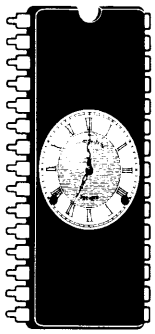


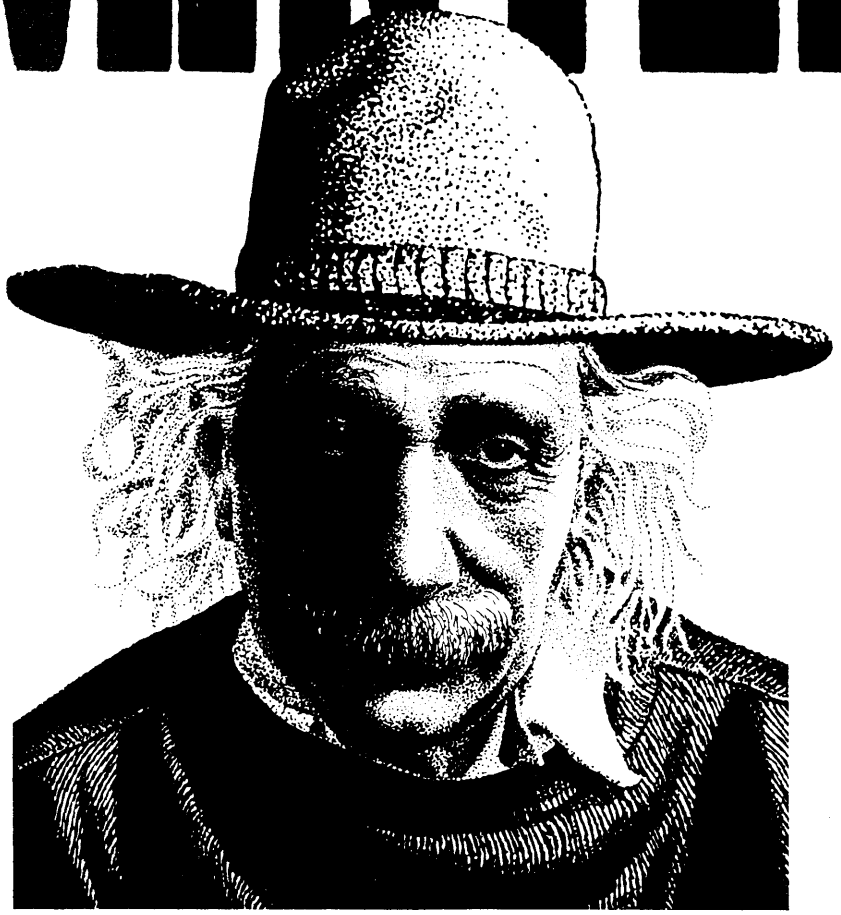
1988 REAL-TIME PROGRAMMING CONVENTION

Sponsored by the

Forth Interest Group

NOVEMBER 18-19, 1988 **GRAND HOTEL - ANAHEIM, CALIFORNIA**

WANTED



$1000 REWARD

for the **World's Fastest Programmer.**

1988 REAL-TIME PROGRAMMING CONVENTION

Sponsored by the Forth Interest Group

The 1988 Real-Time Programming Convention will be held Friday, November 18 and Saturday, November 19, 1988 at the Grand Hotel in Anaheim, California. Program sessions run from 12:45pm to 6:00pm on Friday and 11:00am to 5:00pm on Saturday. All sessions will be held in the Crystal Ballroom unless otherwise specified. Cost to attend all program sessions, exhibit and contest is $5 for FIG members, $10 others.

REGISTRATION HOURS
Friday, November 18th 8:00am - 4:00pm
Saturday, November 19th 8:00am - 4:00pm

EXHIBIT HOURS (Premier Room)
Friday, November 18th Noon - 6:00pm
Saturday, November 19th 9:00am - 5:00pm

COMPANION ARTS & CRAFTS TOUR
Saturday, November 19th 9:30am - 3:30pm ($35 per person)

HARRIS REAL-TIME EXPRESS SEMINAR (Skyroom)
Friday, November 18th, seating is limited to 50 per session
Session 1 9:00am - Noon
Session 2 1:00pm - 4:00pm

"WORLD'S FASTEST PROGRAMMER" CONTEST (Skyroom)
Saturday, November 19th 10:00am - Noon (approx.)

