A PENTON PUBLICATION

DECEMBER 1991

Electronics®

BUSINESS / TECHNOLOGY PERSPECTIVES FOR GLOBAL ELECTRONICS MANAGEMENT

ENVIRONMENTALISM

IT PAYS TO GO GREEN

PAGE 42

WITH TRW'S VIDEO ENCODER, ANYONE CAN PRODUCE PROFESSIONAL VIDEOS WITHOUT HOLLYWOOD BUDGETS.

1988-1989 Emmy Award

Lights. Camera. Action. The monolithic Video Encoder is here. Created by TRW, the film and production industry's leading supplier of high-performance ICs. And the only company ever to be awarded an Emmy for its video IC technology.

Now, TRW brings you the first in its new line of affordable multimedia ICs for desktop video: The TMC22090.

And that means converting RGB, YUV or color-indexed computer images and graphics into studio-quality NTSC, PAL or S-Video signals can now be done with a single, low-cost chip. One fabricated in TRW's Omicron-C™ 1 μ CMOS process. Packaged in an 84 lead PLCC. And, of course, designed with the full-spec performance that is synonymous with TRW standards.

The TMC22090 boasts a 256x8x3 color lookup table, a pixel mask register and compatibility with 171 and 176 RAMDACs. All of which means transparent interface with existing device drivers.

Better still, the high performance Hollywood has come to rely on is provided by 4:4:4 digital encoding, oversampled 10-bit outputs, and built-in test signals. The TMC22090 even gives you a JTAG interface for low cost production testing. So for everything from simply providing an affordable video output for computer display boards, to developing complex desktop video workstations, you can design in confidence. With the video encoder from the leader in video ICs: TRW.

Overlay graphics and titles onto video by selecting a transparent color for the Video Encoder chroma key.

And you can count on TRW to keep you at the forefront of multimedia, too. This Video Encoder, after all, is just our debut. We've got some great sequels in development.

For data sheets, applications and other information on TRW's TMC22090 Video Encoder, as well as to be first in line for coming attractions, call or write today:

TRW LSI Products Inc.,
P.O. Box 2472, La Jolla, CA 92038
(619) 457-1000, FAX (619) 455-6314
(800) TRW-LSIP (800) 879-5747

TRW

TRW LSI Products Inc.

STANDARDS SET. STANDARDS TO BE MET.

CIRCLE 203

Electronics

EDITOR
Jonah McLeod
MANAGING EDITOR
Howard Wolff
SENIOR EDITOR
Lawrence Curran
EDITOR-AT-LARGE
Samuel Weber
914-428-3595
ASSISTANT MANAGING EDITOR
Jacqueline Damian
DEPARTMENT EDITORS
Communications:
Jack Shandle
201-393-6228
System Technology:
(San Jose) **Jonah McLeod**
408-441-0550
EDITORIAL PRODUCTION MANAGER
April Messina
ASSOCIATE ART DIRECTOR
Tony Vitolo
STAFF ARTIST/DESIGNER
Anthony White

BUREAUS
Boston: **Lawrence Curran, Manager**
508-441-1113
Midwest Correspondent: **Francis J. Lavoie**
Mid-Atlantic: **Jack Shandle, Manager**
201-393-6228
Frankfurt: **John Gosch, Manager**
011-49-61-71-53834
France Correspondent: **Andrew Rosenbaum**
011-331-4236-1867
Italy Correspondent: **Andrew Rosenbaum**
011-331-4236-1867
Japan: **Shin Kusunoki, Consultant, Nomura Research Institute**
011-81-45-336-7064
UK Correspondent: **Peter Fletcher**
011-443-226-64355
Electronics Index: **Mark Parr**

VICE PRESIDENT-EDITORIAL
Perry Pascarella
GROUP ART DIRECTOR
Peter Jeziorski
EDITORIAL ADMINISTRATION
Bradie S. Guerrero, Tina A. Montone

Director of Circulation: **Bruce Sprague**
Manager of Circulation: **Bob Clark**

Production Manager:
Doris Carter
(201) 393-6259
FAX: (201) 393-0410
Order Entry
Beverly Desbiens

PUBLISHER
John G. French
617-890-0891

December 1991 Volume 64, Number 12
Electronics (ISSN 0883-4989) is published monthly by Penton Publishing, Inc., 1100 Superior Ave., Cleveland, OH 44114-2543. Second class postage paid at Cleveland, OH, and additional mailing offices.

Editorial and advertising addresses: Electronics, 611 Route #46 West, Hasbrouck Heights, NJ 07604. Telephone (201) 393-6060. Facsimile (201) 393-0204. San Jose, Calif.: Telephone (408) 441-0550. Circulation (1100 Superior Ave., Cleveland, OH 44114-2543): (216) 696-7000.

Subscriptions free to qualified managers. All others: $60 for one year in the U.S.; $70 in Canada; $136 in all other countries. For subscriber change of address and subscription inquiries, call 216-696-7000.

POSTMASTER: Please send change of address to ELECTRONICS, Penton Publishing, Inc., 1100 Superior Ave., Cleveland, OH 44114-2543.

Limited Only By Your Imagination

Remember how quickly you could turn a concept into reality with a set of quality building blocks? How you always seemed to have just the right parts and how well they fit together? How easily you could modify your creation to explore creative alternatives?

Our VI-200 and VI-J00 families of high density converters, along with a host of compatible modular peripheral products, are designed to "plug and play" perfectly... offering you the flexibility, ease-of-use, quality and repeatability needed to implement virtually any power system solution. And with hundreds of standard models to choose from...input ratings from 10 to 400 Volts, outputs from 2 to 95 Volts and power expansion from Watts to kiloWatts... you won't be stuck at the last minute with "missing" parts.

You're not playing with toys anymore...which may be the most important reason for specifying Vicor's component-level "building blocks" for your next power system.

Component Solutions For Your Power System

VICOR

23 Frontage Road Andover, MA 01810
TEL: (508) 470-2900 FAX: (508) 475-6715

CIRCLE 205

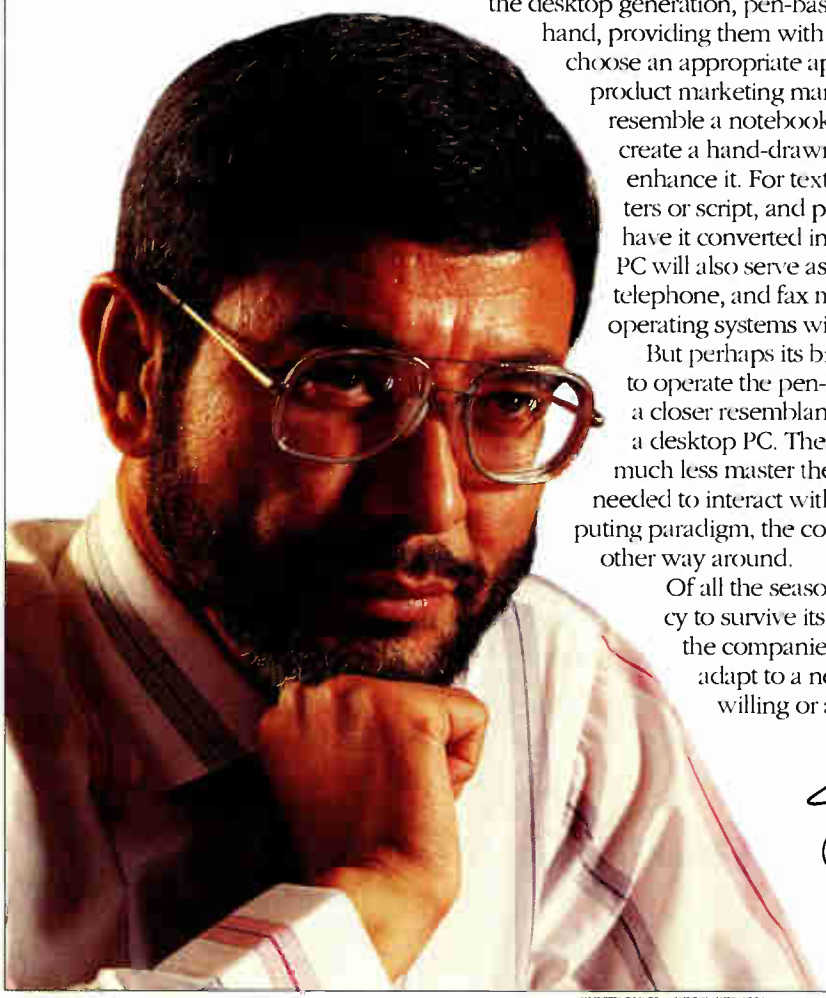
ENTER, STAGE LEFT: A NEW PC

If there is a quotation that suits the Comdex computer show held last month in Las Vegas, it is the familiar line from Shakespeare's *King Richard III*: "Now is the winter of our discontent...." Nothing could more succinctly sum up the state of the personal computer industry today. The near-term strategy for most companies is to simply survive the big chill, says Stacy Lund, marketing manager at Seagate Technology in Scotts Valley, Calif. Companies are trying to anticipate the next hot segment and looking for relief from the cold reality of the recession.

Almost all the industry suppliers are betting that the notebook and subnotebook PC is the next major wave. But Al Shugart, president, CEO, and COO of Seagate, is skeptical about this assessment. The rapidity with which notebooks have advanced to higher-capacity disk drives suggests to him that most notebook customers are PC owners who want a portable version of their desktop system. The question is whether there are enough of these buyers to provide sustained market growth for more than a few quarters.

Just as living creatures go through metamorphosis, so too the PC business. The large installed base of computers is essentially serving a limited number of point solutions: spreadsheets, data bases, and word processing applications. Beyond the winter of its discontent, the industry belongs to a new breed of computing engine. One candidate for this new, transforming machine is the pen-based system. For the first time, it invites the user who has not been touched by the computer revolution to partake. Users will interact with pen-based PCs via a pen rather than a keyboard, and this simplicity means pen-based PCs will undoubtedly find their way into a wide variety of white- and blue-collar applications that are not well served by today's machines.

One company leading the way into pen-based computing is Go Corp. of Foster City, Calif. Unlike the desktop generation, pen-based systems will lead users by the hand, providing them with a table of contents from which to choose an appropriate application, says Atri Chatterjee, Go's product marketing manager. Physically, the computer will resemble a notebook on which the user can, for example, create a hand-drawn sketch and then ask the machine to enhance it. For text, the user can enter data in block letters or script, and preserve the actual image as well as have it converted into alphanumeric text. The pen-based PC will also serve as the user's appointment calendar, telephone, and fax machine. User-friendly, object-oriented operating systems will be standard.



But perhaps its biggest lure is that the user will be able to operate the pen-based computer intuitively—it bears a closer resemblance to pencil and paper than it does to a desktop PC. There is no need to learn to use a mouse, much less master the arcane commands that are now needed to interact with a DOS machine. In the new computing paradigm, the computer acts like a person and not the other way around.

Of all the seasons, winter demands the most resiliency to survive its harsh extremes. For the PC industry, the companies that survive will be those willing to adapt to a new computing paradigm. Those less willing or able to do so will not. ❑

Jonah McLeod

JONAH McLEOD
EDITOR

MEGABIT MEMORIES

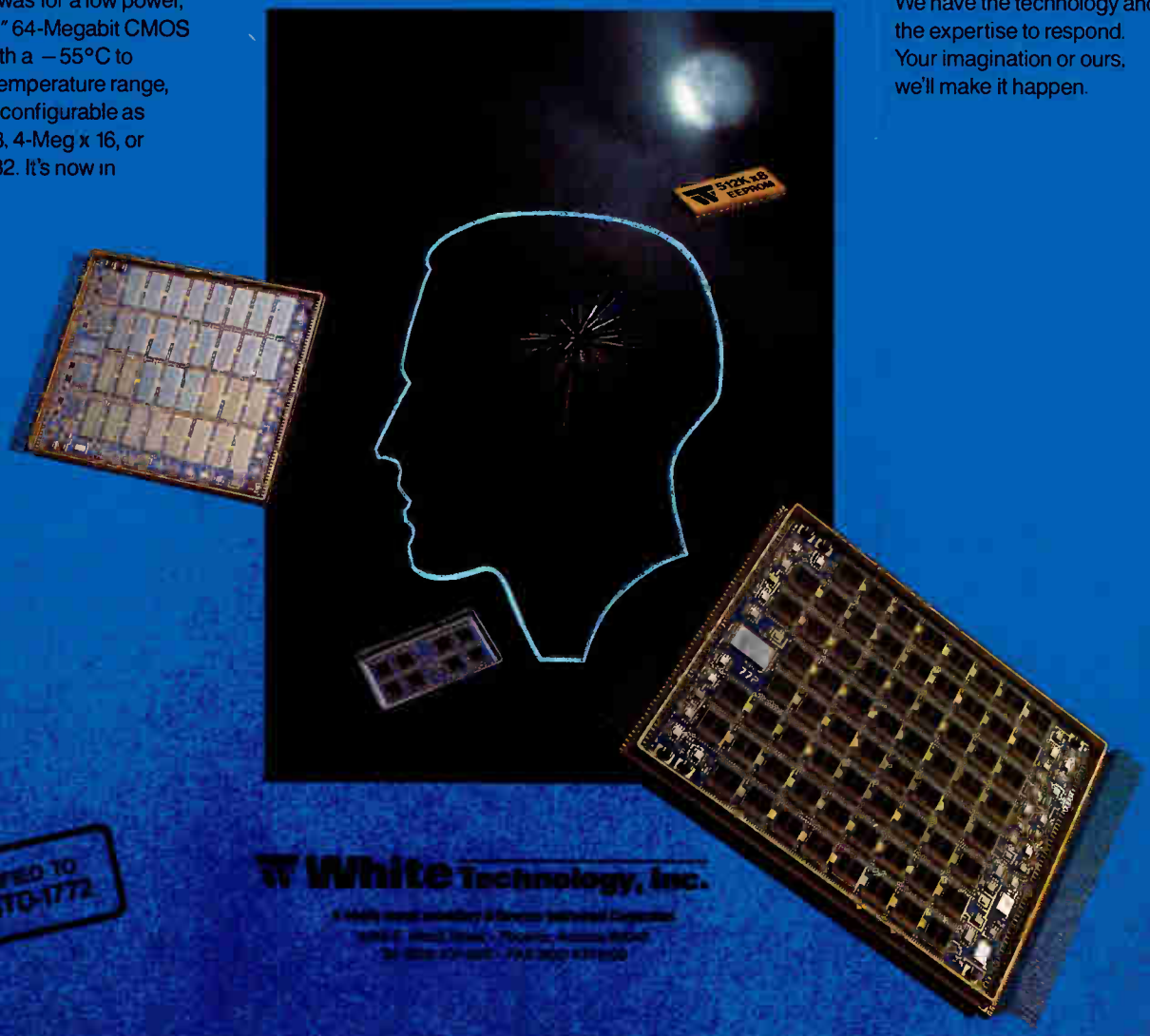
As Big As Your Imagination

What size do you want your next memory package or system to be? Very large? Larger than that, and more complex? We can make your imagination and your design happen. We've been doing that for engineers for almost 20 years.

One of our latest design requests was for a low power, 3.0″ x 3.5″ 64-Megabit CMOS SRAM with a −55°C to +125°C temperature range, and user-configurable as 8-Meg x 8, 4-Meg x 16, or 2-Meg x 32. It's now in production and shipping. Another was for a 128 Megabit Flash PROM in the same package. It's designed, in test, and almost out the door.

We can go from 64- and 128-Megabits up to the Gigabit range, and beyond. Or, we can give you a simple 4-Megabits of CMOS SRAM in a 32-pin DIP with real JEDEC pinouts and footprint. Up or down, when you need high density, high speed, high temperature, and someone's high involvement in your designs, give us a call. We're certified to MIL-STD-1772, and can offer screening to Military standards.

We have all the tools you need. From tiny building blocks of 1- to 4-Megabits of SRAM or EEPROM DIPs to the densities of your ultimate imagination. Want a 80C31-based Microcontroller, a compact 68020- or 486-based single-package computer, or a multi-package memory management information system? We have the technology and the expertise to respond. Your imagination or ours, we'll make it happen.



CERTIFIED TO MIL-STD-1772

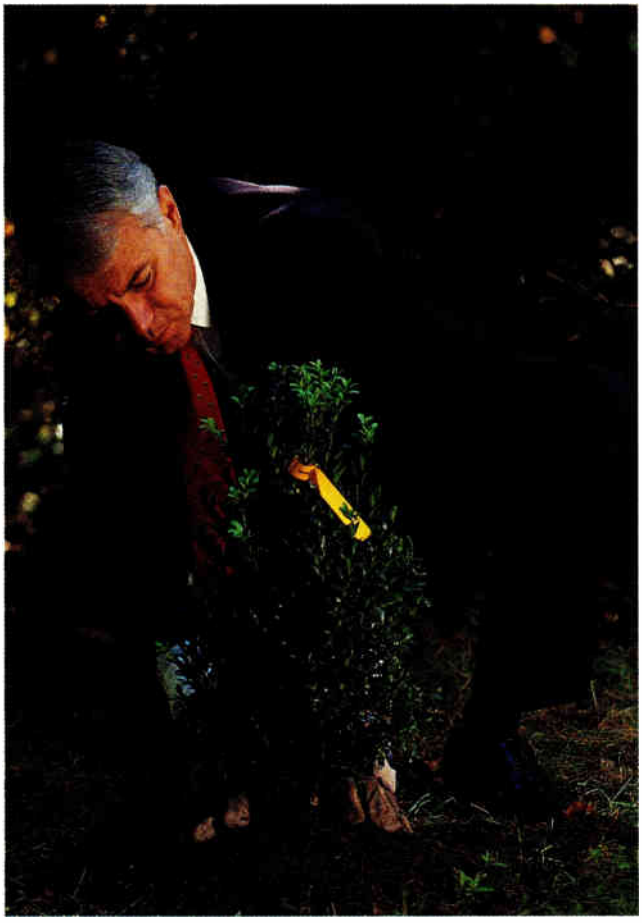
White Technology, Inc.

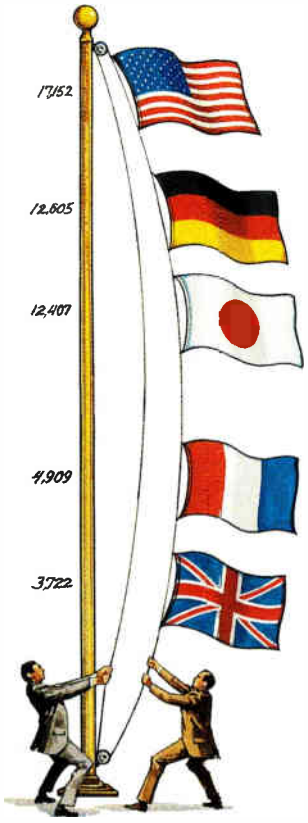
DECEMBER 1991 VOLUME 64, NO. 12

COVER STORY PAGE 42
COVER PHOTO; WILLIAM COSTELLO

Electronics

FEATURES





DEPARTMENTS

NEWS ROUNDUP

WORLDWIDE NEWS

COMMENTARY

Jesse H. Neal
Editorial Achievement Awards

1956 Merit, 1965 First
1975 Merit, 1976 Merit
1977 First, 1978 First
1988 Merit, 1990 Merit

Companies covered in this issue, indexed to the first page of the article in which each is mentioned.

