJECTION SYSTEM

Multi-port fuel injection (MFI) is currently offered on GM's 3.8-liter V-6 engine in Buick Century and Oldsmobile Cutlass model vehicles. Extra precision of fuel control provided by the system makes possible elimination of several pieces of emission control hardware — including air injection, thermac air pre-heating, and early fuel evaporation. Also eliminated are the manifold and barometric pressure sensors. GM refers to the MFI system as "simultaneous double-fire" — i.e., all six injectors fire once each engine revolution such that two injections of fuel are mixed with incoming air to produce the charge for each combustion cycle (1,2).

In place of the customary speed/density indirect estimates of engine air flow (based on inputs from engine speed, manifold pressure, and inlet air temperature sensors) which give slow response and become unreliable with engine aging and require mathematical calculations, direct measurement of mass air flow into the engine is provided by a newly developed mass airflow sensor. The sensor is located between the air filter and the throttle body, and operates on thermal heat transfer principles. A heated nickel film is maintained 75 deg C above the ambient temperature of inlet air. Mass airflow is directly given by the electrical power required to keep the heated film at temperature 75 deg C above that of incoming air (1,2).

COMPUTER-CONTROLLED COIL IGNITION SYSTEM

A distributorless ignition system was introduced on 1984 Buicks. Conventional ignition coils are replaced by an electronic control module which incorporates three separate coils, each of which fires two spark plugs simultaneously (one from the positive end of the coil and the other from the negative end). Cylinders are paired so that one spark plug is fired at the beginning of a power stroke and the other at the beginning of an intake stroke. Conventional distributor driveshafts and mechanical advance mechanisms are replaced by crankshaft and camshaft Hall-effect position sensors, which together with spark timing commands from the vehicle onboard computer, provide inputs to an ignition microcomputer. It then sequentially triggers each of the three coils to fire at the proper crank angle. Buick calls this a CSI system (Computer-Controlled Coil Ignition System) (1,2).
Compact disc, laser-based audio systems use small discs, 1.2 mm thick and 12 cm diameter, each of which contains about one hour of recording. Because audio signals are recorded in digital form, extremely low distortion (0.0002%) and low noise levels (SNR > 90 dB) are obtained. Variations in disc speed do not lead to wow or flutter as the data read from the disc pass thru a buffer store and are read out from there in synchronism with the clock frequency. This insensitivity to speed fluctuations makes the compact disc particularly attractive for vehicular use. A special loading system, which uses trays to carry the compact discs, is proposed by Philips N.V. for vehicular applications. To read a disc, a tray is inserted into the player. Inside the player, the disc is disconnected from the tray and clamped onto a spindle, whereupon it can be read. When ejected, the disc is returned to its tray for removal [3].

**DISC PLAYER COMPONENTS**

**DISC LOADING SYSTEM**

**CONTROL PANEL LAYOUT**

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**MITSUBISHI MASS FUEL FLOW SENSOR**

A new mass fuel flow sensor, based on thermal heat transfer principles, has been developed for vehicular applications by Mitsubishi Electric Corporation. Heat detecting film elements consist of 2000-angstrom-thicks platinum films coated onto 1-mm diameter ceramic bobbins. Room temperature resistances of each film are held at 20 ohms by laser trimming procedures. Fuel is directed through a nozzle such that nearly all the fuel flow directly impacts the hot film element. In addition, the nozzle maintains fuel flow in a turbulent flow regime over the entire flow range of interest thereby providing uniform heat transfer properties (the absence of flow regime transitions makes possible greater accuracy of flow measurement) and insensitivity to external vibration of the vehicle (because laminar flow conditions are not required as is the case for other flow sensors). The sensor has wide 100:1 dynamic range (0.1 to 10 grams), high accuracy (1% of full scale), rapid response (100 ms time constant), and compact lightweight construction [4].