BANQUET FEATURING JEF RASKIN (Regency Rooms)
Saturday, November 19th 7:30pm ($35 per person)

PROGRAM SESSIONS

Friday, November 18, 1988

12:45 **Welcome**
Robert R. Reiling
President of the Forth Interest Group

1:00 **Forth and Real-Time Programming**
Ray Duncan

High-Level Languages and High-End Processors for Real-Time Programming
J.D. Hildebrand

2:00 **Automation**
Elizabeth D. Rather
David Skinner

2:40 **HyperFlo: A Data-Flow-Based Multiprocessor for Real-Time Applications**
Marco Flagg

3:00 **Multi-Tasking**
Brad Rodriguez
Dr. C.H. Ting
Klaus Schleisiek

4:00 **Artificial Intelligence**
Dr. William B. Dress
Mjr. Stevan Le Clair
Dr. Lou Odette

5:00 **Applications**
Phil Burk
Paul Spoltore
Dr. Richard Turpin

Saturday, November 19, 1988

10:20 **Rhealstones: A Real-Time Benchmark Specification**
Kent Porter, Rabindra Kar and friends

11:00 **Language Performance**
Ron Braithwaite
David Fox

11:00 **Bach Organ Recital** (Skyroom)
Dr. C. H. Ting

11:40 **Signal Processing**
Tom Jarmolowski
Clifford King
Robert L. Smith

12:40 **Multi-Processing**
Dr. John Dorband
Dr. Loring Craymer
Phil Koopman, Jr.

1:40 **Language-Oriented Processors**
Dr. George Nicol
Scott E. Reinhart
Ted Dimbero
Charles Johnsen

2:40 **Instrumentation**
Roland Koluvek
Ken Butterfield
Paul Lamar

3:40 **Real-Time Control Systems**
James Gunnard Nelson

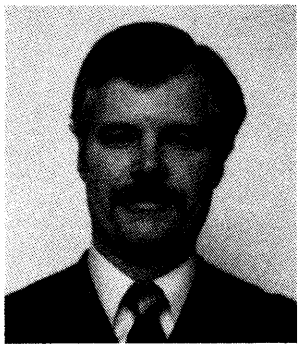
4:00 **Forth in Optimal Control**
Richard Haskell

4:20 **Fireside Chat**
Chuck Moore

WELCOME

1988 REAL-TIME PROGRAMMING CONVENTION

Sponsored by the Forth Interest Group



Martin J. Tracy
Convention Chairman

I would like to extend my warmest welcome to you and invite you to enjoy the sights and sounds of the first Real-Time Programming Convention. While this is actually our tenth anniversary, this is the first time we have selected the theme of Real-Time Programming and Problem Solving. I have always been fascinated by computers that flash, buzz, play chess, talk back, and generally keep up with my world. Nowadays, signal processing and robotics are part of my world, too. The faster computers get, the better.

This year you can hear guest speaker Ray Duncan (*PC Magazine*) talk about programming for the real world. Jef Raskin, banquet guest speaker, will speak of nasty but well-intentioned computers, or the art of interface. He's also the inventor of the Canon Cat, and there are sure to be some around for you to try. J. D. Hildebrand will be here giving away the first issues of his magazine, *Embedded Systems Programming.* And Kent Porter (*Dr. Dobb's Journal*) will be unveiling Intel's new real-time benchmark suite.

You can attend one of Harris Semiconductor's free seminars on the RTX (Real-Time Express) high-performance language-oriented RISC chip. Or you can listen to one of our many excellent speakers-over thirty of them. Drop by your favorite vendor and see what's new. Or maybe you just want to sneak over to Disneyland for a while. Don't forget to come back in time for the contest to find the Fastest Programmer in the World. It will be followed by Dr. C.H. Ting's Bach synthesizer-on-a-chip organ recital.

If you speak Forth, as I do, be sure to hear Chuck Moore's traditional Fireside Chat. And drop by the GEnie booth. This conference is brought to you by the Forth Interest Group, and if you don't know what FIG is, now would be a good time to find out.

So enjoy. And be my guest. I'm the nervous-looking guy in the suit, and please feel free to introduce yourself. I'm looking forward to meeting you.

Martin J. Tracy, Chairman

BANQUET FEATURES JEF RASKIN

Jef Raskin
CEO, Information Applicance, Inc.

"Computers do nasty things to people. This is because we write software to be nasty to people. We don't mean to, but the road to perdition is paved with well-intended software. My discussion will touch on why we do it, how we do it, and what we can do about it."

