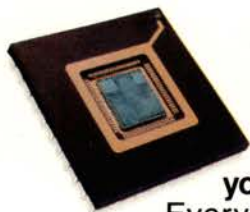




**Get hardware and software  
working together...**

# ...and you'll reach levels you've never



## Harris Introduces Real Time Express™

The first microcontroller optimized for real time, will put your systems on the fast track!

Every designer is looking for a faster system. But the special demands of real-time applications require you to look beyond MIPS—to predictability, repeatability and responsiveness. Because in a real-time world, a late answer is a wrong answer.

Now there's a solution addressing all your performance parameters: our Real Time Express (RTX™) family. Combining the integration of a microcontroller and the speed of a RISC processor.

### Real-Time Tradeoffs Before RTX™

Traditional microprocessors sacrifice predictability and external response to achieve high

instruction-execution speeds, and they can't switch tasks quickly with minimum overhead.

Traditional microprocessors lack flexible partitioning between hardware and software to meet critical timing requirements. You can't easily extend their architectures to accommodate application-specific needs, either.

### Real-Time Software: Hard Without RTX™

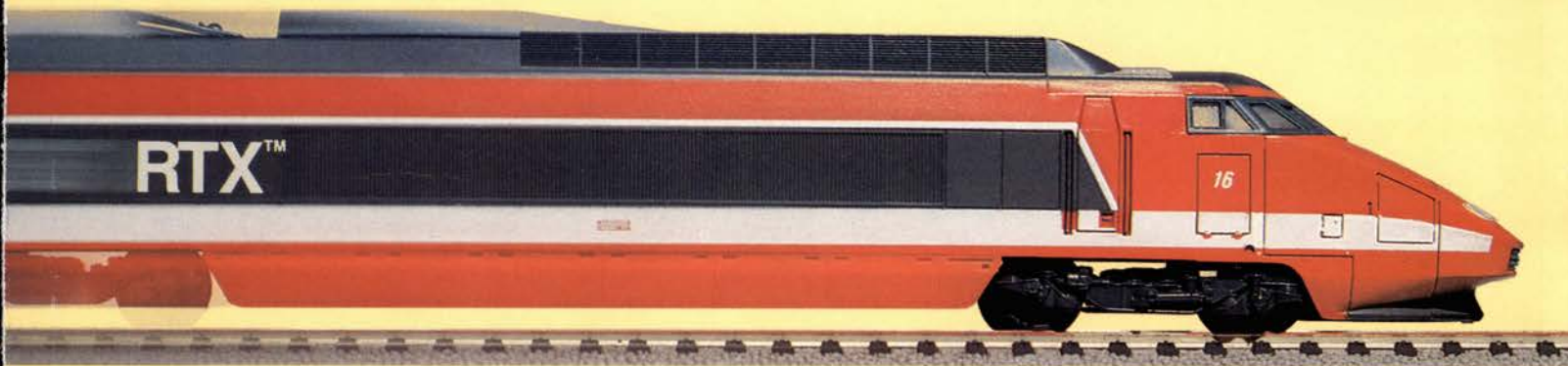
Today's real-time software environment restricts designers' productivity. They have no choice but to mix high-level and assembly language — sometimes microcode, too — during program development. To achieve real-time performance, they must program and debug the most complex tasks at the lowest level. The result: long development cycles, difficult debugging and high maintenance costs.

#### RTX 2000™ Performance

Processor Clock Speed (MHz)	Typical Instruction Rate (MIPS)*	Power Dissipation (mW)	Interrupt Latency (μs)	Conditional Branch (μs)	16 x 16 Multiply (μs)	ASIC Bus™ Bandwidth (Mbytes/Sec)	Subroutine Call/Return Overhead (μs)
10	15.0	400	0.4	0.10	0.10	20	0.10
8	12.0	320	0.5	0.12	0.12	16	0.12
5	7.5	200	0.8	0.20	0.20	10	0.20
1	1.5	40	4.0	1.00	1.00	2	1.00

\*Instruction Rate Measured In Millions Of Instructions Per Second.