*International only

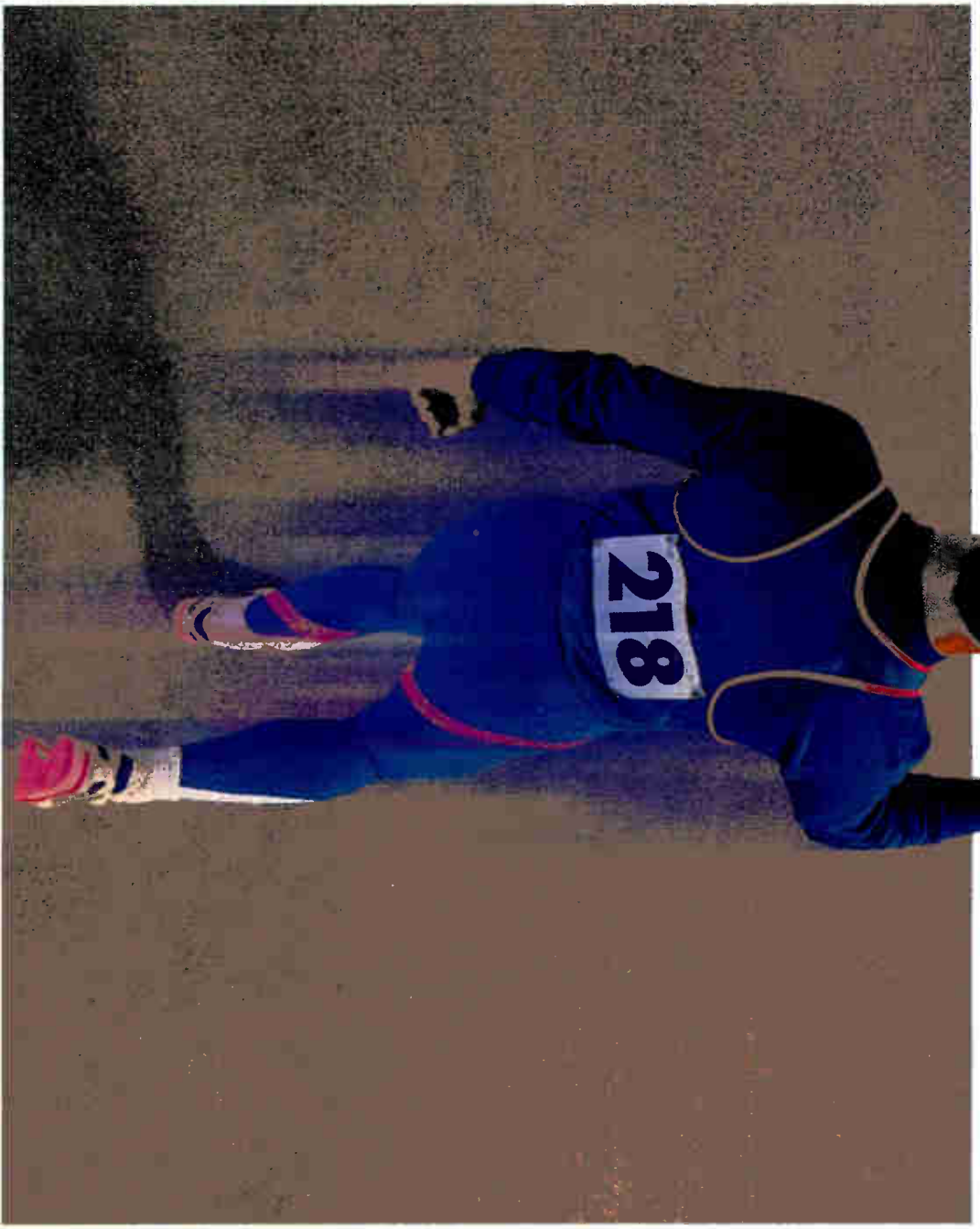
Board test development is a race

HP 3070 high-performance board test systems can help you win.

Get a jump on board test development. With the HP 3070 family of board test products you can get a fast start with a single, compatible platform for design prototype, manufacturing, and depot repair test. That compatibility saves you time. Because your tests and fixtures can all be shared, along with the knowledge it took to create them.

The HP 3070 family's Concurrent Test Environment also helps you develop high-performance digital and ASIC tests faster. And finish analog functional tests in less time with the HP 3070 VXI series.

against time.



Plus, since HP 3070 technology eliminates uncertainties by extending timing accuracy through the fixture to the DUT, you'll save days of programming time and develop reliable, repeatable, transportable tests that much faster.

So make sure you're in position to win the race against time, call **1-800-452-4844**. Ask for **Ext. 2856**, and we'll send a brochure that explains how the HP 3070 family of board test systems can help you win the race.

There is a better way.

Life without the telephone would be unimaginable today. It is truly the pulse of business and personal life.

Now, as ISDN creates new possibilities, the need for Anritsu capabilities is greater than ever.

At the Heartbeat of Communications

Dedicated to Preserving the Connections Between People

Ensuring the quality that people like you depend on every day is Anritsu's special area of expertise.

From local payphones to international communications, we cover every aspect to guarantee instant access with reliable connections. Whether it's high-speed data or the most intimate proposal.

This is no small accomplishment considering the increases in speed, volume, media and services offered by today's networks.

We meet each of these challenges with the most advanced digital, optical and other measurement technologies to support peak communications performance.

We also produce miniature relays, hybrid ICs and efficient industrial automation equipment.

Anritsu has consistently pioneered new standards in speed, precision, and reliability.

That's how Anritsu support ensures clear, reliable performance in any network.

Anritsu

ANRITSU CORPORATION 10-27, Minamiazabu 5-chome, Minato-ku, Tokyo 106, Japan Phone: Tokyo 03-3446-1111, Telex: J34372

CIRCLE 178

LETTER FROM

SINGAPORE

THE CITY-STATE, A MAGNET FOR MULTINATIONALS, HAS A NEW VISION

REALIGNING THE TARGETS FOR THE '90S

BY KRISTA CONLEY

When you think robust economic growth, political stability, and a veritable magnet for multinationals, the likely hot spot in Asia is Singapore, the city-state with a mission. But that mission is changing, as the pragmatic economic planners who have so carefully nurtured Singapore's growth in the past confront new challenges.

Singapore had been governed for decades by Prime Minister Lee Kuan Yew, a charismatic leader who carefully nurtured its development into a strategic operational node for multinational corporations. Yew decided to step down in 1990 and his successor, Goh Chok Tong, has his own vision, one demanding management of a tight labor market, new education priorities, emphasis on capital-intensive industries, and internationalization.

But what is already there is impressive. In 1990, Singapore's trade reached $120 billion, and per capita income $12,785—this for 2.7 million people living and working in just 250 square miles. And unemployment is not a problem, dipping to a record low rate of just 1.7% in 1990.

Yet parts of the machine need work. There is a chronic shortage of trained technical talent, and although the government allocates 20% of its budget to education, skill levels don't seem to match the needs of the next phase of industrial development. According to Jonathan Yuen, director of the New York office of the Singapore Economic Development Board, "We are also interested in overseas talent in the fields of research, science, engineering, and computer science because there is always a demand for these skills in Singapore. Unfortunately, the Singapore talent pool is quite finite."

The government hopes to defuse the labor issue that threatens to constrain economic growth by encouraging the growth of capital-intensive industries rather than traditional labor-intensive production. But that may only change the nature of the problem, requiring many new types of skilled labor, rather than reducing demand. Nevertheless, despite skill problems, the Singapore worker has been rated the most productive in the world for the 10th time by the Washington-based Business Environment Risk Intelligence. Switzerland was a close second, Japan third.

In addition, multinationals, which account for more than 90% of Singapore's manufacturing investment, have helped Singaporeans to expect ever higher wages and an improved standard of living, which is eroding its cheap-labor advantage. And unlike Taiwan and Hong Kong, whose economic growth depends on spirited entrepreneurship, Singaporeans tend to enjoy the security of working for foreign investors, and have little desire to risk new ventures.

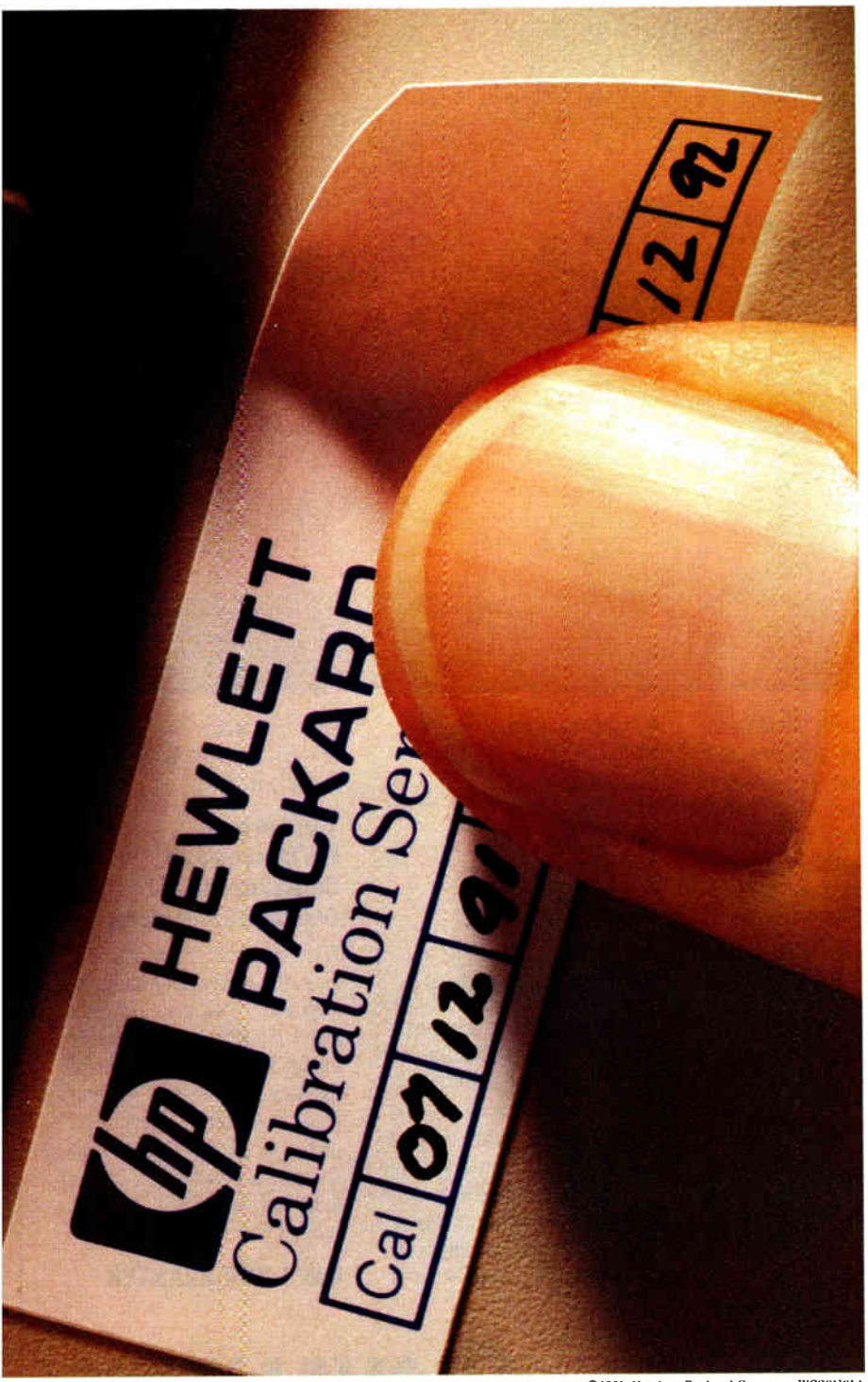
Still, the place is "well-suited to be the electronics center for all of Asia," says one frequent traveler to Singapore, Michael K. Hsu, president of Asia Pacific Strategic Bioventures, a division of D. Blech & Co. based in New York. "They started early in the 1980s with the creation of the National Computer Board," he says. "That showed their neighbors, the U.S., and Europe that Singapore was making a commitment to being No. 1 in the region in telecommunications, computer software, and hardware."

Some 2.7 million people with a per capita income averaging $12,785 live in 250 square miles.

One firm that noticed is Lotus Development Corp. The Cambridge, Mass., software giant weighed the possibilities and picked Singapore as its Asia-Pacific headquarters. Quite possibly the largest software R&D project in Singapore, situated on a 5,000-square-meter site in Chai Chee Industrial Park, the Lotus facility is dedicated to product R&D, manufacturing and distribution, and sales and service. The way Lotus's president and CEO, Jim Manzi, sees it, "We do believe strongly that local language products should have 'native personality,' which can only be supplied by people who really understand local business needs and local culture. In this respect Singapore will be the fulcrum of our Asian product development activities."

Manzi says the $4.3 million plant came on-line as a result of

We make it stick.



When quality depends on calibration, depend on HP.

If the quality of your product depends on the quality of your measurements, you have to be absolutely sure of the calibration of your electronic test equipment. And the best way to do that is with HP Calibration Services. We'll help you develop a solid calibration program that fits your production requirements and calibration cycles, and complies with all the standards you have to meet.

You'll have the security of knowing that Hewlett-Packard stands behind you, with complete, thorough data reports, tracking procedures, and certification to help you pass audits with ease. Calibrations are performed at customer service centers in over 40 countries. We can also provide them at your site. And we move fast. The HP ExpressCal program reduces downtime by completing most scheduled calibrations in 24 hours.

So, for calibration you can depend on, call **1-800-835-4747.** Ask for **Ext. 418,** and find out how HP can help you put a complete calibration program firmly in place.

There is a better way.

HEWLETT PACKARD

RF/MICROWAVE COMPONENTS ACROSS THE COMMUNICATIONS SPECTRUM

Semiconductors to Supercomponents

When it comes to high performance, high volume, and high frequency, no one matches Avantek. For over 25 years, we've been the leader in developing new levels of circuit performance for communications systems across the spectrum. Avantek provides cost effective solutions for the most particular design requirements. Our product line is continuously growing both in process and application leadership. We offer both Si and GaAs based products providing the best performance/price choice for any high-frequency design. Discreet devices, ICs, hybrids, or system subassemblies, Avantek has the broadest line of standard components—literally thousands—for kilohertz to Gigahertz applications, and lightwave components too.

- Surface-mount plastic integrated circuits
- Low-noise amplifiers
- High-power amplifiers
- Active and passive mixers
- DRO, VCO, and YIG tuned oscillators
- Limiters
- Attenuators
- Switches
- Frequency converters
- Multiplexers

We Can Help Today

Your local Avantek sales engineer is an *engineer*, trained and experienced in critical RF/microwave design-in situations and uniquely qualified to support you. Ready to provide design literature, CAD modeling software, or prototype samples. Backed by application engineering teams, your Avantek sales engineer makes the design-in process fast, reliable, confident, and affordable.

The Largest RF/Microwave Component Distribution Network

With over 20 major stocking locations, and a worldwide transshipment operation, Avantek delivers millions of parts every month. We meet the demands of the most demanding JIT program, or supply a critical single prototype with the same matchless service and support. Call us today to hear how we can support your great designs.

Call 1-800-AVANTEK

AVANTEK

CIRCLE 187

the government's progressive attitude toward information technology development, excellent communications infrastructure, and the skilled work force. According to Hsu, Lotus made a good choice: "Singapore is a great place for a research and development center," he says. "There are lots of incentives, infrastructure support, strong national company base, and large multinationals base for support."

THERE ARE LOTS OF INCENTIVES AND A STRONG SUPPORT STRUCTURE IN SINGAPORE

Another multinational, Apple Computer Inc., has been operating in Singapore since 1981. The original plant produced Apple II products for the Pacific region and the U.S. Apple expanded its facility in 1988 and produces the Macintosh Classic and Macintosh LC, as well as all Apple II products—and laptops may be added. The plant operates 24 hours a day, with a staff of more than 500.

Singapore and the U.S. have a healthy history of trade and economic cooperation. This should improve in 1992 under the auspices of a Trade and Investment Framework Agreement with the U.S. signed in October 1990. The objectives of the agreement are to monitor trade and investment patterns and identify opportunities for expansion, to hold consultations on specific trade and investment matters, to negotiate agreements where necessary, and to identify and work toward the removal of impediments to trade and investment flows. In short, rather than meeting only when there's a problem to fix, U.S. and Singapore representatives will get together regularly to strengthen their bilateral ties.

For electronics and software companies, the agreement's so-called action agenda covers antidumping and countervailing duties, market access, services, and intellectual property rights. It also provides for advance warning when antidumping or countervailing duties are brought against Singapore's exports in the U.S., its largest export market. "It won't completely insulate us, but it is a commitment not to do damage to a friend," says Lee Hsien Loong, minister of trade and industry.

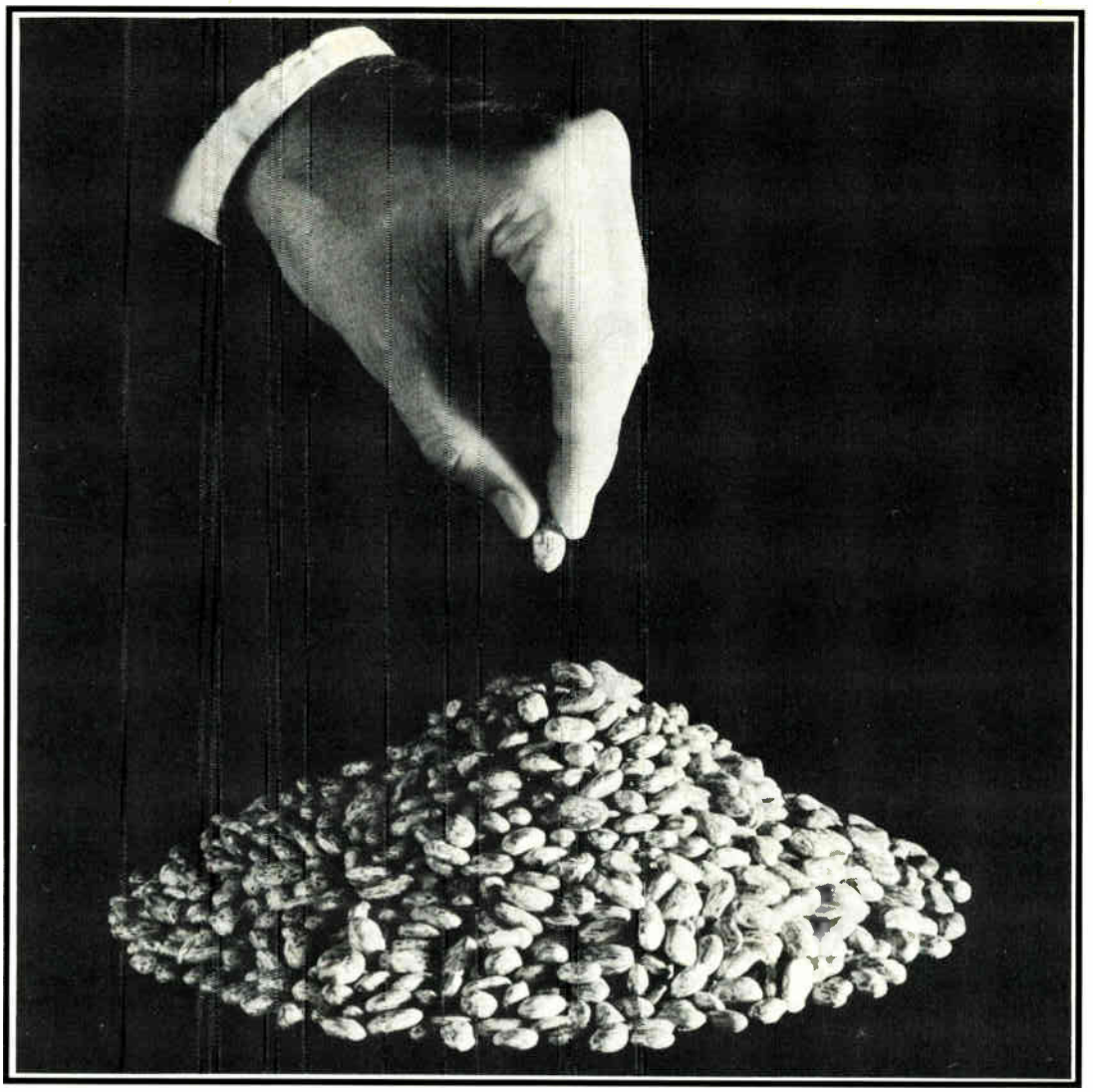
U.S. firms have been pretty comfortable operating in Singapore. Their cumulative investment is $9 billion, and they accounted for 48% of investment dollars committed in 1990 alone.