Jef Raskin

While Jef is best known for having created the Macintosh project at Apple Computer, he is equally proud of having created the basic design for the new and as yet largely unknown Canon Cat. The Cat is distinguished by having probably the best user interface of any new product. It doesn't do windows, stomps on mice, will not bow down before icons, and eschews menus.

Jef believes the only good operating system is no operating system, and notes that the Cat is implemented in Forth. Not only that, but Forth code can be embedded and executed decimal 54 42 do i . loop 42 43 44 45 46 47 48 49 50 51 52 53 in the middle of a sentence (or not) as you desire. (This was written on a Cat, of course.)

Jef is now CEO of Information Appliance Inc., which he founded in 1982. Before that, he was Manager of Advanced Systems at Apple, and still earlier was the conductor of the San Francisco Chamber Opera. He still plays piano, but only conducts occasionally. (This makes him a semiconductor.)

Prior to moving to Silicon Valley he was a professor (of Visual Arts) and a computer center director at the University of California at San Diego. He did postgraduate studies in Music, has an MS in Computer Science fron Penn State, and a BS in Philosophy and Mathematics from Stony Brook. He lives in Pacifica, California where he is trying to get a position on the local paper as restaurant reviewer.

Jef will be our keynote speaker at the annual banquet on Saturday, November 19, 1988 at the Grand Hotel. Tickets are available for $35 each.

PROGRAM SPEAKERS

Friday Sessions and Speakers

1:00 - Keynote

Ray Duncan, President of Laboratory Microsystems, Inc. will deliver our keynote address, *Forth and Real-Time Programming.*

J.D. **Hildebrand** is founder of *Embedded Systems Programming* magazine and will speak on *High-Level Languages and High-End Processors for Real-Time Programming.* The implications of the rapid penetration of high-end processors in the real-time environment, particularly the new emphasis on software that can fully exercise the chip's speed and memory addressing capabilities, will be discussed.

2:00 - Automation

Elizabeth D. Rather, President of FORTH, Inc. will speak on *Using PCs for Distributed Process Control.* PCs have become an important factor in control engineering. We have recently developed a distributed, real-time factory monitoring and control system called the "PC Factory Network." It can handle thousands of points, has a reliable multi-channel communications protocol between processors, and can display process variables in multiple, concurrently updating windows on the same CRT screen.

The software is based on polyFORTH, a real-time multitasking, multi-user OS that runs on both the PCs in the network and the Z80-based local controllers. It not only provides a high-speed run-time environment, but interactive programming and testing support as well.

David Skinner of The Forth House, will discuss *Veneer Mill Control.*

2:40 - A Data-Flow-Based Multi-Processor

Marco Flagg, PC/M Corporation, will speak about *HyperFlo: A Data-Flow-Based Multiprocessor for Real-Time Applications.* HyperFlo is a multiprocessor VMEbus system aimed at high performance real-time applications. Processors in the system can run in parallel, serial or any combination of the two. HyperFlo supports C, Fortran, Ada, Unix, OS-9 and multiple processor types. It is designed as a unified hardware and software solution for real-time applications.

3:00 - Multi-Tasking

Brad Rodriguez, T-recursive Technologies, will speak on *An Event Scheduler for Performance Lighting Control,* a multiplexed 68000-based task and event scheduler.

Dr. C. H. Ting, Offete Enterprises, Inc., will speak on *Multi-Tasking in Music Playing.* Using a multi-tasker to handle polyphonic music, one task is dedicated to synchronization and other tasks are dedicated to handle one voice each. In other words, one task serves as the conductor and many other tasks serve as players.

Klaus Schleisiek of Delta-T, will discuss *The Impact of Multi-Tasking on Mass Storage Access.* The BLOCK concept of mass storage precludes time-sliced multi-tasking.

4:00 - Artificial Intelligence

Dr. William B. Dress, Senior Scientist at Oak Ridge National Laboratory in Oak Ridge, Tennessee will speak on on *Real-Time Artificial Intelligence.* What are the needs of real-time AI, and what can neural nets do today?

Major Stevan Le Clair, Wright Patterson AFB, will speak on *The Science of Manufacturing,* artificial intelligence as applied to manufacturing.

Lou Odette, Director of International Operations at APEX in Cambridge, Massachusetts, will speak on *Bringing Up Prolog on the RTX.* He will focus on the implementation of Prolog on Forth engines and the use of Prolog in real-time control and data acquisition systems. There will be an example from the space program.