# ch performance ver dreamed of.

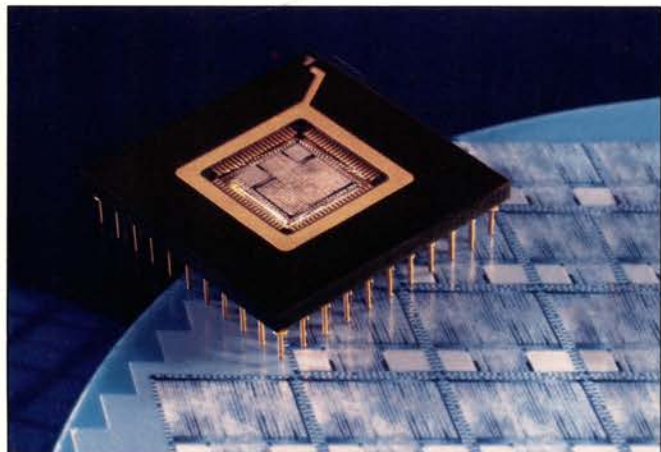


## The RTX™ Solution: No More Performance Penalties

The Real Time Express™ family of general purpose, application-specific and semicustom products offers you microcontroller integration and RISC processor speed — for a fraction of the power of conventional designs.

It achieves performance through simplicity and parallelism, using an innovative dual-stack Quad Bus™ architecture with no caches or pipelines.

RTX™ frees you to program your entire application in a structured, high-level language (C, Forth, Prolog) without traditional performance penalties.



**The Little Engine That Does:** Based on proven macro cells, the Harris RTX is fully integrated into a CAD system, adding flexibility and reducing risk in semicustom designs.

## RTX 2000/2001™ Features

Feature	RTX 2000	RTX 2001
Timer/Counters (on-chip)	3 ea. — 16 bit	3 ea. — 16 bit
Interrupt Controller (on-chip)	NMI and 13 Maskable (Expandable off-chip)	NMI and 13 Maskable (Expandable off-chip)
Memory (on-chip)	256 x 16 Parameter Stack 256 x 21 Return Stack	64 x 16 Parameter Stack 64 x 21 Return Stack
Wait State Controller (on-chip)	Yes	Yes
ASIC Bus™	16 bit	16 bit
16 x 16 Multiply	Single Cycle	20 Cycle
32/16 Divide	21 Cycle	21 Cycle
32/16 Square Root	25 Cycle	25 Cycle
Address Range	1 Mbyte	1 Mbyte
Data Bus	16 bit	16 bit
Byte Operations	Yes	Yes
Package	84 pins	84 pins
883C Compliant	1Q CY89	Not Planned
Semicustom Migration Path	Yes	Yes
Rad-Hard Migration Path	Yes	Not Planned
32 bit Migration Path	Yes	Yes
Development System	Yes	Yes
Forth Compiler	Now	Now
C Compiler	4Q CY88	4Q CY88
Prolog Compiler	1Q CY89	1Q CY89



**A better hardware-to-software balance can make you 10 times more productive.**

You'll boost productivity by debugging interactively — at full speed — with full symbolic debug support. Powerful debugging tools you can use on a low cost PC.

Now you can integrate hardware and software, and debug without investing in costly, complex In-Circuit Emulators (ICE).

It's everything you've wanted in a real-time microcontroller — rapid interrupt response, predictable timing, fast context switch, hardware extensibility (via a unique ASIC Bus™). And our

16-bit RTX 2000™ and RTX 2001™ are just the start. To respond to the diversity of your real-time applications, we'll be announcing a broad family of RTX™ products, among them fixed and floating point versions, and a 32-bit model.

Find out more about how you can move more of your hardware into software — and get them working together like never before.

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

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

### Sales Offices

**U.S. HEADQUARTERS**  
Harris Semiconductor  
2401 Palm Bay Road  
Palm Bay, Florida 32905

**EUROPEAN HEADQUARTERS**  
Harris Systems Ltd.  
Semiconductor Sector  
Eskdale Road  
Winnersh Triangle  
Wokingham RG11 5TR  
Berkshire  
United Kingdom  
TEL: 0734-698787

**FAR EAST HEADQUARTERS**  
Harris K.K.  
Shinjuku NS Bldg. Box 6153  
2-4-1 Nishi-Shinjuku  
Shinjuku-Ku, Tokyo 16 Japan  
TEL: 81-3-345-8911

**DISTRIBUTORS IN U.S.A.**  
Anthem Electronics  
Falcon Electronics  
Hall-Mark Electronics

Hamilton/Avnet Corporation  
Schweber Electronics

**DISTRIBUTORS IN CANADA**  
Hamilton/Avnet Corporation  
Semad Electronics

**IN REAL-TIME CONTROL,  
THE NAME IS  
HARRIS**

Harris Semiconductor: Analog - CMOS Digital  
Gallium Arsenide - Semicustom - Custom



Reorder Number: 6AD-5030  
©Harris Corporation, July 1988  
Printed in U.S.A.