The cost of doing business in Singapore is high, but the potential return in specific target areas could be worth it. The government's planners are now aiming at the information technology, biotechnology, and automation industries.

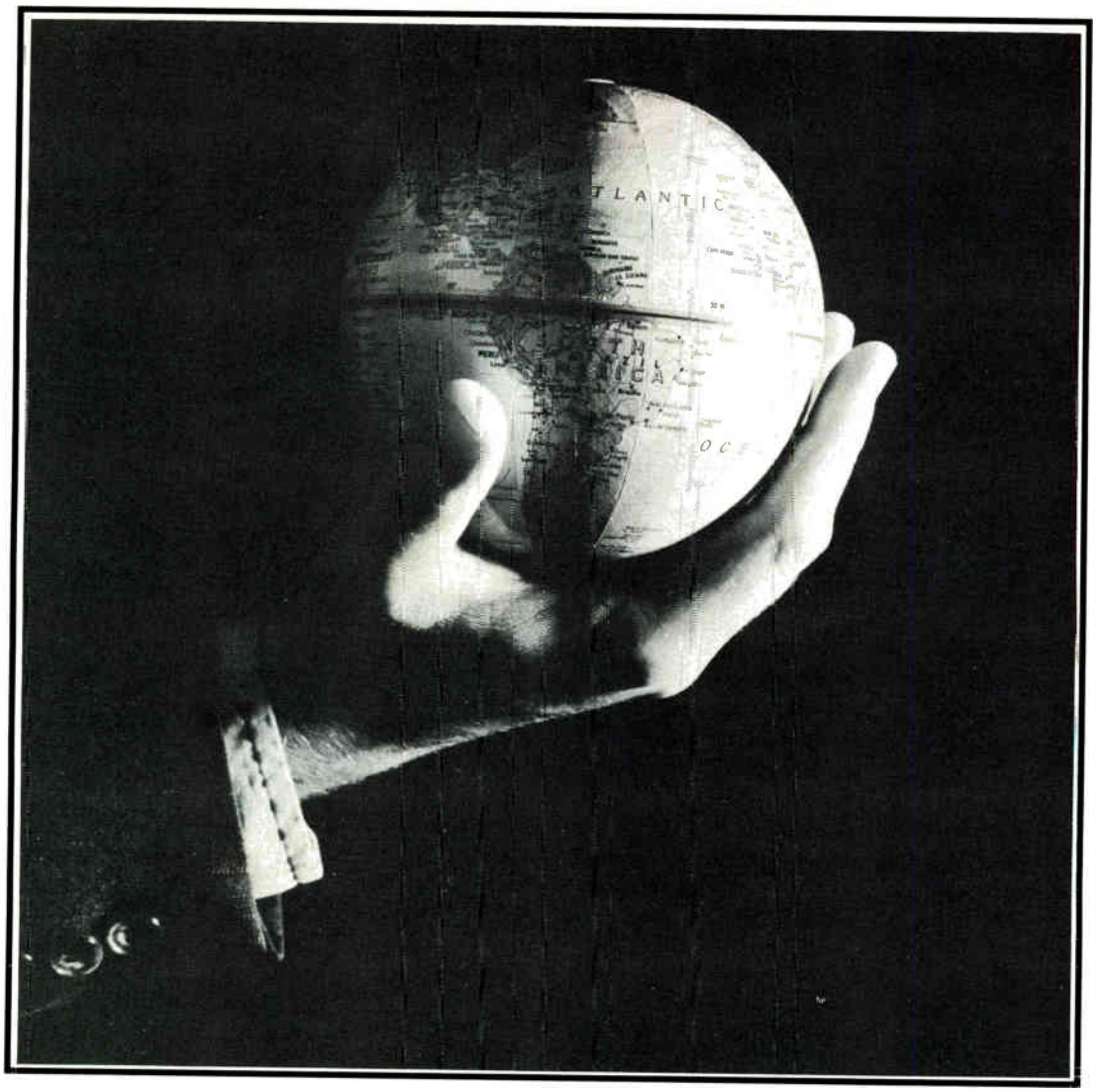
To support the information technology sector, the need is computers, peripherals, and application software. Other big growth areas are telecommunications equipment and services, as well as electronic components and equipment. In addition, Singapore has established itself as a center for aviation repair and overhaul, so it needs aviation and avionics support equipment. Lastly, the government has targeted the services sector.

A key to understanding business with Singapore is a new attitude toward the rest of the world. The Economic Development Board's Yuen says, "I think there is an increasing awareness that the next stage of our economic growth rests on opportunities outside Singapore." One illustration is the "growth triangle" initiative, which combines the unique skills of Singapore with adjoining parts of Malaysia (Johor) and Indonesia (Riau Islands, including Batam and Bintan). Johor has developed infrastructure and skilled workers, while the Riau Islands have ample land and labor. Singapore supplies the sophisticated infrastructure, skills, and support facilities. Many of the concerns interested in the program are electronics companies, including Western Digital, Thomson, and Sumitomo Electric.

In addition, internationalization means looking overseas for strategic alliances, and in some instances acquiring businesses. The Singapore government is encouraging companies to venture overseas to expand markets, acquire technologies, and improve distribution channels. The government, too, is investing abroad, with an estimated $1.5 billion of direct investment into foreign ventures. ❑



ESTIMATE



CERTAINTY

There's more to electronics industry management than counting beans - much more. The typical electronics CEO wouldn't be typical in any other field. Unlike his colleagues in traditional industries, a career crunching numbers didn't get him that corner office - and neither did smooth-talking salesmanship. 71% of electronics industry management got to the top through the engineering/technical side of the business - and once they've arrived they combine a current, experienced understanding of technology change with the analytical business skills of a seasoned pro. They run their companies hands-on – and you need to reach them in the pages of ELECTRONICS if you want your hill of beans to amount to something.

Electronics

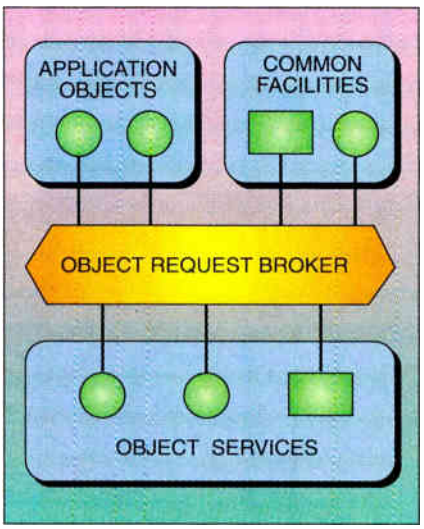
Business/Technology Perspectives For Global Electronics Management
A Penton Publication

'END OF THE BEGINNING'

For object-oriented programming to become a commercial reality, there must be a standard software framework based on a way to make requests within the object-oriented environment—that is, a software road or bus enabling objects to interact over a network of different systems.

Now there is such a bus. Its development means the "end of the beginning of [the development of] object technology," says William Blundon, vice president of marketing at Object Design Inc. in Burlington, Mass., the developer of an object-oriented data-base-management system for both Unix and Microsoft Windows.

Announced at the end of October at the Unix Forum International show in New York and called the Object Request Broker (ORB), the bus is the first of three elements that will make up the Object Management Architecture being assembled by companies in the 180-member Object Management Group, which was started in 1989 to promote object technology. ORB's specs were hammered out by six members of the group—Digital Equipment, HyperDesk, Hewlett-Packard, SunSoft, NCR, and Object Design. By making it easy for application software from different vendors to work together, ORB is a gateway to the goal of open distributed computing.



The Object Request Broker is the object-oriented software bus.

The payoff for independent software vendors is the ability to "harness ORB's power to bridge the differences and distances, empower the individual, and facilitate the group," declares HP's Robert Frankenberg, vice president and general manager for personal information products at the Palo Alto, Calif., firm.

The other two elements in the Object Management Architecture are promised next year. The Object Model (which is the "language" for conversing among objects) is due in the first quarter, and the Object Services (the common "topics") by the third quarter. ❑

IBM-INTEL PROCESSOR CHIP DEAL SENDS COMPETITORS SCURRYING

Makers of PC clones and their chip suppliers had better start thinking about strategic alliances. That's one of the more important implications of last month's IBM-Intel chip accord, in which the two giants agreed to cooperate for the next decade in the design of central processors. The deal's potential synergy promises both parties a big advantage over their go-it-alone adversaries.

The work will be done by about 100 engineers from both companies at a facility to be established in Boca Raton, Fla.—which is where IBM Corp. designs and builds its PCs—called the Robert N. Noyce Development Center, after Intel Corp.'s late cofounder. According to the terms of the deal, both companies will have the right to make the microprocessors, and Intel will have exclusive rights to sell them to other computer manufacturers.

For Intel and IBM, the 50-50 arrangement means, among other things, that the staggering cost of developing chips and computers will be halved. Also, it gives IBM a head start on use of the newest Intel chips: for example, a version of the 80486 is planned that will integrate more functions on-chip. IBM, which has been slower to develop PCs than its competitors, should be able to use the Intel alliance to react more quickly.

Finally, in a business where it is becoming difficult to tell one manufacturer's product from all the others, IBM now has the opportunity to differentiate itself more strongly from the rest of the pack. And the agreement will quiet speculation about what Intel and IBM planned to do after IBM invested $250 million in Intel nine years ago for 12% of the chip maker. ❑

IT'S BACK TO COURT IN LCD DISPUTE

Apple Computer Inc. has fired the latest round in the bitter dispute over LCD tariffs. Last month, the Cupertino, Calif., company filed an appeal with the Court of International Trade in Washington asking it to reverse the 63% tariff imposed in August on active-matrix LCDs. At the same time, John F. Akers, the chairman of IBM Corp., threatened to move production of some of Big Blue's smallest computers out of the U.S. if the tariff on LCDs is not repealed.

Apple is the only U.S. computer maker that is now using active-matrix displays in its laptops, including the Macintosh PowerBook 170. But it wasn't the only firm to protest the antidumping suit brought by the Advanced Display Manufacturers of America, which argued before the International Trade Commission that unfair Japanese pricing had harmed business. IBM and Compaq Computer Corp. also testified that with the dearth of domestic LCDs, a tariff on imports would force U.S. laptop vendors to move manufacturing offshore [*Electronics*, October 1991, p. 27].

"We feel very strongly that the finding of material injury in the ITC decision is factually incorrect and not supported by substantial evidence," says James Burger, Apple's manager for government.

ADMA, meanwhile, called the IBM move a "smokescreen." Threats by the computer makers to move offshore "are cynical attempts to pressure the U.S. Commerce Department to weaken its enforcement of the U.S. unfair trade laws," the group said. ❑

WHEN DEMANDS CHANGE MINUTE TO MINUTE, HOW CAN YOU ATTAIN THE AGILITY TO TURN THOSE CHANGES INTO ADVANTAGES?

Reacting rapidly to changing internal and external demands makes you more competitive. This is where EDS can help you.

HOW CAN YOU TURN A WHIRLWIND INTO A SECOND WIND?

Constantly changing demands can seem like a whirlwind. But EDS can help you turn change into opportunity. By helping you cut lead times, get to market faster, improve productivity and quality. Our proven methods, flexible resources and full complement of information technology services can be the second wind you need to be more competitive.

HOW CAN YOU HARNESS THE WINDS OF CHANGE TO MOVE AHEAD FASTER?

The best way is to concentrate on your business and your strategic plans for the future. EDS can help you find the time to do that by helping you plan, develop, implement, even manage your information technology a little or a lot. Our level of involvement is up to you.

CAN EDS REALLY HELP YOU ATTAIN COMPETITIVE ADVANTAGE?

Yes. Manufacturing companies of all sizes, with all types of needs, have benefited from our experience, resources and manufacturing expertise. To learn more, call 1-800-365-8232.

EDS

TAKE ADVANTAGE OF CHANGE℠

Redefining Microelectronics: End users understand best what they want from microelectronics to give

Power control in automotive systems

their products a competitive edge. We know because we are end users. So is our parent,

Power regulation in telecommunications

Daimler-Benz Group. What makes us unique is that we're also a leading supplier. We're distinguished, as well, by our century of industry experience

Analog signal processing in test and measurement equipment

Motion control in hard disk drives

and our worldwide infrastructure. Our Telefunken heritage

instills us with European precision, while French-based

Antiskid braking control unit

Matra MHS and Silicon Valley-based Siliconix keep

Semiconductor components for microwave, cellular phone and optical fiber communication

us on technology's cutting edge. The combination

ADDED

delivers added value—not only through

Multichip modules with chip-on-silicon

innovation and performance, but

durability and longevity. Call (908) 231-8405 to see how

AEG can redefine microelectronics for you.

Power management in portable computers

AEG Corporation.

AEG

Member of the Daimler-Benz Group

CIRCLE 182

TO WATCH

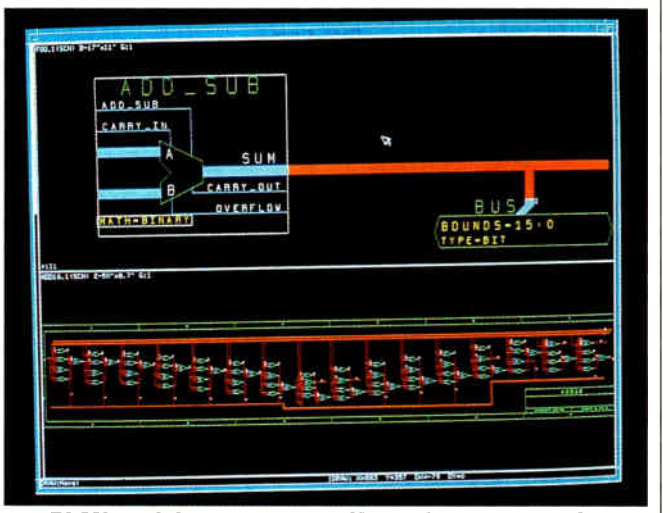
XILINX MAKES FPGA DESIGN A SNAP

In a move likely to enhance its dominance in field-programmable gate arrays, Xilinx Inc. has unveiled BLOX, a high-level synthesis tool that automates gate-level design for the San Jose, Calif., company's XC4000 family of FPGAs.

The BLOX library has 30 generic design modules that can be linked together using standard schematic design editors. Each generic module has an electronic parameter sheet for entering key specifications such as bus width or operating mode.

The widths and types of data on a data path are automatically carried through all levels of the design hierarchy. This means the size of a design can be modified by changing just a few fields on the schematic.

BLOX uses an expert-knowledge system to produce optimized designs. For example, it will automatically assign clocking for high fan-out signals to special buffers, or, move registers from the core to I/O blocks to maximize density. BLOX will be available in January priced at $2,995 for a PC version and $4,995 for workstations. It runs on the XACT 4000 development system. Versions for other families are scheduled for mid-1992. ❑



BLOX modules on the top offer a sharp contrast in complexity to the gate-level design below.

AT&T SPEEDS FPGAs TO GATE ARRAYS

AT&T Microelectronics' SoftPath design tool speeds the migration of field-programmable gate array designs to CMOS gate arrays while preserving pin-to-pin and package-footprint compatibilities.

SoftPath converts AT&T and Xilinx Inc. FPGAs to AT&T's recently introduced ATT656 family of gate arrays. This capability makes the Berkeley Heights, N.J., chip maker the first to offer single-supplier support for this design migration.

Pricing for ATT656 Series gate arrays depends on design complexity, packaging type, and production volume. Nonrecurring engineering costs for low-end gate arrays start at $15,000 to $20,000. Unit prices range from less than $5 in thousands to more than $100 for circuits in large ceramic packages. ❑

NCR CHIPS IMPLEMENT ETHERNET NETWORK MANAGEMENT

NCR Microelectronics has become the first vendor of Ethernet chip sets to deliver hardware-based network-management capability. The Fort Collins, Colo., company's EtherCore chips also offer the flexibility of designing to several popular personal-computer system buses.

Using the 92C105 network management chip, LAN vendors can now configure a complete Ethernet network including media-access-control-layer statistics. The chip traces and records all 37 network events specified by the IEEE 802.3 standard.

Another key differentiator is the flexibility of NCR's interface to the system bus. Instead of a single interface chip that the system designer has to design to, NCR has optimized an interface to each popular bus. The first is the 92C143 for the ISA bus. In the works are EISA, MCA and workstations. ❑

CADENCE ENHANCES ITS VERIFICATION TOOL

Cadence Design Systems Inc., San Jose, Calif., is shipping a new version of its popular Dracula IC design-verification software. Version 4.0 includes a tool called InQuery, which is a probe between screen windows displaying the circuit netlist, layout, and schematic that Cadence says cuts layout-versus-schematic debug time in half.

In a multimillion-transistor IC, that reduction may be two weeks or more. Dracula 4.0 also includes a parasitic-resistance-extraction tool segment to locate unforeseen electrical resistance, which helps designers working with submicron features to achieve top clock speeds.

The per-seat price for Dracula, which runs on IBM and Sun Microsystems servers, begins at $118,000; InQuery sells for $15,000. ❑

CIRRUS CHIP SET DOES DATA, FAX, VOICE

Cirrus Logic Inc. has squeezed lots of functionality into a two-chip modem that delivers data, facsimile, and voice capability to laptop and notebook computers.

The CL-MD1424 eliminates the external controller, host interface, and memory chips required by competing solutions, says the Fremont, Calif., company. This means a complete data/fax/voice modem can be created in an area smaller than a business card. On-chip firmware eliminates software development and debugging.

The chips will be available this month for $45. ❑

The Microprocessor & License to Create Your Own Industry

Western Design Center backs you with the world's leading installed 8-bit microprocessors and the industry's most workable business arrangements.

The technology that started the personal computer and video game revolution.

The Western Design Center (WDC) W65C microprocessors are the core of some of the world's most popular microcomputers, peripherals and video games...and the heart of some of the health care industry's most important life preserving devices. In fact, with the largest installed microprocessor-based technology, WDC has been the secret to the success of many of the world's most widely used products. Our leading edge technology is only one reason.

You can get a license to succeed.

WDC's unique licensing agreement guarantees you total control over product development, manufacturing and proprietary information – total control over your future. You have Freedom of Manufacturing. That means you can work with any one of several foundries throughout the world. Plus, you have the confidence of knowing your parts are second sourced. With a WDC license, you have the industry's most workable business arrangement because *you drive development.*

- High performance, low cost, low power, low voltage microprocessors
- Core standard product and ASIC product licenses
- Hi-Rel, scaled and worldwide manufacturing
- Freedom of Manufacturing
- Second Sourcing

Investigate the real secrets to success.