5:00 - Applications

Phil Burk is Vice-President of Delta Research. He has been instrumental in the development of JForth for the Amiga and HMSL (Hierachical Music Specification Language) for the Amiga and the Macintosh. Phil will discuss his project *Programming the Washington State Bell Gardens.*

Paul Spoltore of Neuroscientific Corporation will speak on *VENUS - Visual Evoked Neurological Stimulator.* Using two AT-class computers, medical instrumentation is being pushed to the outer limits in the exploration of the visual pathways. Through simulation using visually evoked potentials, neurologists and biophysicists can now analyze more functions of the brain than ever before possible. This research may one day lead to the early diagnosis and treatment of disease.

Dr. Richard Turpin, University of the Pacific School of Engineering will speak on *MicroMouse: A Student Exercise in Real-Time Control,* an EE senior student design project in which the student designed, built and tested a robot for entry in the IEEE student micromouse competition.

Saturday Sessions and Speakers

10:20 - Rhealstones: A Real-Time Benchmark Specification

Kent Porter is Senior Technical Editor of *Dr. Dobb's Journal of Software Tools.* He will discuss *Rhealstones: A Real-Time Benchmark Specification.* Originally developed by Rabindra Kar at Intel, these benchmarks include interrupt latency, semaphore shuffling and other real-time bottlenecks.

11:00 - Language Performance

Ron Braithwaite, Senior Software Engineer at Sattel Technologies, Inc. will speak on *ROM'd Applications Using C, Assembler and Forth.* He will discuss the pros and cons of using Forth, C and assembler in residence and cross-compiling to a target using a development system embedded in the target itself.

David Fox, Chief Scientist with MISC, will speak on *Compiling C to Forth.* The very different architectures of C and Forth are surprisingly compatible. Some difficulties and advantages of implementing a C compiler for a Forth stack processor will be discussed.

Saturday Sessions and Speakers continued

11:00 - Bach Organ Recital (Skyroom)

Dr. C. H. Ting will present a concert of Bach's organ music played on a PC electronic organ, using a program written in Forth.

11:40 - Signal Processing

Tom Jarmolowski, Senior Software Engineer at General Electric Company will discuss *Radar Signal Processing Test Systems.* ASSETS is a computer-aided test system for a radar signal processor. Use of industry standards such as Unix, X and VME, as well as a data-driven architecture, has resulted in a highly portable test system. This presentation discusses the architecture that has enabled Tom to develop a quality user interface in a high performance, real-time test system without compromising either sub-system in order to meet the requirements of the other.

Clifford King of Micro K Systems will discuss the *AT&T DSP32 Development System.* The AT&T DSP32 is a four megaflop 32-bit floating-point digital signal processor. An interactive development environment, including a Forth language compiler, editor and assembler which runs on the DSP32-8PC plug-in board will be described. Forth is a very productive, interactive program development environment, exploiting the full capabilities of the DSP32.

Robert L. Smith, Senior Software Engineer at Maxtor, will speak on *Three Forth-Based Floating-Point Packages.* In order to make floating point available for most users of Forth, one of the three packages to be described will load in fig-FORTH, 79-Standard or 83-Standard. Another package may be used with 8088-type systems. The third package is an update of the public domain 8087 hardware support.

12:40 - Multi-Processing

Dr. John Dorband is the MPP Group Leader at NASA - Goddard Space Center in Greenbelt, MD. He will speak on *Programming the Massively Parallel Processors.* Included in his presentation will be fundamentals of programming single-instruction and multiple-data processors.

Dr. Loring Craymer of Jet Propulsion Laboratory in Pasadena, California, will speak on *Programming the Hypercube.* From one node of a hypercube to another, how does one program a routine problem of communicating between the two? Dr. Craymer will discuss this and other questions in his portion of the panel.

Phil Koopman, Jr., WISC Technologies, will speak on *Programming MIMD Processors.*

1:40 - Language-Oriented Processors

Dr. George Nicol, President of Silicon Composers, Inc., will speak on *Embedded Real-Time Control Tools,* the new generation of Forth-RISC engines, co-processor boards, single-board computers and software tools for developing embedded real-time control applications.

Scott E. Reinhart, Software Manager of Silicon Composers, will speak on *Software Development Systems Using the RTX 2000,* a Forth-RISC microprocessor for embedded real-time control applications.

Ted Dimbero, Senior Engineer at Harris Semiconductor, will present *Replacing Hardware with Software on RISC Processors.* Functions such as SCSI interfaces, IEEE 488 interfaces, UARTs and DMA controllers may be implemented in software without a significant reduction in processor bandwidth.