Real Time Express, RTX, RTX 2000,  
RTX 2001, ASIC Bus, and Quad Bus  
are trademarks of Harris Corporation.



# Don't swallow that line about what a RISC processor can do for your real-time system.

---

## Harris RTX 2000™: Superior Performance, Dramatic Cost Savings.

---

They dangle a RISC chip in front of you and tell you how well it performs in real-time systems. Bite... and you'll regret it.

---

## Real Time Needs Speed, Response And Predictability.

---

Our unique RTX 2000 does away with the caches and pipelines that cause erratic execution speeds and response times in RISC processors. In fact, in an asynchronous interrupt driven environment, the RTX 2000 is so agile and predictable, it can outperform RISC processors by up to 10x. And its 16-bit architecture is a better fit for the majority of real-time applications.

---

## Consider Form-Factor And Low Power.

---

With 84 pins, our RTX 2000 package is about half the size of many conventional RISC machines. In many cases, RISC chips require support circuits to reach their promised performance benchmarks. Not the RTX. And consider power use. The RTX 2000™ uses a mere 7 mA/MHz at full speed: about 1/6 the power consumption of basic RISC chips. That power and space savings is critical when sealed enclosures, high-density packaging and battery operation are considerations. And systems that run cooler, run more reliably.

---

## Faster Development, Reduced System Cost.

---

Complex RISC hardware and software development

can take months to master. You'll reach production-ready status much sooner in our highly integrated development environment with programming in a structured high-level language (C, Forth or Prolog).

Cost savings come mainly from RTX 2000's low memory requirements. Memory can account for 80% or more of system cost, and RISC processors require massive amounts of high-speed memory. The RTX 2000 works with **4x to 6x less** program memory than RISC machines.

---

## They Sample, We Deliver.

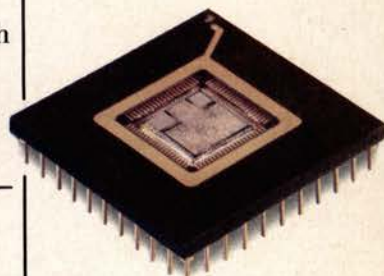
---

While RISC vendors continue shake-out sampling, we're delivering RTX 2000 chips now. In the quantities you need. With the

support you need.

Don't ask RISC to do something it can't do. Design around a micro-controller optimized for real time. Reel in a winner: the Harris Real Time Express™.

Contact us for technical briefs or to register for our real-time design workshops. In U.S.: 1-800-4-HARRIS, Ext. 1291. In Canada: 1-800-344-2444, Ext. 1291.



What your vision of the  
future demands. Today.

 **HARRIS**  
SEMICONDUCTOR  
HARRIS · RCA · GE · INTERSIL

# WIN AN ALL EXPENSE PAID TRIP INTO THE FUTURE.



## Up to one-half million dollars in prizes.

RTX™ is the wave of the future in embedded control. It's the only microcontroller optimized for the unique demands of real-time, offering 10 MIPS of predictable performance in low-power CMOS.

And to show you how easy it is to develop your vision of the future on the RTX, we'll help pay your expenses along the way. Announcing the Harris/*Embedded Systems Programming Magazine* Real-Time Design Competition.

## 1,000 Free RTX Development Kits.

The Harris/ESP Real-Time Design Competition begins with nothing but ideas. Simply send us your application ideas for the RTX. And if your entry qualifies, we'll give you a free RTX development kit.

Up to 1,000 free RTX development kits will be given away. The kit includes a Euro-card size RTX development

board, with 16K of PROM, 4K of SRAM, serial port and development software.

Once you've qualified for a development kit, you've already won a \$500 value. But there's lots more to win.

## \$10,000 Grand Prize

The grand prize winner, as chosen by Harris and *Embedded Systems Programming Magazine*, will win a \$10,000 prize, so you can continue your trip into the future, all expenses paid.

## Send for your entry kit today.

The Harris/ESP Real-Time Design Competition is happening in real time. Initial proposals must be received by April 16, 1990. Send for an entry kit with complete rules and regulations. Call 1-800-4-HARRIS, ext. 1010.



What your vision of the future demands. Today.