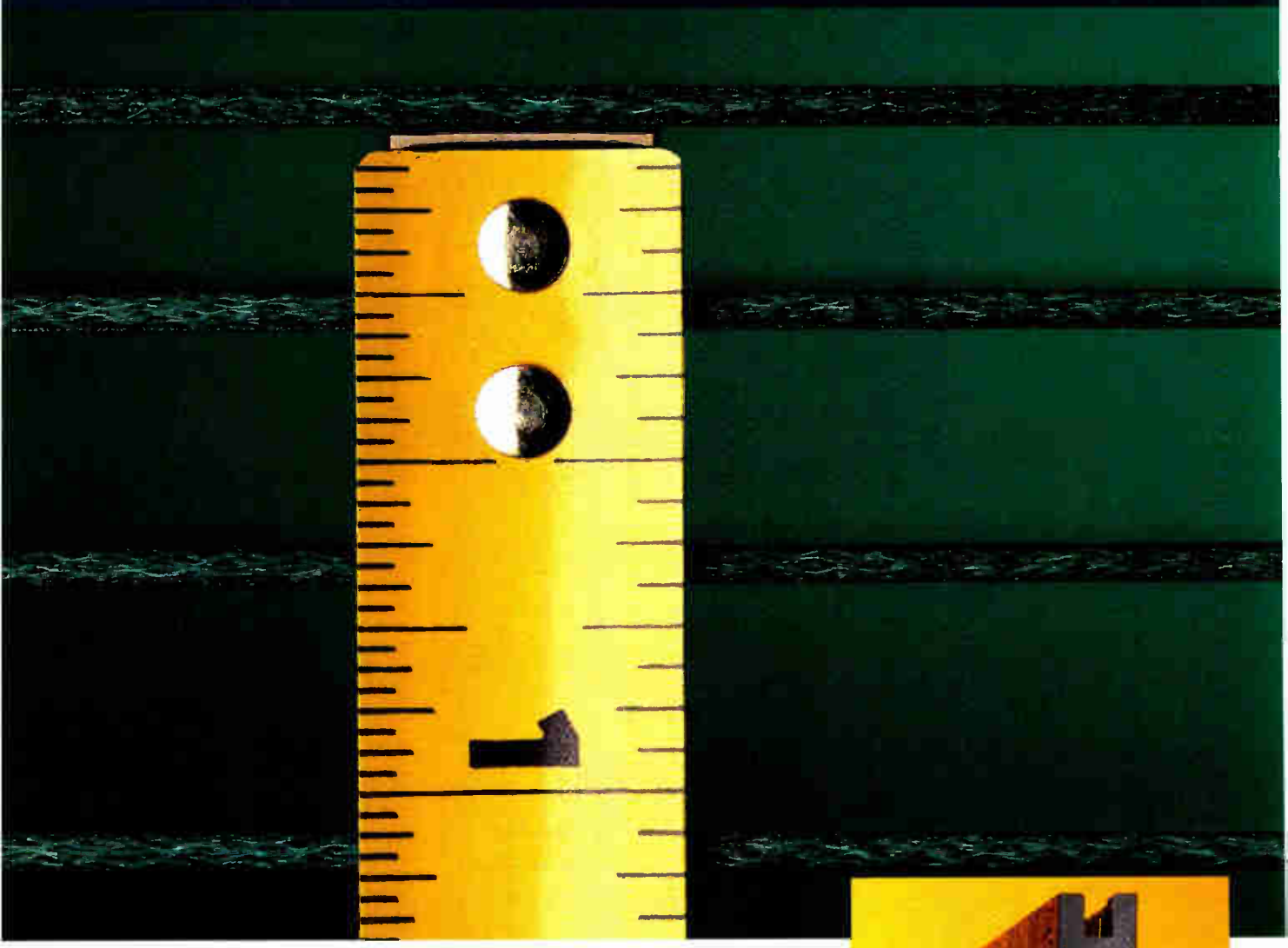
Want the technology that can shift your product development into high gear? The license that can put you in the driver's seat? Send for more information about our 8-bit, 16-bit and 32-bit microprocessors and microcomputers. Find out how to qualify for free device samples and a look at our innovative license agreements.

WDC

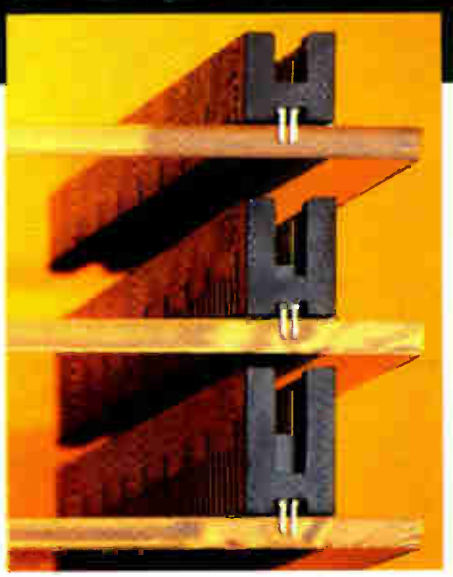
"Founded in 1978, Licensing since 1981."

The Western Design Center, Inc.
2166 East Brown Road,
Mesa, Arizona 85213
602.962.4545
FAX 602.835.6442

.050 centerline stackers. Close, closer, closest.



THIS IS AMP TODAY.



Surface-mount stack heights: .250"/.320"/.390"

AMPMODU 50/50 Grid Connectors give you a choice of parallel pcb stack heights: .390", .320", and a very close .250" (the tightest in the industry). So you can squeeze everything possible out of (or into) your design.

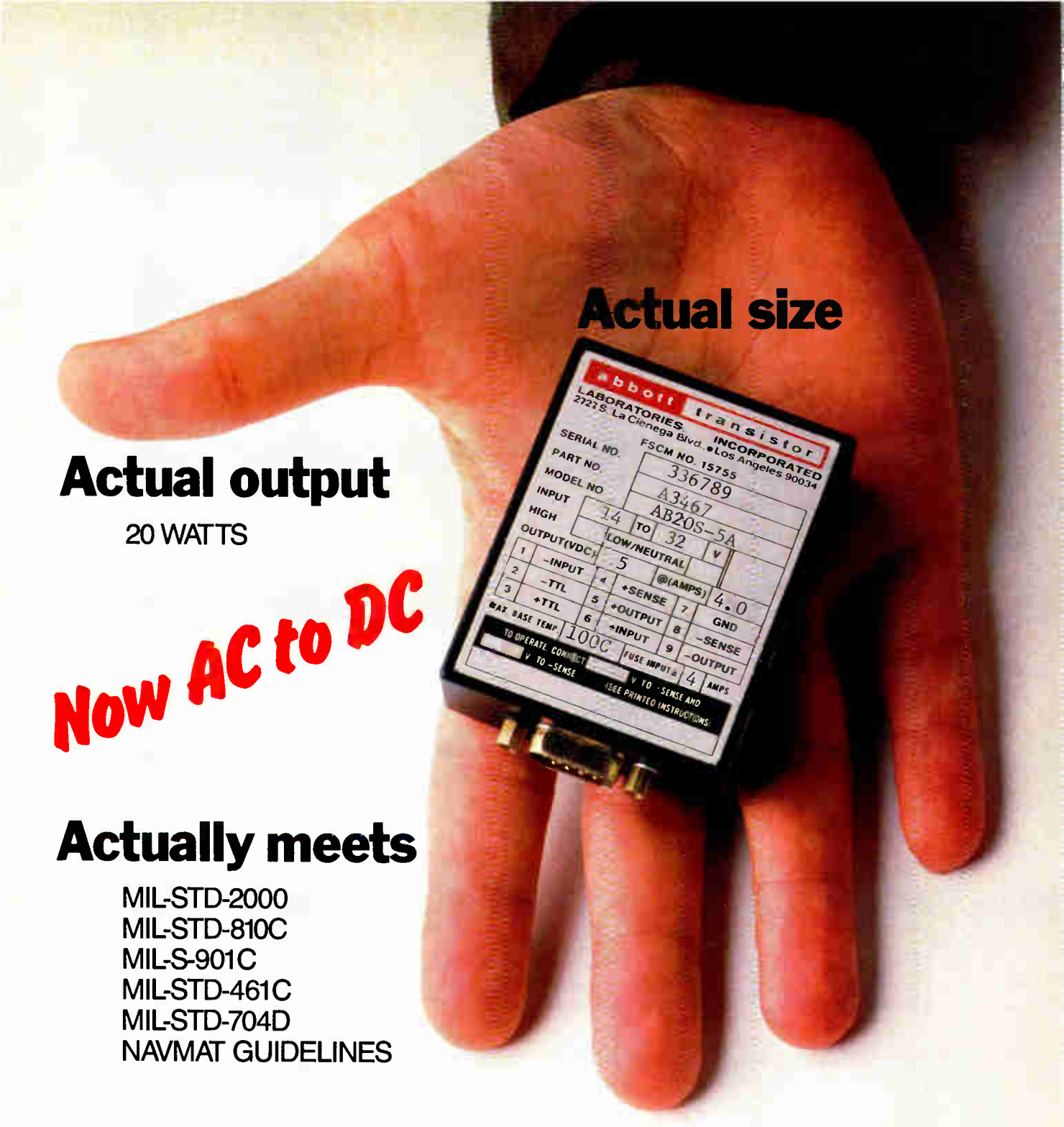
This surface-mount system utilizes a .050" contact grid in double row, polarized shrouded headers and receptacles, and offers our exclusive plated copper alloy holddowns. On standard .062" thick boards, the barbed holddowns do their job without protruding through, allowing surface mounting on both sides. And holddowns are soldered during reflow, providing long-term strain relief.

Dual-beam receptacle contacts and duplex gold plating provide high reliability, in selected sizes from 10 to 100 positions. Dimensional tolerances, reference datums, holddown characteristics, and packaging support robotic application; materials are fully compatible with IR and vapor phase reflow processing.

Ask us for more information on the AMPMODU 50/50 Grid Surface-Mount Connector System. Call the AMP Product Information Center at 1-800-522-6752 (fax 717-561-6110). In Canada call 416-475-6222. AMP Incorporated, Harrisburg, PA 17105-3608.

AMP

CIRCLE 172



Mil/Pac™ high-density military power supplies. Now you can order Abbott's full mil-qualified compact power supplies in both DC *and* AC input models.

Mil/Pacs come in 20W, 35W and 50W configurations, with single (5, 12, 15, 24, or 28V) or dual (±12V; ±15V) outputs.

DC-to-DC models accept input from 14V to 32V. AC-to-DC models accept 103.4 to 126.5V rms, 47-440 Hz single phase.

All Mil/Pacs operate at temperature extremes from −55°C to +100°C. All are designed with a field-proven topology that has been verified by rigorous environmental stress screening.

Mil/Pacs are available with or without MIL-STD-2000. Either way, the specs are worth reading. Just write us at 2727 South La Cienega Bl., Los Angeles, CA 90034. Or call (213) 936-8185.

abbott

WHEN RELIABILITY IS IMPERATIVE.™

CIRCLE 211

THE BLITZ OF NEW VAX MODELS COMES WITH A MESSAGE: THE COMPANY IS COMPETING ON PRICE

A NEW, AGGRESSIVE DEC

BY LAWRENCE CURRAN

COMPUTERS

You've got to admire Kenneth Olsen's dedication to his VAX computer family. The founder and president of Digital Equipment Corp. keeps the Maynard, Mass., firm pumping new energy into the 14-year-old VAX architecture. The latest infusion centers around a DEC-designed-and-built 83-MHz CMOS microprocessor, several aggressively priced systems that incorporate it, and new software that simplifies networking any other class of computer to a VAX.

The blitz of new systems and software means that Digital is able to offer one of the most extensive ranges of systems available. It also means that machines from the $13.9-billion company can link up with just about any other type of computer under perhaps the broadest open-system network umbrella in the industry. Finally, the October introductions carry price tags that signal Digital's newfound willingness to compete with the most aggressive on price.

DEC's William Demmer with the hot 83-MHz microprocessor.

"In 10 years of DEC watching, I don't think I've ever seen such an across-the-board price/performance improvement, from the top to the bottom of the [VAX] product line," says Terry Shannon, president of Gander Resources in Ashland, Mass., and former director of the DEC Advisory Service at International Data Corp., the Framingham, Mass., market-research firm.

Following DEC's relatively sluggish 1991 revenue growth of 7.5%—and the company's resultant downsizing [*Electronics*, September 1991, p. 32]—Shannon views the October broadside as evidence that "DEC is really serious about getting rolling again."

For his part, Olsen, always a semiconductor buff, trumpeted at the introduction that "we now have the fastest chip and machines at the lowest price per unit of computation in the industry." Even though DEC uses reduced-instruction-set-computing microprocessors from MIPS Computer Systems Inc. of Sunnyvale, Calif., in many of its workstations, Olsen seems to relish the blazing performance his engineers have extracted from the new DEC chip.

The so-called NVAX microprocessor is a hummer, especially for a complex-instruction-set device. Its 1.3 million transistors deliver a clock speed of 83 MHz. That's 20 to 30 MHz faster than both commercially available RISC processors and the 50-MHz Intel 80486, a leading CISC device.

Tom Willmott, vice president at the Aberdeen Group, a Boston-based mar-

CONNECTING TO A TERAFLOPS

The latest model in the Connection Machine family of massively parallel supercomputers from Thinking Machines Corp. has the Cambridge, Mass., company talking about 1 trillion floating-point operations per second—that's an impressive 1 teraflops.

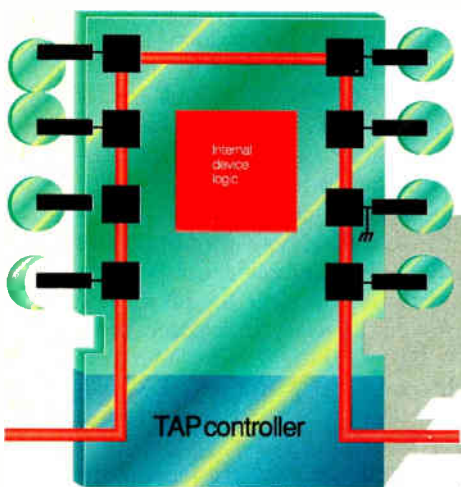
The CM-5 is described by its first customer as "the first highly parallel supercomputer that can be seriously considered for commercial production environments." That's true in part because of a joint standard that lets users apply various classes of computers to solve a problem. The customer is John Sell, president of the Minnesota Supercomputer Center in Minneapolis, which in August installed the first CM-5 for the U.S. Army High-Performance Computing Research Center at the University of Minnesota in Minneapolis.

The joint standard will stem from an agreement among Thinking Machines, IBM Corp., and Sun Microsystems Inc. to develop a common scalable programming standard for scientific computing. That means customers will be able to turn a mix of workstations, mainframes, and supercomputers loose on a problem, says Danny Hillis, Thinking Machines' chief scientist and also one of the founders of the eight-year-old company.

"Users will be able to run the same Fortran program on a Sun workstation, an IBM vector supercomputer, and a Connection Machine, and third-party software developers will be able to maintain a single source code for all types of machines," Hillis says.

Each node of the CM-5 is a 22-mips Sparc reduced-instruction-set-computing microprocessor. Each has four vector pipes, providing 128 megaflops of peak speed, and all components of the system's architecture—including software, input/output, and communications networks—scale in a balanced manner up to systems with 16,000 processor nodes. Prices of CCM-5 systems begin at $1.4 million.—*L.C.*

People say boundary
in low cost, high quality
Now you can test that



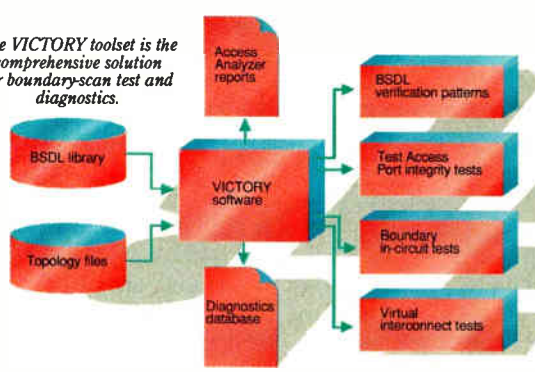
Find common manufacturing faults without test pattern libraries or physical test access with boundary-scan design and VICTORY software.

Increasing device complexity. Rising pattern development costs. High density packaging. Disappearing nodal access. These are the board test problems boundary scan was created to solve. Which is fine in theory. Only problem is there hasn't been any way to put boundary scan to the test. Until now.

VICTORY – the first software to automate boundary-scan testing.

Introducing VICTORY™ from Teradyne: the only software toolset ready to help you turn boundary-scan theory into a practical advantage. From the moment your first boundary-scan device is designed in, VICTORY starts to simplify the testing of complex digital boards. And the more boundary-scan parts you have, the more time and money you save.

The VICTORY toolset is the comprehensive solution for boundary-scan test and diagnostics.

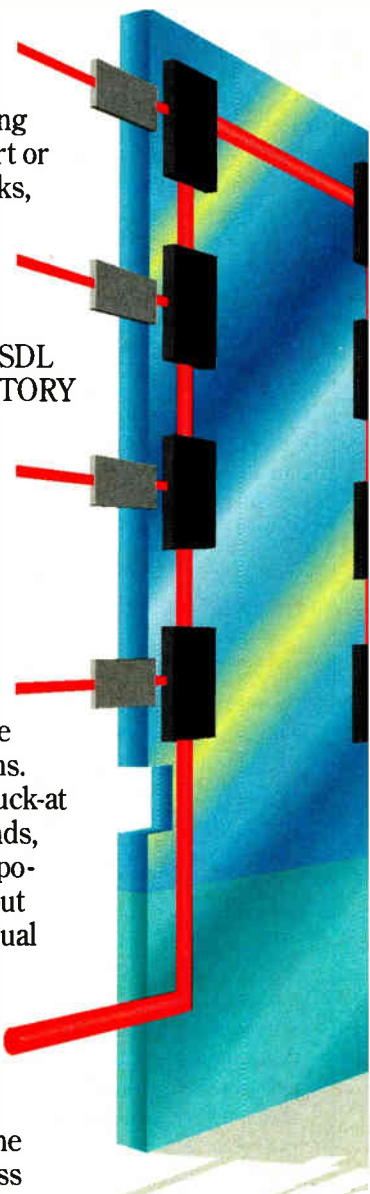


Delivers high fault-coverage.

Whether you're testing one boundary-scan part or boundary-scan networks, VICTORY software automatically gives you 100% pin-level fault coverage. Using the IEEE 1149.1 and BSDL standards, it takes VICTORY only a minute or two to generate test patterns. It would take a programmer days, even weeks to deliver the same fault coverage for conventional designs.

Concurrent engineering takes on new meaning when you use VICTORY's Access Analyzer to optimize board layout for testability and cost-efficiency.

Now you can find stuck-at faults, broken wire bonds, wrong or missing components – even open input pins – all without manual diagnostic probing. VICTORY's fault diagnostics clearly spell out both fault type and fault location. And that's just the manufacturing process

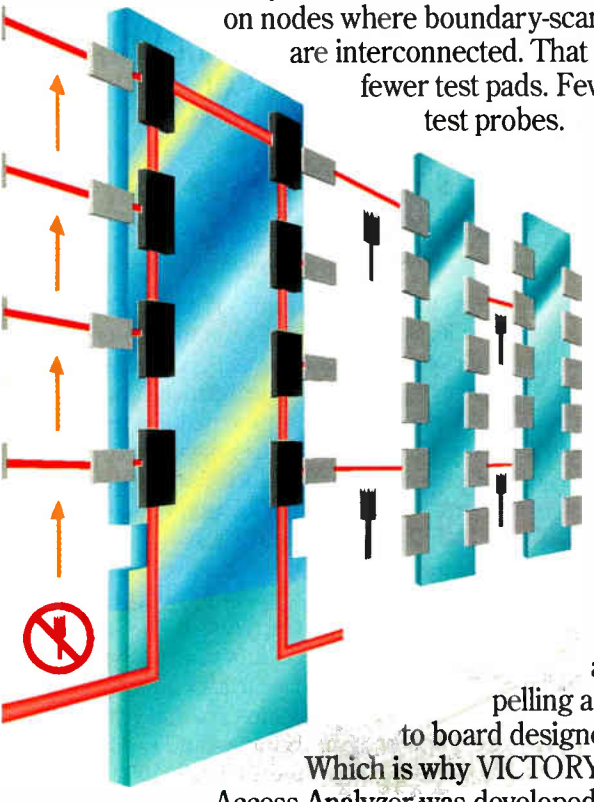


scan is a breakthrough board testing. theory.