Charles Johnsen, President of MISC, will discuss the *MISC Forth Processor.* The M17 microprocessor has innovations aimed at low-cost performance. The asynchronyous clock allows cycle-by-cycle matching of processor phase and speed to memory and peripherals. This is made possible by a unique simultaneous fetch-and-execute architecture.

2:40 - Instrumentation

Roland Koluvek of Rosemount Analytical will speak on *Panel Instrumentation in the Processing Industry.*

Ken Butterfield, Physicist Staff Member, Group N2, Los Alamos National Laboratory, will discuss *Hand-Held Neutron or Gamma Ray Collectors.* These instruments, designed to look at gamma rays or neutrons, need to detect pulses that are one microsecond wide; often, the peak height is important. They are portable, battery powered, and usually run with an LCD and keypad.

Paul Lamar, Lamar Instruments, will speak on *The Glass Cockpit, A Programming Challenge.* The Glass Cockpit is a grass-roots, public-domain project to develop an IBM PC-based instrumentation system for private aircraft. A CRT will replace analog gauges on the instrument panel.

3:40 - Real-Time Control Systems

James Gunnard Nelson, President of Chrysalis Microsystems, Inc. will present *Design and Implementation of Real-Time Control Systems.* Real-time control is realized by constructing objects using primitive but fast multiple-code-field words and a few carefully followed conventions. The technique has been used on microcontrollers for products as varied as video crosspoint switches, automatic transmission prototypes and gantry robots.

4:00 - Forth in Optimal Control

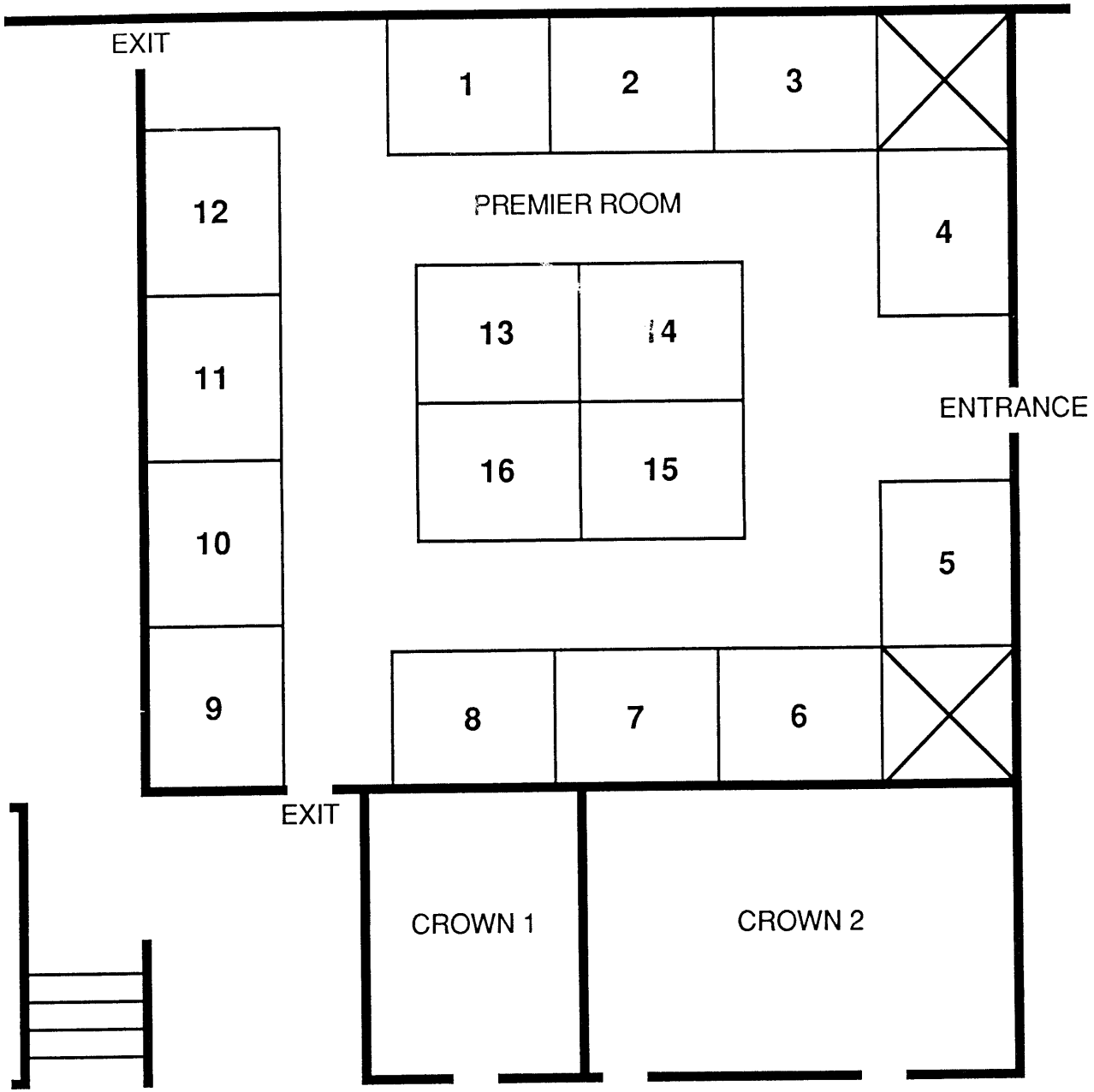
Richard Haskell, Center for Robotics and Advanced Automation, Oakland University, Rochester, Michigan, will present *Forth in Optimal Control.* Optimal control is a branch of modern control theory that has been used extensively by control engineers in various areas such as the process industry, the space program and the defense industry.