**FUEL SENSOR ASSEMBLY**

**SENSOR CROSS SECTION**

**HEAT DETECTING FILM ELEMENT**

---

**IS THIS WHERE AUTOMOTIVE ELECTRONICS IS GOING?**

Japanese penchant for elaborate use of electronics is personified in Mitsubishi's modification of its Starion model for the upcoming Hollywood movie, Cannonball Run II. This car contains over $40,000 worth of electronics, including a video radar warning, several video monitors, and CRTs, 2000 blinking lights, and five miles of copper wiring. The underwater maneuvering controls located aft of the stick shift are needed because the vehicle is water submersible [5].

**FORWARD CONTROLS**

**REAR COMPARTMENT CONTROLS**
GENERAL MOTORS PROCLAIMS THE ERA OF THE ELECTRONIC AUTOMOBILE

If the Beach Boys were still writing songs about cars, their lyrics would be a bit different today. "Little Deuce Coupe," for example, had a line that went, "She's got a competition clutch and a four on the floor and she purrs like a kitten till the Lake pipes roar." Today, that line could be replaced by, "She's got a micro-driven turbo and a VF display and she'll get you there fast and show you the way." GM, with bragging rights as the world's largest automobile maker, can also brag that through Delco Electronics Division, it is also one of the world's largest producers of electronics.

Since the late 1970s, Delco has been growing its own silicon crystals. Presently, Delco produces more than 500,000 silicon chips each day. In a high-security building, new special equipment is placing leadless capacitors and resistors on circuit boards at the rate of 100 components per second per board. With completion of its advanced manufacturing systems, Delco will have some 850 automatic machines -- 101 of them robots -- installed at a $115-million price tag. They are moving away from conventional printed circuit board technology and toward thick-film hybrid circuit board technology [a-b3].

It often surprises people to find out that GM is far and away the largest computer manufacturer on the globe -- much bigger, in terms of units manufactured, than IBM, H-P, or Hitachi -- making more than 4.5-million microcomputers each year. Present automotive microcomputers run at 1-MHz data rates and use 100 deg.C-rated parts, but microcomputers slated for introduction on 1980 model year vehicles will run at 2-MHz data rates and will use 120 deg.C-rated parts. Today's automotive microcomputers use 0.20-inch square silicon chips that crowd in over 10,000 transistors on each chip [a-b3].

REFERENCES

CALL FOR PAPERS

Workshop On
Automotive Applications of Microprocessors

October 25-26, 1984 • Hyatt Regency Hotel • Dearborn, MI

Sponsored by the Industrial Electronics Society of IEEE and Endorsed by Convergence 84 Conference Committee. Workshop follows Convergence 84.

The Workshop is focused on the application of microprocessors to automobiles, trucks, and their associated products and systems. An open and informal discussion of technologies, methods, problems, solutions, and benefits is encouraged. Novel or improved uses of microprocessors are of particular interest. The Workshop provides a forum for an exchange of information on hardware, software, and systems.

Papers are being solicited for presentation at this Workshop. Emphasis will be on technical value, readability, and informational content.

Topics of interest include, but are not limited to, the following areas:

- ENGINE CONTROLS
- DRIVETRAIN CONTROLS
- ENGINE AND VEHICLE DIAGNOSTICS
- INSTRUMENTATION AND DISPLAY
- RIDE AND COMFORT CONTROLS
- SAFETY SYSTEMS
- ENTERTAINMENT SYSTEMS
- TEST EQUIPMENT
- SENSORS/ACTUATORS
- PLANT PROCESS AND QUALITY CONTROL

Those interested in presenting a paper at the Workshop should submit a 300-500 word summary (double spaced) in two copies to the address below. The summary should define the purpose of the work and what results have been obtained. The paper should be suitable for a 20 minute presentation. A proceedings containing the accepted papers will be distributed to the Workshop attendees. Accepted papers may be submitted for publication in the Industrial Electronics Transactions.

The summary deadline is March 30, 1984. Authors of accepted papers will be notified April 15, 1984. Final papers are due June 1, 1984.

Mr. Robert Martinsons, Technical Program Chairman, Motorola Automotive & Industrial Electronics Group, 1299 Algonquin Road, Schaumburg, Illinois, 60196.