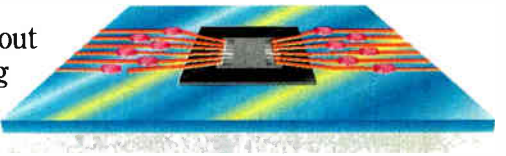
feedback you need to eliminate defects where it's most cost-effective – at the source.

Helps solve the test access problem.

With boundary-scan design and VICTORY software, you won't need bed-of-nails access on nodes where boundary-scan parts are interconnected. That means fewer test pads. Fewer test probes.



That's a compelling advantage to board designers. Which is why VICTORY's Access Analyzer was developed. With this concurrent engineering tool, designers get testability information early in the design process. They can easily see where test points are required for visibility and where they can be dropped, for optimized board layout without lowering fault coverage.



Boundary-Scan Intelligent Diagnostics identify faults by type and location without physical probing – even on high-density SMT assemblies

Good for the bottom line.

Shorter test programming time. Higher fault coverage. Lower PC board and test fixture costs. The bottom line on VICTORY is how positively it will affect your bottom line. And because VICTORY works with all Teradyne board testers, you're free to tailor a test process that's cost-effective for both your boundary-scan and non-scan boards. No matter what your test objectives. For example, with our new Z1800VP-series testers, a complete solution for in-circuit and boundary-scan testing starts at well under $100,000.

Get high fault coverage at low cost when you test boundary-scan boards with our new Z1800VP system and VICTORY software.

Make the next logical move. Call today.

Boundary scan is the design-for-test breakthrough that promises lower cost, higher quality board testing. But don't take our word for it. Call Daryl Layzer at (800) 225-2699, ext. 3808. We'll show you how, with VICTORY software and Teradyne board testers, you can test this theory for yourself.

TERADYNE

ket-research organization, is impressed with that 83-MHz claim, but is also waiting to see if the number holds up in shippable systems. "If the numbers are true, Digital has come from dead last in performance at the clubhouse turn to win the race by two lengths," he says.

Willmott points out that, except for its earlier VAX 6000 models, DEC hasn't had much high-performance hardware to sell recently. "They've done a good job of selling software and services in recent years. They've also successfully reorganized their matrix-management approach and effectively streamlined their sales organization," says Wilmott. "Now, with this blockbuster hardware and the popular NAS [networking] packages to sell, I feel their near-term financial results will be quite positive," he concludes.

In all, the introduction encompassed at least eight software products, including an updated version (5.5) of Digital's VMS operating system. And there are some seven new systems and system-clustering configurations.

The top-of-the-line VAX 6000 model 610 and VAX 4000 model 500 outdistance any other company's offerings, says William Demmer, vice president of Digital's VAX VMS Systems and Servers Group. Demmer says those machines are rated first and second in the industry on price/performance vs. the audited Transaction Processing Council's TPC benchmark A, which measures total system performance (instead of central processor cycles) in a demanding application environment.

The model 610, intended for mainframelike corporate data-center use, is rated at 83.6 tpsA at a cost of $12,922 per tpsA, or two to three times faster than the earlier VAX 6000 model 500 at a lower price. The VAX 4000 model 500, a midrange or departmental computer, comes in at 64 tpsA and $11,945 per tpsA. "These systems have faster TPC-A performance than any IBM AS/400, IBM RS/6000, or any comparable Hewlett-Packard system tested," says Demmer.

Two versions of a low-end workstation—the VAXstation VLC—also made their debuts. They sell for $3,450 (black and white) and $3,950 (color), respectively, making them probably the lowest-priced workstations on the market.

DEC says its new VAXstation 4000 outdistances any other company's computers.

Networking software, the glue that makes computers from different vendors run harmoniously together, is also a critical element of the new Digital products. The company added four entries—NAS 200, 250, 300, and 400—to its expanding Network Application Support family. These tools work with either or both VMS and Ultrix, the company's variation of Unix.

NAS 200, for example, for VMS and Ultrix servers, provides basic networking and file and data sharing for programs running on IBM or clone PCs, Apple Macintosh systems, or workstations. NAS 200 also implements popular standards. These tools meet the needs of corporate MIS managers, "who want standards that are easy to use and buy, want to support all systems in their inventory, and [want to] be able to run all their application programs on any or all of those systems," points out David Stone, vice president of DEC's Software Products Group. ❑

IT'S BOUNDARY-SCAN TESTING OF BOARD-LEVEL PRODUCTS, AND THE CUSTOMERS DEMAND IT

THE SILENT ADVANTAGE

BY JACK SHANDLE

Apple, AST, and IBM demand it. Intel, Motorola, MIPS, and TI all do it, but for the most part quietly.

In the semiconductor industry, where product preannouncements are commonplace and vaporware is a salable commodity, the silent treatment for a technology can mean only one thing: it gives its users a strategic advantage that they would like to keep under their hats.

TESTING

The technology—boundary-scan testing of board-level products using standards developed by the Joint Test Action Group (JTAG)—is certainly not unheard of. JTAG itself has been around since 1986, and the IEEE formalized its boundary-scan proposals into the 1149.1 standard in February 1990. But most industry observers are surprised to learn that Intel Corp. used JTAG boundary-scan to debug its 50-MHz 80486 module, or that Motorola Inc. added the four pins JTAG requires to its 68040, or that Texas Instruments Inc. did the same for its 320C30 digital signal processor. The relatively rapid adoption of JTAG by the major processor vendors has pleasantly surprised Doug Kostlan, product development manager for TI's general-purpose logic marketing group.

"Once the processors have boundary scan, the systems houses begin looking for more chips with it," he says. Kostlan, whose job it is to proselytize JTAG, says that a year ago he would have guessed Intel, Motorola, and MIPS Computer Systems Inc. would not find boundary scan useful until 1992 or 1993. But PC-systems houses such as Apple, IBM, and AST found it cost-effective in testing their motherboards—both in the design and manufacturing phases. So they are pressuring the chip makers to earmark the needed pins and real estate on their latest chips. Because the strategic advantage over non-

Oh no. Please, not now. Not with manufacturing release next week.

THE PROTOTYPE DOESN'T WORK.

Six ASICs, fifteen PLDs and the whole thing's gone south. Maybe I should go south too. Yeah, hop a bus. Head for Mexico.

THE PROTOTYPE DOESN'T WORK.

Software? Could be. Hardware? Might be. So where do I start? At the beginning, of course. And just where is that, smart guy?

THE PROTOTYPE DOESN'T WORK.

And my performance review comes up next month. Maybe they'll just forget about all this, right? Yeah. Sure.

THE PROTOTYPE DOESN'T WORK.

Wait. What about that glitch in the handshake on the first pass? Couldn't reproduce it. Maybe it just reproduced itself.

THE PROTOTYPE DOESN'T WORK.

These are just a few of the reasons Tek makes a complete line of scopes, logic analyzers and signal sources. Instrumentation that can quickly get to the core of your prototype's problems. Whether they're digital, analog or software. Because even when your prototype doesn't work, Tek does. **TALK TO TEK/1-800-426-2200**

Tektronix

Test and Measurement

CIRCLE 223

JTAG users appears significant, Kostlan has had some difficulty getting JTAG testimonials.

"We know of one large computer company that says [boundary scan] justified itself before the product got out of the design phase. The savings were so great that they would not give any data to us," he says. Another significant problem is that there is no accepted cost model for analyzing the benefits of using IEEE 1149.1.

To help this along, TI is developing a cost model that it is making widely available. And the Dallas chip maker has had a busy autumn. It released a number of JTAG products at September's International Test Conference, including a board with a built-in logic analyzer that allows users to access the JTAG test bus. And in October, TI announced two ICs—a scan-path linker and a scan-path selector—that partition test paths into smaller segments.

On the standards front, the IEEE 1149.1A group is defining a boundary-scan description language that will formalize a way of addressing IC logic. The federal government is also getting into the act by requiring boundary-scan capability in its project proposals. In fact, the government is the driving force behind the proposed P1149.5 standard for a test bus for system backplanes. It has already been used by the Department of Defense and could be adopted by the American National Standards Institute by next summer. ❑

WITH NO SEA CHANGE IN SIGHT, UNIX IS SWIMMING ALONG WITH THE BIG GUYS

INTO THE MAINSTREAM

BY HOWARD WOLFF

It has come to this with Unix: there is no major trend. That was the most striking impression among the industry movers, shakers, and watchers exploring the aisles and meeting rooms of New York's Jacob K. Javits Convention Center at this fall's Unix Expo. And as an indicator of the state of the industry, it is a positive one.

OPERATING SYSTEMS

There are, to be sure, a healthy collection of what might be called trendlets—for example, in X terminals and computer-assisted software engineering (CASE)—as well as the potentially massive IBM-Apple-Motorola undertaking. But the absence of a single defining announcement or revelation is another indication that Unix and open systems have swum bravely into the mainstream. In short, the king of the multiuser networked systems seems secure in its domain.

Nevertheless, there were some interesting developments at the gathering of Unix club. On the X-terminal front, the move seems to be toward specialization for what just a year ago were merely inexpensive dumb terminals. So for users, the question is not merely "How cheap?", but "What can it do?" Manufacturers, looking for differentiation among their products, have begun to move some of the functions from the host server to the terminal—in fact, IBM Corp. has even added a local hard disk for image storage.

So products unveiled at the New York gathering ranged from Visual Technology Inc.'s monochrome model for the price conscious, all the way up to more sophisticated entries—some complete with color and others boasting their own operating systems. And they came from the likes of Hewlett-Packard, Network Computing Devices, and Human Designed Systems.

In the CASE-for-Unix area, the buzz phrase is "enterprise-wide." Interactive Development Environments of San Francisco, an eight-year-old company, showed off a system that is designed for the network, rather than for real-time or embedded use. Called Software through Pictures, it is available for SCO Open Desktop—one of the first integrated CASE products to be available for that environment, says Nobby Akiha, Interactive Development's director of marketing communications. "This port will position Software through Pictures as the leading CASE solution for the Advanced Computing Environment," says Akiha.

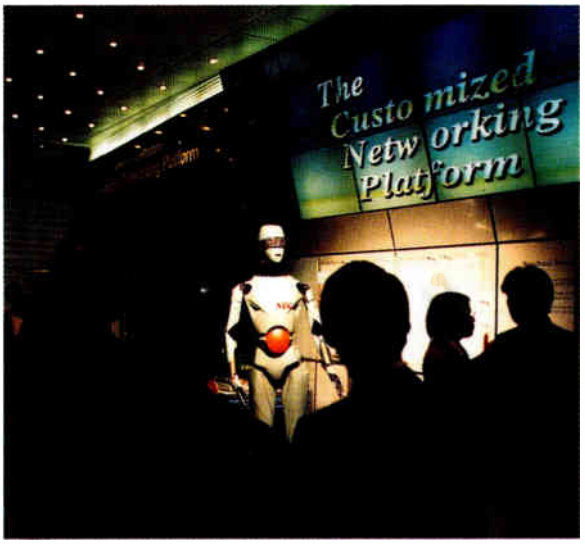
But perhaps the Unix Forum event carrying the most important long-term implications was the joint appearance by executives from IBM, Apple, and Motorola to explain how and what they would support in their joint development effort.

There will be five initiatives in hardware, software, and silicon: the Power PC, PowerOpen, enterprise networking, multimedia, and object-oriented technology. Taking them one at a time:

- The Power PC single-chip design will appear in 18 to 24 months. James Norling, president of Motorola Inc.'s Semiconductor Product Sector, says, "There will be 300-plus engineers in Austin developing four implementations in parallel—desktop, portable, laptop, and entry-level workstation. That will give users a wide variety of price points. Design rules for the CMOS chip will be 0.5 μm, the same as those for 16-Mbit DRAMs." The workstation will be based on RISC technology.
- PowerOpen is to be a standards-based Unix computing environment. It will be able to handle existing applications for Apple Computer Inc.'s Macintosh A/UX and System 7.0, as well as IBM's RS/6000 AIX workstation.
- The enterprise networking effort will be aimed at making it easy to integrate Apple Macintoshes and IBM PCs on the same network.
- Multimedia development will be undertaken by two independent companies to be set up by IBM and Apple. One, called Kaleida, will develop multimedia products; the other, Taligent, is to come up with an object-oriented software platform that will be based on the one, code-named Pink, under development at Apple.
- The object-oriented-programming initiative will be undertaken by Taligent. "The real promise of object-based systems," says Michael Spindler, Apple's president, "is to maintain applications over a variety of networks and add features. The promise is time to market, not complexity."

The work of the three companies is designed to take advantage of what Spindler sees as the underlying appeal of Unix: true scalable architecture. "We want to move Unix into volume desktop space," he adds, "and transit the Mac onto the RISC power platform." ❑

Customized Networking Platform takes communications into the 21st century.



A friendly robot offered a video presentation of the CNP concept.

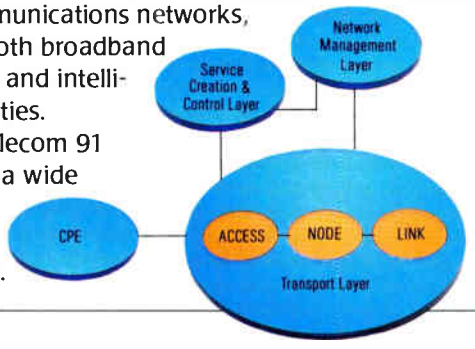
Described as the Olympics of Telecommunications because of its huge scale and worldwide audience, Telecom 91 was a highly competitive environment for new technology introductions. One of the highlights was NEC's announcement of the Customized Networking Platform (CNP), an advanced architectural concept designed to take telecommunications well into the 21st century.

CNP offers a total network solution for evolving communications requirements. Responding to the immediate needs of each operator and end-user with an optimum mix of services, CNP also provides exceptional flexibility for future growth.

An all-encompassing concept

As a world leader in integrated computer and communications (C & C) technology, NEC implements CNP with the broadest product line in the industry. Switching, transmission, radio, and computer systems are integrated with terminals in a seamless setup that leads to smooth network operation. Yet CNP also offers open-interface flexibility for today's multivendor environment.

CNP is an ambitious concept. A unified architecture able to cover all public, corporate and mobile communications networks, it provides both broadband transmission and intelligent capabilities. Visitors at Telecom 91 experienced a wide array of futuristic CNP services.



Broadband ISDN demonstration via the Cu

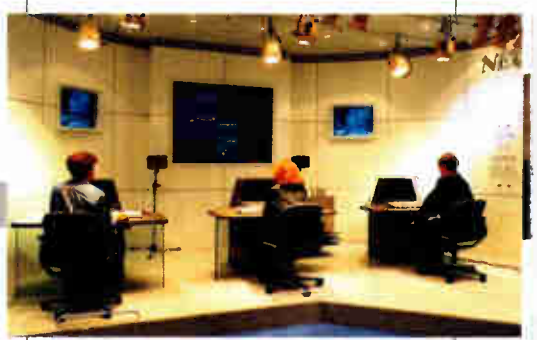
Global Multimedia Communication System

The Customized Networking Platform (CNP) creates an innovative, multi-party teleworking environment. People in remote locations can "meet" via face-to-face desktop teleconferencing. In real time, they can share and process multimedia information – text, graphics, images and handwriting.

The new multimedia communication system links multiple hypermedia stations and a hypermedia database with a broadband ISDN and multimedia LANs.

The hypermedia database features semantics-based association. People working at multiple remote hypermedia stations can simultaneously retrieve and process multimedia information.

These capabilities were demonstrated at Telecome 91 by a global teleconference. Linking two NEC booths at Palexpo, Geneva with offices in Munich and London, the conference focused on the preservation of planet earth.

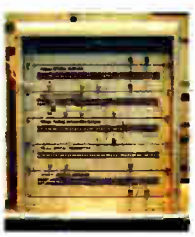


LONDON

MUNICH

CNP Transport Layer

The transport layer was demonstrated by a wide range of leading-edge equipment. A NEAX61 ATM service node and a photonic switching system displayed broadband switching capabilities.



10Gbps fiber optic transmission system with optical amplifiers

2.4Gbps/600Mbps/ 150Mbps SDH fiber optic transmission systems

6GHz 150Mbps/ 18GHz 150Mbps SDH digital radio relay systems

NEAX61 ATM service node

A prototype photonic switch, with multi-gigabit capacity, performed HDTV switching.

ıstomized Networking Platform.

Customized Networking Platform

Hypermedia Station

CNP Service Creation and Control Layer

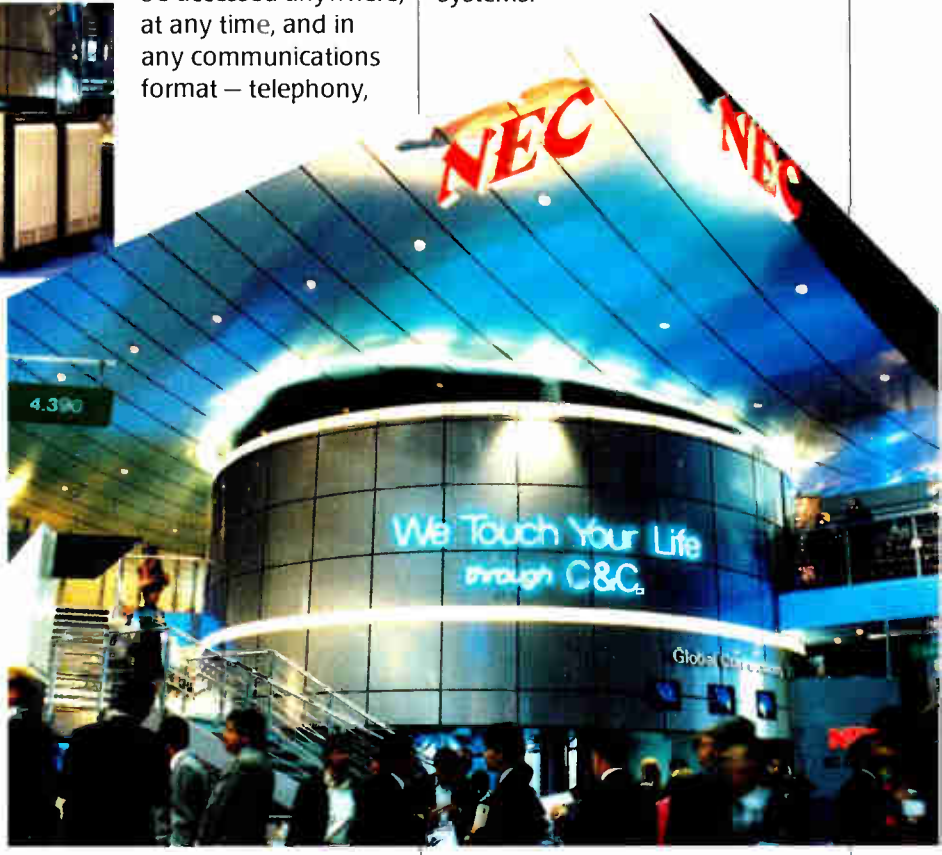
The NEAX61 application service processor is a powerful core for advanced intelligent networks. Designed for fast start-up, it provides a wide range of innovative customer-programmable services.