4:20 - Fireside Chat

Charles Moore, Computer Cowboys, is the creator of the Forth language. He will express his thoughts on the development of Forth and its future.

EXHIBIT AREA

GRAND HOTEL — ANAHEIM



The exhibit area is in the Premier Room located on the ground floor of the Grand Hotel.

Hours
Friday, November 18
12:00 noon to 6:00pm

Saturday, November 19
9:00am to 5:00pm

Asyst Software Technologies	15
Concept 4	2
CPSA	11
Creative Solutions, Inc.	10
Dash, Find Associates	3
Delta Research	5
Embedded Systems Programming	10
FORTH, Inc.	13
Forth Interest Group	16
GEnie™	9
Institute for Applied Forth Research, Inc.	3
Harris Semiconductor, RTX Marketing	1
Laboratory Microsystems, Inc.	4
Minimum Instruction Set Computer, Inc.	8
New Micros, Inc.	8
NC 4000 Users Group	6
PC/M Corporation	12
SDS Electronics	10
Silicon Composers	14

EXHIBITORS

The following companies will participate in the exhibit area of the Real-Time Programming Convention.

Asyst Software Technologies
Kate Kressmann
100 Corporate Woods
Rochester, NY 14623
716/272-0070
Programmable, Forth-based software designed exclusively for scientists and engineers. Data acquistion, instrument control, analysis and graphics.

Concept 4
Loren Redmond
PO Box 20136
Voc, AZ 86342
602/284-1920
PVM 83 Prolog extension to F83 and Codeopt Code Optimizer for F83.

CPSA
Al Pierce
166 S. "J" Street
Livermore, CA 94550
415/449-7744
Flashcard, a Forth engine inside the Mac II using the Novix 4016 chip, low-power CMOS, 64K words of memory and 2K words of dual-port RAM, 16-bit bi-directional interface 16-bit b port.

Creative Solutions, Inc.
Christine Colburn
4701 Randolph Rd. Suite 12
Rockville, MD 20852
301/984-0262

Dash, Find Associates
Larry Forsley
70 Elmwood Avenue
Rochester, NY 14611
716/235-0168
Forth employment recruiters.

Delta Research
Phil Burk
PO Box 1051
San Rafael, CA 94915-1051
415/485-6867
JForth for Amiga and HMSL - Hierarchial Music Specification Language for Amiga and Macintosh.

Embedded Systems Programming
Carol Frederico
500 Howard Street
San Francisco, CA 94105
415/397-1881
Publishers of *Embedded Systems Programming* magazine.

Forth, Inc.
Janine Ritscher
111 North Sepulveda
Manhattan Beach, CA 90266-6861
213/372-8493
Publishes polyFORTH software.

Forth Interest Group
Georgiana F. (Jan) Shepherd
PO Box 8231
San Jose, CA 95155
408/277-0668
Association of programmers, managers and engineers who use Forth-based systems. Publishes *Forth Dimensions* magazine.

Forth Interest Group Chapters Booth
c/o Wil Baden
229 Princeton
Costa Mesa, CA 92626
714/546-9894

GEnie™
General Electric Network for Information Exchange. Contact the Forth Interest Group for information about our RoundTable.™

Harris Semiconductor
Alice Gills
RTX Marketing
PO Box 883
Melbourne, FL 32902-0883
407/729-4629
RTXDS Development System, RTX32 prototype.