CNP Network Management Layer

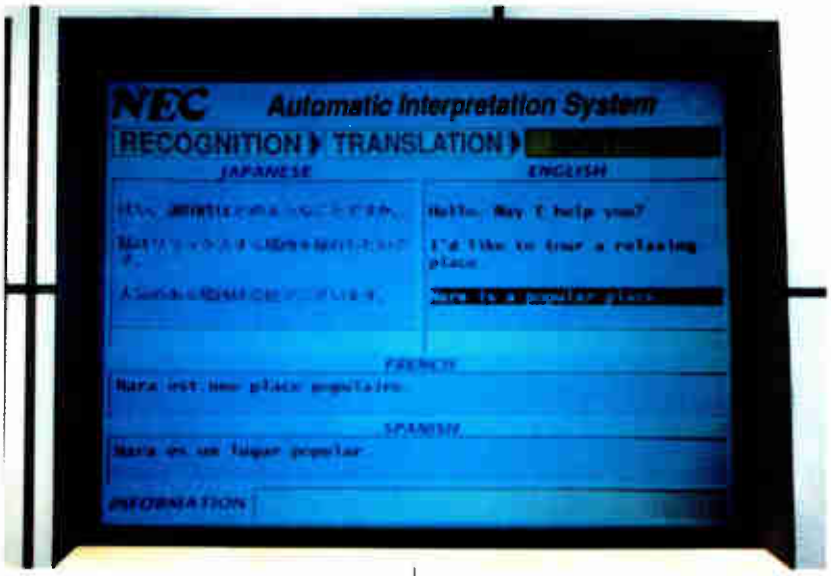
NEC's network operation and management systems are based on both the CCITT TMN and OSI protocols. ACTNET-X provides fully integrated management of next-generation networks,including SDH.

CNP Mobile Communications Network

To free users from cell restrictions, NEC integrates multiple mobile networks into one full-service mobile communications sphere.
Each subscriber has a personal telecommunication number which can be accessed anywhere, at any time, and in any communications format – telephony, data, or fax. At Telecom 91, NEC displayed a wide variety of network elements, including cellular phones, cordless PCs, a base transceiver station, mobile satellite terminals, and car navigation systems.



Automatic Speech-to-Speech Translation System



Because language is the ultimate communications barrier, NEC has developed an advanced automatic speech translation system. It allows continuous speech input by any (non-designated) speaker and provides simultaneous machine translation into multiple languages. An experimental system at Telecom 91 automatically interpreted from Japanese to English and from English to Japanese, with simultaneous translation and voice output in French and Spanish.
The NEC system features demi-syllable recognition and PIVOT Interlingua, a unique intermediary language for efficient machine translation.

Open Application Interface

NEC's advanced PABX series can communicate with most general-purpose computers via our Open Application Interface.
OAI is the key to a computer-controlled telephone system in which multi-function phones serve as handy data terminals. New services include order entry, inventory management, electronic telephone directory, and work-hour management. At Telecom 91, order transaction was demonstrated by a NEAX2400 IMS linked to an IBM S/370 in Japan.

SX-3 Series Supercomputers

The supercomputers of the SX-3 series are regarded as the fastest in the world, with performance up to 22 GFLOPS, or 5.5 GFLOPS per processor. The SX-3 series supports the UNIX-based SUPER-UX operating system. An on-line demonstration at Telecom 91 linked audiences with an SX-3 Model 12 installed at the National Aerospace Laboratory in the Netherlands.

64-bit RISC Microprocessor

The VR4000 is the world's first 64-bit RISC microprocessor. On a single chip, it integrates all the functions necessary for 64-bit computing, including 64-bit integer unit, 64-bit floating point unit, 8K-byte instruction cache, and 8K-byte data cache. The 64-bit integer CPU features an 8-stage superpipelined architecture which executes two instructions in one clock cycle. Average performance is 60 SPECmark (50MHz).

UNIX: Registered trademark of UNIX System Laboratories, Inc. in the U.S.A. and other countries. SPECmark: Trademark of Standard Performance Evaluation Corp.

NEC

LESS CASH, HIGHER PROFILE FOR JESSI

Jessi is going to have to tighten its belt. The Joint European Submicron Silicon Initiative will have to get by with 25% less money in 1992 because the contribution from the European Community will fall short of the financial support it promised last year. The program's 1992 budget now checks in at about $500 million (roughly half of that coming from the project partners themselves). Jessi officials hope, however, the EC will later reconsider and restore the cut.

"We are pinning our hopes on a new direction for the Jessi program," says Klaus Knapp, spokesman for the organization. The new approach aims to enhance the program's effectiveness and give it more visibility so that the public gets a better understanding of how and on what the EC funds are spent.

The big question for Jessi's executives is whether the EC will change its mind about a 25% budget cut.

So for the main phase, which begins in January—following the startup phase during which more than 70 projects were approved—the Jessi board has designated a set of highly visible "flagship projects" to catch the public's eye.

Included are digital high-definition TV, audio broadcasting, and cellular phones. Also, advanced integrated services digital networks, fine-line lithography, and competitive manufacturing. ❑

SIEMENS WILL EXPAND IN THE U.S. WITH AUTOMATION GEAR

Now that Siemens AG has acquired the industrial control sector of Dallas-based Texas Instruments Inc. and has set up a new company, Siemens Industrial Automation Inc., in Atlanta, the German electronics giant is poised to become a leader in the American market for automation systems and equipment. Executives figure that during Siemens Industrial Automation's first fiscal year—it ends next Sept. 30—U.S. sales will approach $170 million. The Atlanta firm, which marries TI's industrial control activities to Siemens's former U.S. automation equipment business, already checks in as the fourth largest supplier of industrial automation gear to the $12 billion U.S. market.

Siemens is sanguine about its new company's future. It expects an annual growth rate between 10% and 15%, which is better than double the 6% predicted for the overall U.S. market for electrical equipment.

For success, the company is banking on the large range of products resulting from the marriage of the Siemens and TI activities in the field. Another factor is the tight network of technical centers—these are located in Detroit, Chicago, Atlanta, and Johnson City, Tenn.—and more than 60 sales and service bases throughout the U.S. The company, which will eventually employ 1,200 people, is aiming its products at the American chemical, paper, plastics, oil and gas, and metal-processing industries.

Siemens did about $2 billion worth of business around the world in automation technology last year. In programmable controls, it is the world's leader. ❑

EUROPE REGAINS AUTONOMY IN GALLIUM ARSENIDE PRODUCTION

German—in fact, all European—makers of gallium arsenide ICs can breathe easier. Their independence from Japanese suppliers of the material seems assured now that a small firm in formerly Communist East Germany has ramped up production of GaAs wafers. That independence from outsiders was threatened when Germany's Wacker Chemitronic GmbH earlier this year stopped production of GaAs substrates in the face of heavy Japanese competition and decided to concentrate on silicon [*Electronics*, May 1991, p. 41]. Wacker, in Burghausen, had been Europe's only native producer of high-purity GaAs crystals. Lobbying hard for autonomy were the German ministries for defense as well as research and technology, joined by the chip industry and the state of Saxony.

Wacker has transferred its GaAs production gear to Freiberger Elektronik Werkstoffe GmbH in Freiberg, which is already making and marketing the material. Its standards in GaAs crystal growing are said to match those demanded by Western firms. The company now wants to perfect its skills in cutting and polishing GaAs wafers and increase their size from the present 3- and 4-in. diameter.

Experts are counting on a boom in GaAs devices for mobile telephones and satellite receivers to drop prices. ❑

FAST. ACCURATE. LIGHT.

Now you can perform NIST-traceable, spectrally-based photometric and colorimetric measurements anywhere, anytime. With the battery-powered Photo Research® PR®-650 SpectraColorimeter.™ You no longer need to settle for the inaccuracy of filter instruments just for the convenience of cost-effective portability.

This hand-held portable offers AutoSync,™ a unique feature which automatically locks to, and measures, refresh frequency. Pritchard®-style spot viewing and measuring optics are also included.

A plug-in Integrated Circuit Memory Card holds the complete and easy-to-use program software for the internal microcomputer--and there is enough space for over 150 measurements. Fast-Charge Nicad batteries, Energy-Saving Auto Shut-Off, an RS-232 interface permitting remote control from a host computer, plus numerous other features make it the most flexible and versatile colorimeter on the market.

Backlit supertwist LCD display

Proven SpectraScan® diode-array technology captures the entire visible spectrum from 380 to 780 nm – simultaneously. With the press of a button. And a wide variety of accessories are also available to choose from.

Call us and discover how affordable, easy and accurate spectrally-based light and color measurement can be.

The PR-650. Light Measurement on the Move.

PHOTO RESEARCH®
The Light Measurement People®
Division of KOLLMORGEN
9330 DeSoto Avenue, P.O. Box 2192, Chatsworth, CA 91313-2192 USA
(818) 341-5151 FAX: (818) 341-7070 TLX: 69-1427 Cable: SPECTRA

International Sales Representatives: AUSTRALIA HADLAND PHOTONICS Ph: (03) 560-2366 BELGIUM ANALIS SA Ph: (81) 225085 CANADA OPTIKON CORPORATION Ph: (519) 885-2551 FRANCE INSTRUMAT S.A. Ph: (1) 69-28-27-34 GERMANY OPTEEMA ENGINEERING GmbH Ph: (2) 126-7352 HOLLAND INTECHMIJ B.V. Ph: (20) 56-96-611 INDIA PHOTONICS INTERNATIONAL Ph: (812) 363-573 ISRAEL ANKOR Ph: (03) 575-4242 ITALY PHOTO SYSTEMS SAS Ph: (29) 532-1363 or (29) 532-1366 JAPAN KYOKKO TRADING COMPANY Ph: (3) 3586-5251 SPAIN INSTRUMATIC ESPANOLA SA Ph: (1) 555-8112 SWEDEN SAVEN AB Ph: (8) 630 93 00 SWITZERLAND MAC TECH SA Ph: (21) 28-9177 U.K. MICRON TECHNIQUES LTD. Ph: (202) 841-261

Circle 219 - Please have salesman call
Circle 220 - Please send literature

QUICK-STEPPING COMPANIES ARE CHALLENGING THE STALWARTS IN LUCRATIVE AUTO MARKET

OUT WITH THE OLD?

BY FRANCIS J. LAVOIE

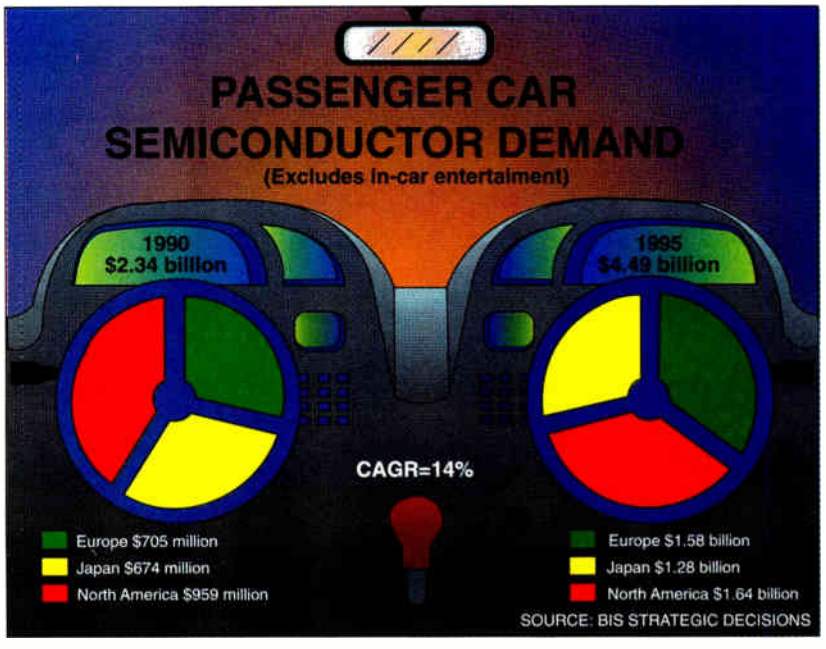
AUTOMOTIVE

The history of automotive electronics in the U.S. reveals an industry dominated by a well-established group of companies, mostly domestic. But the old order is changing as other manufacturers on three continents rev up their efforts to grab shares of what is becoming the world's most lucrative electronics market. A few cases in point:

•United Technologies Corp. is ready to transfer its vast storehouse of expertise in military electronics to the automotive sector. This is a major shift in marketing direction for the aerospace giant, as well as a serious challenge to the dominance of established automotive-electronics suppliers.

•Japan's TDK, long a force in entertainment electronics, is trying to gain a foothold for its chip sets in the auto business through its Santa Cruz, Calif., subsidiary, Silicon Systems Inc.

•VLSI Technology Inc. set up an Automotive Products Division in late 1989 and is busily staffing up to plunge into the fray.



The market potential is awesome. A report from the Freedonia Group in Cleveland puts the OEM electronics content of cars, light trucks, and vans at $1,800 per vehicle by 2000. And BIS Strategic Decisions, a Luton, UK, marketing firm, estimates the total value worldwide for systems controls in automobiles, excluding trucks and entertainment components, will reach $14.2 billion by 1995. The projections appear solid despite the well-publicized problems currently facing automakers in the U.S. and abroad. That's good news for suppliers, but with the new players in the game, only the most astute are likely to survive the stiffer competition.

They will be jostling in the near term for sales resulting from further penetration into areas already well established, at least in the U.S., say the analysts. For example, the Freedonia Group predicts that growth will focus mainly on engine and drive-train controls; navigational and instrumentation systems; comfort, convenience, and entertainment equipment; and safety and security.

According to the Freedonia report, the safety and security category offers the best opportunities, with annual gains of 25% projected to 2000. Included in this category are antilock braking systems, electronic restraints (air bags), antitheft systems, light and mirror controls, and traction controls.

Among the components that will see growing use are accelerometers for air bag deployment systems and suspensions; mass air-flow sensors for engine control; chemical sensors for exhaust-gas analysis; fluid-level sensors for measuring lubricants, fuel, and coolant; and angular-position sensors for antilock braking systems and for sensing crankshaft and camshaft positions.

Downward migration will be the dominant factor in the near-term growth in most categories, says Jeff Bartlett, director of product marketing for AVX Corp., a Great Neck, N.Y., components maker. "For example, a low-end car might have six engine and transmission control modules, while a high-end car might have over two dozen." This heavier use of electronics will filter down to low-priced cars as time goes on and carmakers strive to meet more stringent fuel-economy and emission standards.

The increased use of these systems will expand beyond U.S. borders. Japan, for example, is expected to see greater use of air bags and antilock braking systems. This will be primarily to meet export needs, but more and more Japanese cars sold in the domestic marketplace will also have these safety features.

But it is Europe that will most likely show the greatest growth in the use of electronic subsystems. This will result primarily from the European Community's new emission regulations, scheduled to go into force at the end of 1992, which will apply to all engines up to 2 liters. To meet these new standards, manufacturers are expected to change from carburetors to electronically controlled fuel injection.

For suppliers, the most serious challenges may yet come from overseas. For example, at the recent Society of Automotive Engineers show in Detroit, Korea's giant Daewoo International announced its readiness to tackle "practi-

The new Canon NP 1500 copier has more than Canon's good name behind it. It has Canon's revolutionary cartridge technology that makes the copier virtually trouble-free, and you, definitely worry-free.

Exclusive Canon Cartridge System

When you snap in the NP 1500 cartridge, you replace the toner and almost every part that can wear out. That means your copier keeps running like new, delivering consistently high-quality copies.

Canon Performance Guarantee℠ Program

CANON PERFORMANCE GUARANTEE PROGRAM

When you purchase the Canon Performance Guarantee Program, you get the NP 1500 cartridge as well as any necessary maintenance, parts, and guaranteed machine replacement for up to three years.

0% Financing

And until 12/31/91, buying the NP 1500 copier has never been easier. Just purchase it and the Canon Performance Guarantee Program on your Canon Credit Card, and 0% financing is available for up to one year.*

What all this amounts to is an affordable, reliable Canon copier that has more protection than you may ever need. Now isn't that a comforting thought.

For details, see your participating Canon authorized dealer, or call 1-800-OK-CANON.

*Subject to credit approval, beginning 10/23/92, for all qualifying purchases made on your Canon Credit Card. Finance Charges will accrue at an Annual Percentage Rate of up to 17.88%-with a minimum Finance Charge of 50 cents for any month in which a Finance Charge is due.

Canon

Enjoy easy extended payments with the Canon Credit Card
Ask for details at participating Canon dealers and retailers
Available only in U S

Canon

CIRCLE 4

AUTOMOTIVE SYSTEM CONTROLS
(EXCLUDES ENTERTAINMENT)

	1991	1995
NORTH AMERICA	$3.1 BILLION	$5 BILLION
WEST EUROPE	$2.8 BILLION	$4.9 BILLION
JAPAN	$2.5 BILLION	$4.3 BILLION

SOURCE: BIS STRATEGIC DECISIONS

cally any job." The company used the SAE show as a first step in getting the Daewoo name more closely associated with the automotive sector.

Some foreign suppliers are making their moves through their American arms. Siliconix Inc., the Santa Clara, Calif., chip maker that is 85% owned by Germany's AEG AG, is aggressively marketing a line of power MOSFETs, which the company feels will be especially useful in chassis applications.

What are the chances of the ultimate nightmare coming true—that the Japanese or Koreans, for example, will take over the U.S. auto electronics market as they did consumer electronics?

"A lot has been written about that," says AVX's Bartlett, whose own company was recently bought by Kyocera of Japan. "But remember, many Japanese companies are already strong in this country, so we're already competing with them successfully. There's no reason for that to change if we keep our wits about us, and don't just surrender the market to them like we did in consumer electronics."

Bartlett does worry about the short-term mentality prevalent among U.S. suppliers. "It may seem as though we just naturally play by 'good-guy' rules, with everyone welcome to compete," he says. "In fact, we like competition because it provides lower prices. And American manufacturers will buy from anyone if they can get a better price. That could cost us in the long run."

One disappointment to U.S. suppliers has been the lack of activity resulting from foreign carmakers establishing manufacturing and assembly plants in the U.S. "The Japanese tend to bring their own infrastructure with them when they establish plants in this country," says Bartlett. "Also, they are far more loyal to their suppliers. They don't tend to jump from one supplier to another, as American car manufacturers do, just to get a better price."

Bartlett feels that this reliance on an existing infrastructure is one way the Japanese skirt U.S. domestic-content laws. As for the chances of an American manufacturer breaking into this infrastructure in a big way, Bartlett says, "I just don't see a tidal wave of opportunity for U.S. manufacturers from the likes of Toyota and Honda."

But Bartlett doesn't write off completely the potential for exports to Japan and Europe. He believes the greatest opportunities lie in subsystems rather than components. "There's a lot more electronic content in our cars, particularly in engine controls and driver comfort and safety systems, and these systems are much more highly developed than those in, say, European cars," he says. "Supplying subsystems to the overseas market is where the most promising opportunities lie. If the subsystems are developed there, they will use their own domestic suppliers."

At first glance, Eastern Europe would not seem to be a promising market for sophisticated automotive electronics. But that isn't the case, says Arie Brish, director of marketing for Motorola Inc.'s Advanced Microcontroller Division. "Many Eastern European countries import cars, and buyers are demanding the same kinds of embellishments as their Western European neighbors. It won't be long before what is considered a luxury today will be seen as a necessity." Brish believes that this trend will broaden to include Eastern European car manufacturers as their countries' standard of living improves.