Institute for Applied Forth Research, Inc.
Larry Forsley
70 Elmwood Avenue
Rochester, NY 14611
716/235-0168
Sponsors annual Rochester Forth Conference and publishes the *Journal for Forth Application and Research.*

Laboratory Microsystems, Inc.
Ray Duncan
3007 Washington Blvd. #230
Marina del Rey, CA 90292
213/306-7412
LMI Forth, interpreters and compilers

MISC, Inc.
Charles Johnsen
19704 E. Loyola Circle
Aurora, CO 80013-3904
303/680-9749
Designers of language-specific microprocessors.

NC4000 Users Group
John Carpenter
1698 Villa Street
Mountain View, CA 94041
415/960-1256

New Micros, Inc.
Gary Harden
1601 Chalkhill Rd.
Dallas, TX 75212
214/339-2204
CMOS Forth Engines (F68HC11) and small board-level controllers for embedded applications.

PC/M Corporation
Bob Nelson
6805 Sierra Court
Dublin, CA 94568
415/829-8700
HyperFlo is a data-flow based multiprocessor for real-time applications. Supports C, Fortran, Ada, Unix, OS-9 and multiple processor types.

SDS Electronics
Gabriel Gagne
2865 Kent Avenue #401
Montreal, Quebec, Canada H3S 1M8
514/461-2332
PC-based Forth development system for Intel 8051 family.

Silicon Composers
George Nicol
210 California Ave. Suite K
Palo Alto, CA 94306
415/322-8763
SC/FOX development system using Harris RTX 2000 Forth CPU.

ACKNOWLEDGEMENTS

The following individuals and organizations have generously contributed to the 1988 Real-Time Programming Convention.

Wil and Jocelyn Baden

Donald Colburn, Creative Solutions, Inc.

Ray Duncan, Laboratory Microsystems, Inc.

Gabriel Gagne, SDS, Inc.

Elizabeth Rather, FORTH, Inc.

Embedded Systems Programming magazine

Harris Semiconductor, RTX Marketing

Harris will offer two free Real-Time Express seminars on Friday November 18, for registered convention attendees. Harris will discuss the problems associated with real-time control systems and why it is difficult to develop software for them. They will also discuss the various programming languages for real-time and the one designed especially for the RTX 2000.

ABOUT THE FORTH INTEREST GROUP

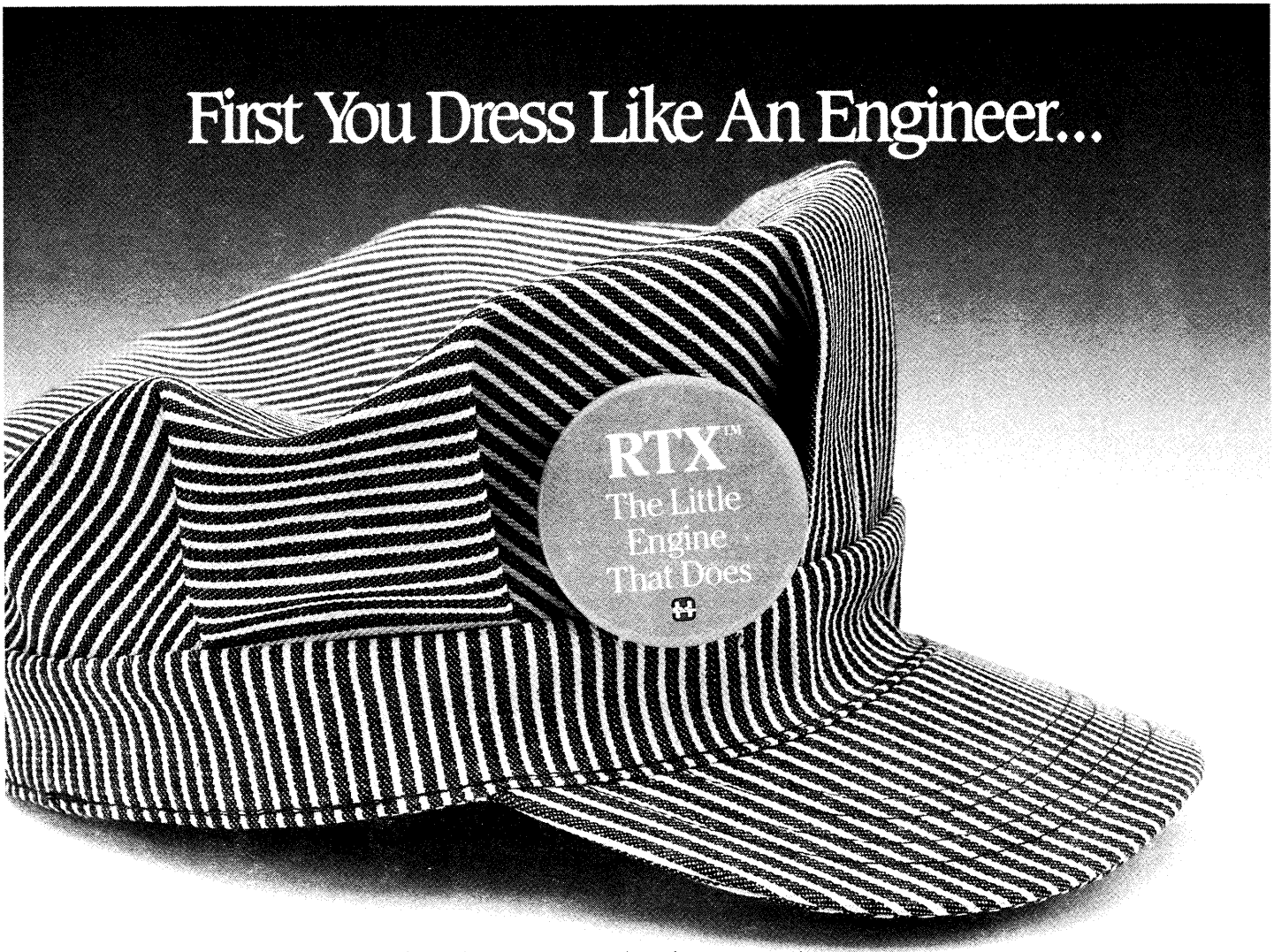
The Forth Interest Group (FIG) is a non-profit corporation dedicated to the purpose of nurturing and furthering interest in Forth.

Forth is not a language but a programming tool, one step removed from a language. It imay be considered a metalanguage, a language for writing other languages. The programmer can, indeed must, define most of the words he or she will use in writing their program. Forth provides both the most basic foundation for an application program and the tools with which to build a language that can express the solution simply and elegantly.

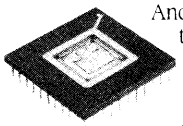
FIG is the publisher of *Forth Dimensions* magazine, which is issued six times a year. FIG also offers the best Forth publicaitons through its mail order service.

Technical support is offered through the Forth RoundTable on GEnie (General Electric Network for Information Exchange). FIG members can take advantage of a special GEnie sign-up offer.

Annual membership dues are $30 for USA, Canada and Mexico, and $42 for all other countries. Membership includes a subscription to *Forth Dimensions*. Contact FIG at PO Box 8231, San Jose, CA, 95155 or call (408) 277-0668.



...Then You Climb Aboard The Real Time Express.™



And leave behind all the performance limitations of traditional microprocessors.

Harris' Real Time Express™ offers you microcontroller integration and RISC processor speed – 15 MIPS (typical) at 10 MHz – all for a fraction of the power dissipation of conventional designs.

The RTX 2000™ is the first in a family of general purpose, application-specific and semicustom products addressing your real-time performance requirements:

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- Fast context switching • Hardware extensibility (via ASIC Bus™) • No need for costly in-circuit emulators

There's more:

- Dual-stack Quad Bus™ architecture which eliminates caches and pipelines • Programming in a structured high-level language (C, Forth, Prolog) • Interactive debugging – at full speed – with full symbolic support

Why wait? Get hardware and software working together like never before – and become more productive than ever. With the Real Time Express.™

RTX, Real Time Express, Quad Bus, RTX 2000 and ASIC Bus are trademarks of Harris Corporation.

Contact us for technical briefs or to reserve a seat at an RTX™ seminar near you.

In U.S.: 1-800-4-HARRIS Ext. 1288 (literature), or Ext. 1299 (seminars).
In Canada: 1-800-344-2444 Ext. 1288 (literature), or Ext. 1299 (seminars).

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☐ Send me a seminar schedule and save me a free engineer's cap
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☐ Let's talk...Have an RTX™ specialist contact me soon.

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COMPANY _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

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Mail to: Harris Semiconductor
P.O. Box 883, MS 53-035 Melbourne, FL 32902-0883

HARRIS
SEMICONDUCTOR

NOTES