Some believe the American companies' greatest potential lies in their unmatched software expertise. "Digital signal processing, for one, is a very software-intensive technology," says Matt Robinson, product line director for mobile communications for the DSP Group. "This favors a country like the U.S., which leads the world in software development, and is why this country is the acknowledged leader in digital signal processing. The Japanese have a shortage of software engineers that is likely to extend into the next decade." ❑

GREEN IS GOOD FOR BUSINESS

SURPRISE! ENVIRONMENTALISM CAN PAY OFF IN BETTER MANUFACTURING, MORE EFFICIENT PROCESSES, AND SAVINGS

BY JACQUELINE DAMIAN

COVER STORY

In the 1970s and early 1980s, the electronics industry suddenly found itself, along with the rest of American manufacturers, confronting a new and expensive wrinkle interfering with business as usual: the environmental movement. The mood was adversarial as wrathful activists and "not in my backyard" citizens' groups began questioning the impact large companies were having on the environment, and increasingly stringent government regulations demanded the control of air and water emissions—often at great cost.

Just a decade later, the face of industry environmentalism has radically changed. Across the board, virtually all the large electronics producers and many of the smaller ones have begun to go green. Companies have integrated environmentalism into their corporate cultures, forged environmental policies and practices, appointed "green managers" who oversee environmental initiatives and rank at the highest tier of the corporate hierarchy. No longer lurching from crisis to cleanup, the companies in the forefront of the movement have realized substantial—and often unexpected—gains from their efforts, among them big cost savings and improved manufacturing processes. They have found that what's good for the environment can be good for business, too.

•Intel Corp. is saving what it conservatively estimates to be $1 million a year by radically reducing its hazardous waste. Instead of carting the end products of the manufacturing cycle to increasingly scarce (and pricey) toxic-waste disposal sites, the Santa Clara, Calif., chip maker recycles much of the material that would otherwise be dumped—and retools processes so they don't generate waste in the first place. That means savings on chemical purchases as well as on disposal.

•Recycling and reuse of parts and metals saves one division of Hewlett-Packard Co. $17 million a year. Each month, the Support Materials Organization in Roseville, Calif., and Grenoble, France, refurbishes or recycles some 500,000 pounds of excess, scrap, and obsolete products returned by customers, creating fresh raw materials instead of solid waste.

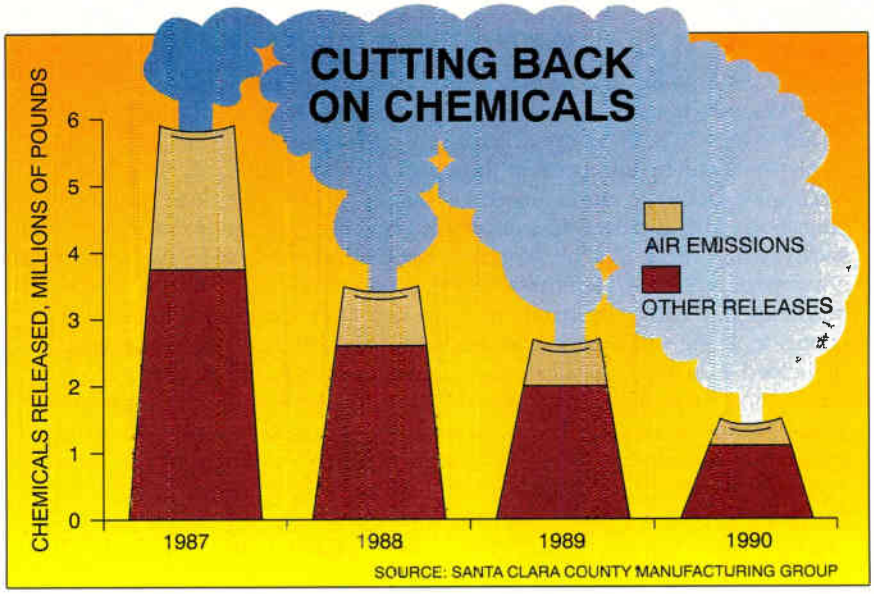
•Tektronix Inc. is saving 30% per square foot in its metal-painting operation since switching to an environmentally safer low-solvent paint. The paint itself is more expensive but the Beaverton, Ore., company's new system uses 40% less of it, which means less hazardous waste generated and less money spent on disposal.

•And 3M Co., which is singled out by environmentalists and the business community alike for its longstanding embrace of environmentally friendly manufacturing (see p. 46), has saved $537 million since instituting its groundbreaking Pollution Prevention Pays program in 1975. That's a lowball figure, taking into account only first-year savings from any new process implemented. The sum would be much higher if computed over product lifetime.

"It really does turn out to be a practice of corporate improvement," says Art Kleiner, a journalist who follows corporate environmentalism for *Garbage* magazine. "That very definitely came as a surprise, just as quality came as a surprise" to U.S. business, he says. "People used to engineer to a spec; now they engineer for continual improvement. And that's a perfect kind of way to apply environmentalism," as well as quality, to an operation.

However, despite the many success stories, a host of questions remains for managers who are striving to make their businesses environmentally responsible. For starters, just how green is green? There is little consensus at the managerial level. Some companies are satisfied to simply meet federal, state, and local regulations, which grow tougher every day. Others try to second-guess the regulators, cutting back today on the chemicals most likely to be limited or banned in the future. Some are folding environmentalism into their quality programs, aiming for "zero emissions" in the same way that they strive for "zero defects."

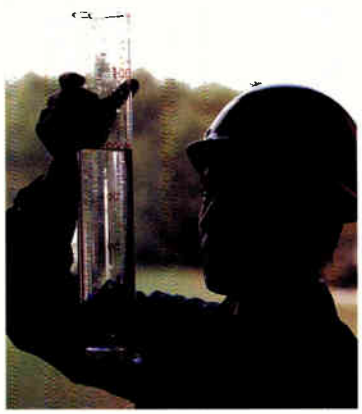
Today's approach to green issues has its roots in the failures and limitations of the 1970s, says Mark Haveman, a staffer at the National Wildlife Federation's Corporate Conservation Council in Washington. After installing all man-



In 1990, Silicon Valley sent 74% fewer toxics into the environment—air, water, land, underground, public sewage, and off-site releases—than in 1987.

ner of end-of-the-pipe equipment to trap pollutants generated in manufacturing, Haveman says, companies soon found that these "command and control" solutions were self-limiting. They made a dent in pollutants released, but to get further improvements would mean spending outlandish sums on bigger and better scrubbers, wastewater treatment facilities, and other trapping devices. Benefits realized per dollar spent took a nosedive after the initial, first-level installations.

So companies were "forced to look at more creative ways to reduce toxics or use resources more effectively," Haveman says. "Black boxes as 'fixits' are getting more and more difficult to come by." The solution, for many, was the equivalent of a thorough spring cleaning: a "cradle-to-grave assessment," Haveman says, of manufacturing processes, materials used, and even such seemingly trivial matters as packaging and recycling in an effort not to control pollution after it's created but to prevent its being created in the first place. The new approach is called "pollution prevention" to distinguish it from the old-style "pollution control."



A TI engineer checks water quality at Hiji, Japan, plant.

"Large companies in particular are embracing the pollution prevention concept," says Gordon Rands, who co-taught the National Wildlife Federation's pilot, MBA-level business-and-the-environment course last year at the University of Minnesota. "They have found from experience—for example, 3M—that they can reformulate, or trap and recycle, or modify a process so that a certain chemical isn't necessary...so that waste that needs to be disposed of simply isn't generated." However, says Rands, while "pollution prevention has picked up a lot of steam in the past two or three years, it hasn't yet become the paradigm" for large portions of U.S. industry. Many companies, he says, are still scrambling for after-the-fact cleanups.

But the cost of that approach is skyrocketing, as any company implicated in a Superfund site or a major groundwater cleanup can attest. Simply being listed as liable in a Superfund cleanup costs a company $500,000, says Gary Burke, president of the Santa Clara County Manufacturing Group (SCCMG). Intel's green manager, Terry McManus, says the cleanup itself averages $30 million. And mopping up 60 Silicon Valley groundwater cleanup sites has cost the companies involved $300 million since 1982, says Burke.

A less extreme example, but one that is being addressed by virtually every company in the electronics industry, is disposal of everyday toxic waste—the chemicals and other substances used to manufacture semiconductors, printed-circuit boards, and other products. Back in 1985, when Intel began an aggressive program to cut back on its hazardous waste, it cost about $200 to manage a ton of such material, says McManus, who is corporate manager of environment, health, and safety and is based in Chandler, Ariz.

By 1989, with ever tighter restrictions on where toxic waste could be transported and dumped, the cost had soared to $1,300, he says, and by 1990, it hit $2,000. "For certain solvents," says McManus, "it costs more to dispose of them than to buy them."

Intel is just one of many electronics producers that is cutting back. Apple,

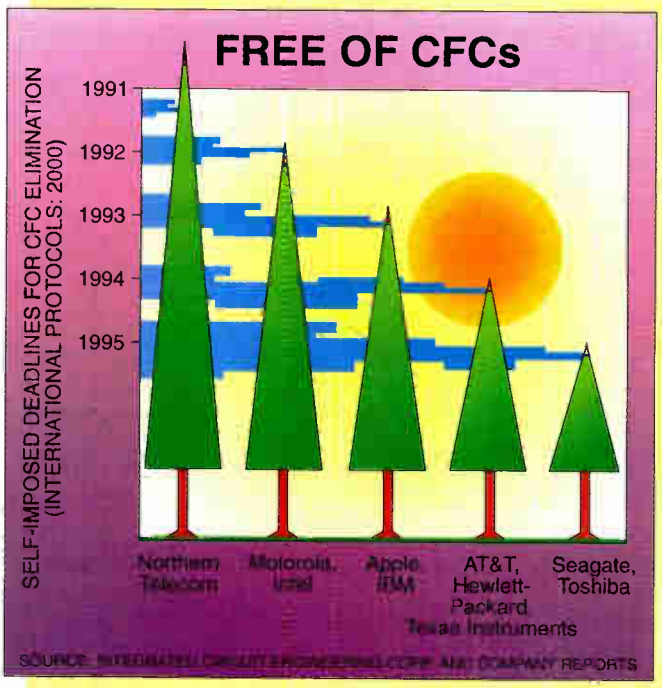
CFCs: A DEFINING MOMENT

Some industry watchers point to the chlorofluorocarbon crisis as the defining moment in the electronics industry's environmental education. The industry mobilized swiftly when, in 1987, the world's governments set an international deadline of 2000 for eliminating this ozone-depleting class of chemical. "It helped turn the big ship," says Dan Bartosh, the green manager at Texas Instruments Inc. in Dallas. "It galvanized the industry."

Through seminars, workshops, the Industry Cooperative for Ozone Layer Protection, even a computer bulletin board called "Ozone Net," companies have freely shared methods of coping with the need to suddenly replace CFCs, which are used for cleaning and other tasks in a wide range of electronics production. The result: a drop in CFC use and near deadlines for their ban.

The Santa Clara County Manufacturing Group recently issued a report on chemical releases that showed CFC emissions by 25 member companies had declined 78% between 1987 and 1990, and that figure is representative of cutbacks by the industry overall. Most companies—even the small ones—will do away with CFCs by mid-decade, says Gary Burke, SCCMG president. And that's a good thing, given reports in October that ozone depletion is far more widespread than previously believed, and accelerating faster than anticipated. If the United Nations negotiates an earlier global ban—a step it is considering—the electronics industry will not be caught with its pants down.

Water-based cleaning and no cleaning at all—a solution that demands either low-solid fluxes, which leave behind no residue, or conductive adhesives to replace soldering—are the two methods most widely used for printed-circuit boards. Both can save money, if only by eliminating the need to buy costly cleaning chemicals.



By 1995, in advance of international deadlines, most electronics firms will have banned CFC use.

At Intel Corp., for example, green manager Terry McManus reports that reconfiguring the manufacturing line for aqueous cleaning has increased throughput. The no-clean approach shaves the final step off the manufacturing cycle, saving time and money at Apple Computer Inc., Apple says.

But some believe CFCs represent a unique situation and not a model for future action. Given the clear and present danger of CFCs, pressure was high to ban them, says Terry Foeke, president of the Waste Reduction Institute in Minneapolis. "I don't think similar arguments are going to be makeable for other substances. It's not often that industry is going to have such a powerful sword hanging over them."—*J.D.*

AT&T, HP, IBM, Motorola, and Texas Instruments are among others that have also made significant reductions in the past few years—though not so dramatic as Intel's 80% drop. Of the remaining 20%, says McManus, "most goes to recycling," leaving just a fraction to be sent to a landfill.

To get such sharp cutbacks requires a constant rethinking of manufacturing processes in which green issues are factored into the equation alongside the traditional cost, yield, and throughput considerations. "We see environmental [issues], health, and safety—all three—as part of our overall quality picture," McManus says. "An employee accident or injury, or an emission to the environment, is a defect in the system."

Some companies resist tinkering with their manufacturing processes—if it ain't broke, don't fix it. But for others, environmentalism offers a new handle on manufacturing efficiencies, just as quality did a decade ago. One small example: 3M's Electronic Products Division in Columbia, Mo., installed a decanter system to distill wastewater and recycle solvents used in one process. The system cost $4,000 but saved $3,100 the first year on solvent purchases and kept sewer discharges within limits, averting a substantial expenditure for a wastewater treatment facility.

"Any company that's going to compete in high technology is looking at input into the process as well as the output," says Burke of the SCCMG, an industry organization that numbers among its 110 members most of the Silicon Valley electronics concerns. "The concept is embraced by every company out here. It's an ongoing product-cost-engineering process."

But it's a process that gets increasingly complex as more and more substances come under environmental scrutiny. "We are really at a dead run all the time" to meet current and emerging goals, says Dan Bartosh, manager of environment, health, safety, and energy at Texas Instruments Inc. in Dallas. For example, the federal Environmental Protection Agency recently asked 600 U.S. companies—including some of the biggest electronics producers—to voluntarily cut emissions of 17 toxic substances including such metals as nickel, cadmium, mercury, and lead. The goal is a 33% cutback by 1992 and a 50% drop by 1995.

Those substances are in addition to 300 chemicals that the nation's largest

GenRad is about to change your thinking about low-cost board test.

We've always had a reputation for the best board testers in the world. That's why we've maintained the world's leading market share for more than twenty years.

Unfortunately, too many people associate the best with high price.

Not so. Our new Essential Test Collection (ETC), for example, a powerful, versatile software and hardware package, brings you new ease-of-use in high throughput board test. And the price is *lower* than other systems with less capability.

ETC puts powerful new automation tools at your fingertips to simplify and speed the whole process from test program development to data collection. Now you can have the very best in low-cost test for your complex boards. Even those with ASICs, SMT, Boundary Scan and other new technology you thought required expensive test systems.

It's time to take another look at the best in test. We have something new for you to think about in low-cost board test.

Call your local GenRad office or 1-800-4-GENRAD for more information about the new ETC package.

GenRad

A New Way of Thinking

CIRCLE 185

companies must track and report. The EPA compiles the data in its Toxics Release Inventory, and environmentalists say the very act of reporting is a powerful tool for getting cutbacks. "Companies are more conscious of their use of chemicals [because of it]," says Burke. Burke's group publishes its own compilation of releases by members, and this year found that discharges of the 37 chemicals measured (including CFCs; see p. 44) declined 74% since 1987.

Besides consciousness-raising, the Toxics Release Inventory affects businesses in other ways. Activist groups analyze the EPA data and publicize the results, listing which companies are the biggest polluters. Large investors—such as those running pension funds—are starting to use such data in considering whether to put their money into a company's stock, says Intel's McManus.

The new EPA initiative is a large hint that metals are fast joining chemicals in the regulatory parade. "I think the metals problem is going to be a real stickler for the electronics industry," says Terry Foeke, president of the Waste Reduction Institute, a nonprofit Minneapolis group that works with companies on toxic-waste problems. Organic solvents and metals, he says, are found "across all waste streams. [Soon] you just won't be able to dispose of some of this stuff." In some places, says Foeke, "local limits on metals and organics in the water-waste stream are incredibly tight. And they're about to take a nosedive" across the board.

Indeed, the industry can see the writing on the wall, says TI's Bartosh. At one point, he says, TI was planning to make a device with a mercury switch. Even though safeguards had been incorporated to deal with the mercury, which showed up on the EPA's new hit list, Bartosh says the firm redid the design using steel balls instead. With environmental concerns now firmly entrenched in product planning, says Bartosh, "you go through those kinds of scenarios constantly."

Beyond metals regulation, Foeke sees the environmental impetus shifting from waste and its disposal to how toxics are used upfront. "We're still pretty concentrated on waste, the back end of the system," he says. "What's going to build is use: [employee] health and safety issues will drive people from whole classes of chemistry." Another trend, he says, is stricter regulation of smaller companies, some of which now escape the regulatory net. In compiling its Toxics Release Inventory, for example, the EPA requires reporting only by companies releasing at least 10,000 pounds of emissions. Now, says Foeke, Minnesota regulates every outfit "that generates even a molecule of waste—and that's the direction it's going [everywhere]."

Small companies are pressured as well by their customers. "Many of the [smaller firms] are suppliers to bigger companies, so it's almost impossible to not be aware" of green engineering, says Burke. Intel, for example, has environmental guidelines for the production equipment it buys, and convinced SEMI—the equipment-makers' trade group—to adopt them, says McManus.

All these factors will conspire to make the greening of American industry a more urgent goal for a wider range of companies—a goal that's a moving target. "These changes that they're making [now] are simply process engineering, good common sense," says Foeke. "Many companies were overdue to look at their processes," and once they did, they found "process efficiencies beyond their wildest dreams. But the gut-wrenching changes are still to come."

For example, he asks, how will companies respond if the new equipment they install for reducing toxics at the source is difficult to operate and thus demands more highly skilled, higher-paid employees? What if a scheme that seemed promising in R&D bombs out in manufacturing? Suppose a customer wants a high-risk process that runs counter to a company's environmental policy but promises a big short-term profit? "They may decide to go on with the emissions and eat the disposal cost," Foeke says. "We're very early in the scheme, and all these things are just starting to ripple out."

For all of that, Foeke pronounces himself optimistic about the future. "We have finally got the right people out there doing the innovating," he says. "I've really seen a sea change in that way of thinking."

And the electronics industry is well-positioned for the next green wave, says Intel's McManus. "We are used to change, and therefore to go in and say 'we need to do it differently' is not as big a deal as it is in other industries that are locked into World War II technology. The industry is more adaptable—it's what we're used to doing in the marketplace." ❑

DEBITS INTO CREDITS

In a recent survey of California executives, 41% of the respondents cited environmental overregulation as one of the reasons for expanding a business out of state rather than in. Indeed, the conventional wisdom is that going green is burdensome, costly, a drag on business.

But it need not be, says Tom Zosel, manager of pollution prevention programs at 3M Co. in St. Paul, Minn. Vanquishing pollution through source reduction, recycling, and the reformulation of processes "can have distinct business benefits," Zosel says, and "you can do it on basically no budget." The key: top management must be committed and must set up a structure so every employee understands that pollution prevention is part of the job.

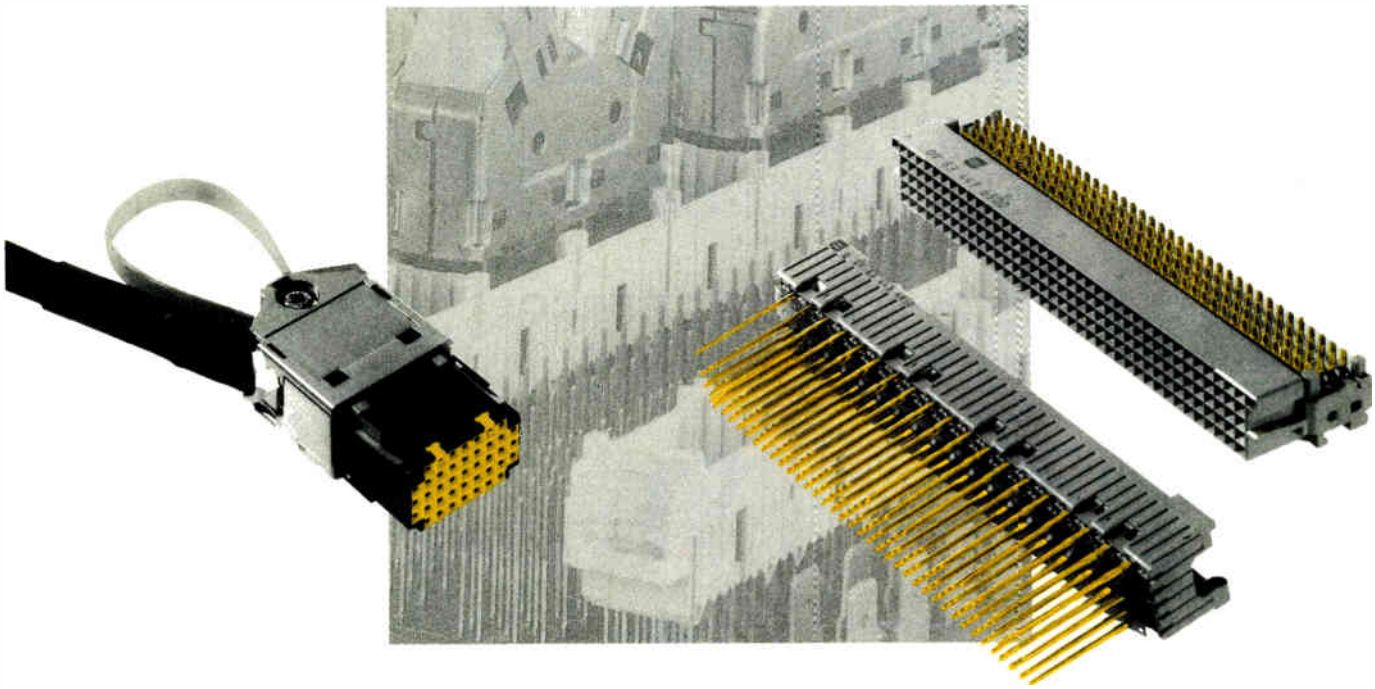
3M gets big annual savings—$30 million to $40 million—largely from small, innovative changes suggested by employees, who might be rewarded with cash, a certificate, or a dinner with the president, Zosel says. Line workers who know a process inside out can often find cheaper, environmentally friendly ways of getting the job done. One example: people at one 3M plant suggested using pumice slurry—which generates nonhazardous, landfillable waste—to clean copper plates instead of an acid bath, which produces toxic waste.

Inventory control is another approach, Zosel says; overpurchasing often means dumping excess, unused chemicals. "That's something any company can implement, yet there's a lot that haven't looked at just-in-time manufacturing."

Smaller companies should also take advantage of technology transfer, Zosel says. Professional groups sponsor meetings, and green managers at large companies will often share information, especially with a supplier. Also, Zosel says, many state Environmental Protection Agencies now have Technology Assistance Programs designed to "assist small to midsize companies" in prevention. —*J.D.*

har·pak® Connector Systems

The future is metric



As a world leader in the DIN 41612 connector market, HARTING has been instrumental in the setting of connector standards.

Once again HARTING innovation and support are to be seen in the development and standardisation of a high density, multi pin, hard metric connector system.

The introduction of har·pak® makes available a futuristic, internationally standardised (IEC) metric connector system.

The totally three dimensional modular design of the har·pak® system has turned a vision into reality providing the user with new potentials for computer aided designs. The system meets existing international standards specifying physical, mechanical and electrical requirements.

This state of the art concept can be utilised in a wide range of high technology applications such as telecommunications and factory automation.

Connectors from HARTING – the quality connection

CIRCLE 147

HARTING

HARTING ELEKTRONIK GmbH · P.O. Box 1140 · W-4992 Espelkamp
Germany · Telephone 05772/47-0 · Fax 05772/47-462
Telex 972310-14 he d

COMING IN 1993: EUROPE'S COMMUNITY PATENT

JUST ONE APPLICATION OPENS THE WAY TO A PATENT THAT'S VALID THROUGHOUT THE SINGLE MARKET

BY JOHN GOSCH

PATENTS

When the Single Market becomes a reality on Jan. 1, 1993, Western Europe will be a region that statesmen, financiers, business executives, and engineering managers have long yearned for: a deregulated market with no trade barriers among countries, a continent with common industry standards and where people, goods, and capital move freely across national borders. Such a Europe is now in the making, at least for the 12 countries that form the European Community. It will also bring something new in the field of patents.

The Community Patent, slated for introduction also on Jan. 1, 1993, will complement the existing European Patent, which has been around for the past 13 years. The Community Patent will be issued on the basis of a single application and unified grant procedure, yet it protects an invention or intellectual property in the 15 countries that are members of the European Patent Organization (EPO). It will be valid in EC countries and a few non-EC nations that are members of the organization and have ratified the Community Patent Convention.

U.S. companies intent on doing business in the single-market Europe are likely to benefit from the Community Patent. Perhaps its prime advantage is in providing a solid basis for business decisions on investments and licensing. In addition, there's the lower cost stemming from a single application, a special boon to small and medium-size firms with limited resources. For them, the Community Patent is a relatively inexpensive tool for gaining access to the potentially lucrative European market.

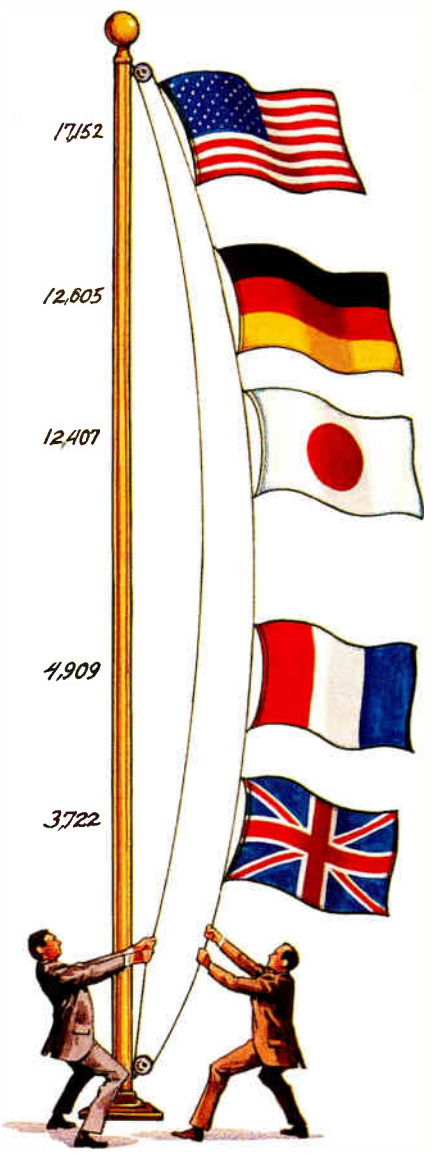
With the advent of the Community Patent, U.S. and other non-European companies and inventors will have four options for getting their inventions patented outside their home market. First, they can apply for a national patent in any European country in which they want to do business. Second, companies can seek an international patent in any of the 49 countries (including European ones) that are members of the Patent Cooperation Treaty, which comes under the auspices of the Geneva-based World Intellectual Property Organization. Third, they can apply for the European Patent and, lastly, go after the new Community Patent.

The major difference between the European and the Community Patents is that the latter will be a truly supranational industrial property right, conferring uniform protection in all member countries and transferrable or revocable only unitarily. The European Patent, on the other hand, is effectively a national patent in each country for which it is granted, and the protection it confers is limited to that country's territory.

The sole body to process applications and grant Community Patents will be the EPO in Munich, Germany, with its branch in The Hague, the Netherlands, and suboffices in Berlin and Vienna (see p. 50). This means that applicants will be dealing with a single authority instead of a number of national patent offices.

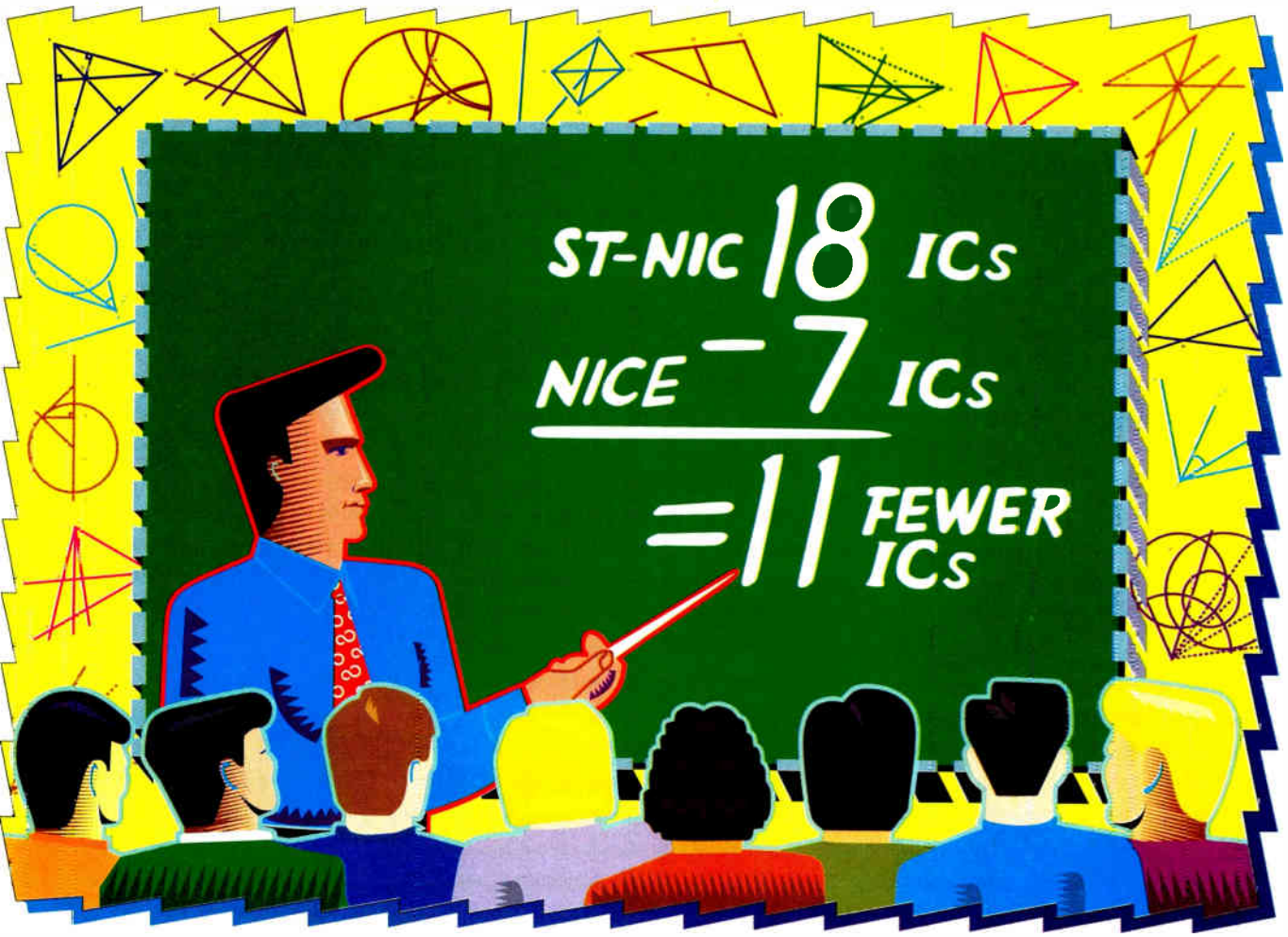
Understandably, one of the prime proponents of the Community Patent is Europe's industry. Why? It offers companies and inventors three basic advantages: simplicity, economy, and legal safety. "It's simple, because a single application in just one language opens the way to a patent that's valid virtually throughout West Europe," says Rainer Osterwalder, spokesman for the EPO in Munich. As for economy, getting a

WHO'S GETTING PATENTS?



FILINGS WITH EUROPEAN PATENT OFFICE (1990)

SOURCE: EPO



NICE and simple math exposes the myth of ST-NIC.

It doesn't take a mathematical wizard to see the superiority of the NICE® Ethernet solution from the Advanced Products Division of Fujitsu Microelectronics. We think the numbers speak for themselves.

Our NICE solution, for example, requires far fewer ICs than ST-NIC's™ so-called single-chip solution—7 vs. 18.* And that means fewer passive components as well. Making Ethernet LAN board design easier. Faster. And more cost effective than ever before.

Then, add on another factor—that NICE products are competitively priced—and systems designers clearly have a proven formula.

What's more, the fewer the parts, the smaller the size—and the lower the power consumption. All of paramount importance for motherboard applications.

Plus, because NICE is a highly automated controller, it offers substantially greater system performance for user applications—by freeing CPU and memory bandwidth. Fact is, benchmarks and customers report up to 33% higher performance over competitors' controllers. Quite an edifying statistic, don't you think?

And, unlike other available solutions, NICE has been designed to *fully* comply with Ethernet standards—ensuring international interoperability. And that's no myth.

For more enlightening facts, here's one more NICE number: 1-800-866-8608. Or call your local sales office for our NICE Designer Kits. And discover the world's most advanced, highly-integrated, cost-effective Ethernet solution—the NICE family of high-performance products from Fujitsu. Because all it takes to expose a little myth is a little math.

FUJITSU

Delivering the Creative Advantage.

FUJITSU MICROELECTRONICS, INC., Advanced Products Division. 77 Rio Robles, San Jose, CA 95134-1807. Ph: 408-456-1161 Fax: 408-943-9293. FUJITSU MICROELECTRONICS ASIA PTE LTD. (Head Office, Singapore): Ph: 65-336-1600 Fax: 65-336-1609. HONG KONG SALES OFC: Ph: 852-723-0393 Fax: 852-721-6555. TAIPEI SALES OFC: Ph: 886-2-757-6548 Fax: 886-2-757-6571. JAPAN SALES OFC: Ph: 81-3-3216-3211 Fax: 81-3-3216-9771. KML CORP. (Rep., Korea): Ph: 82-2-588-2011 Fax: 82-2-588-2017. PACIFIC MICROELECTRONICS, PTY. LTD., (Rep., Australia): Ph: 61-2-481-0065 Fax: 61-2-484-4460. FUJITSU MIKROELEKTRONIK GmbH (Dreieich-Buchschlag, Germany): Ph: 06103-6900 Fax: 06103-690122.

Community Patent granted will cost less than seeking patent protection in, say, three countries separately.

Legal safety enters the mix because the new patent is granted only after an extensive search of a data bank that now contains information on some 26 million documents. (Some countries issue national patents after a cursory search, and very often it turns out that these patents do not suit markets other than their home market.)

The Community Patent and the EPO will also generate what Osterwalder calls a "fallout benefit." The unitary patent information policy, as well as the EPO's enormous resources in data processing, will not only speed up patent searches but also help reduce the industry's duplication of development efforts. According to EC sources in Brussels, reinventions cost the continent's industry between $18 billion and $24 billion a year. "That waste of money and engineering resources must be cut," Osterwalder declares.

Europe's patent organization is structured very much like many democratic, three-branch governments in the West. The legislative branch is the Administrative Council in Munich—it approves the budget and amends rules and regulations relating to patent fees. Constituting the executive branch is the EPO as it examines applications and grants the patents. Still to come is the judicial branch, a central European court—the Community Patents Appeals Court, or Copac—which will decide litigation on infringements and validity of Community Patents and ensure that the provisions of the European patent conventions are uniformly applied. Copac will most likely be located in Luxembourg.

Patent experts at European companies are very much in favor of the Community Patent. "With the granting of patents, checking for their validity, and the legal processes involved all being in one hand makes it much easier for a company," says Hermann Reichel, an executive in the patents department of Intermetall GmbH in Freiburg, Germany. Indeed, "It will considerably simplify the administrative tasks involved and all but do away with the need for patent lawyers," says Hans Goldrian of Siemens AG's patent department in Munich. Goldrian also points to the advantages of having a single appeals court.

Some in the industry have mixed

THE EPO POWERHOUSE

Founded in 1977, the European Patent Office now employs about 3,700 people, roughly 1,700 at its Munich headquarters, 1,700 at its branch in The Hague, the Netherlands, and the remainder at the Berlin and Vienna suboffices. Half of the employees are patent examiners, all with an academic background and most with advanced degrees in the natural sciences. They are supported by 80 lawyers. And starting in January 1993, when Europe's new Community Patent takes effect, this organization will be command central for the European Community's patent activity.

Not surprisingly, the EPO goes all out for data-processing systems. The organization spends an average of $47 million a year for everything from giant computers and software to personal computers on workers' desks, which they use to access the data stored in 26 million documents.

The EPO is a truly international body. Indeed, when you walk down the aisles of the stark, 10-story headquarters building that sprawls along the banks of the Isar River in Munich, you can tell by the many different languages spoken that you are in some cosmopolitan world. As one official observes, you can hear people curse in Danish, flirt in Italian, complain in Dutch, argue in German, and cajole in Spanish. The official languages—the ones in which Community Patents should be filed—are English, French, and German.

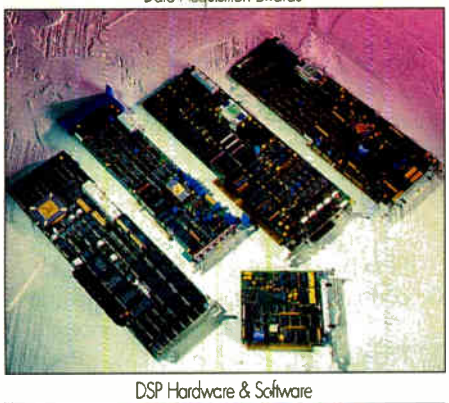
Headed by the Swiss-born lawyer Paul Braendli, the EPO is an autonomous body, financing itself exclusively from income generated by procedural and patent-renewal fees. When it was founded, the EPO expected the number of patent applications to peak at an annual 30,000 within a few years and then level off, says spokesman Rainer Osterwalder. But in 1990, the agency's 13th year, the number exceeded 62,000. Since 1982, applications rose between 12% and 15% a year, and Osterwalder thinks the number will hit 100,000 by 2000.

This office building in Munich, Germany, houses the European Patent Organization, which will administer the Community Patent.

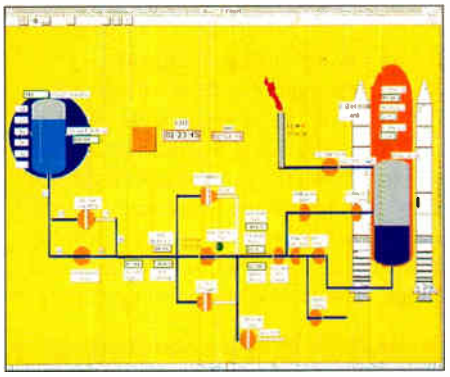
Globally, about 80% of all inventions are registered at the world's three major patent offices—the U.S. Patents and Trademarks Office, the Japanese Patent Office, and the EPO. In 1983, these agencies embarked on an active program of cooperation that now encompasses 18 projects.

Among them are automating patent search and paperwork, and establishing and exploiting computer data bases containing the core of the world's technical information. One important cooperative goal is a uniform application and patent grant procedure. So far, agreement has already been reached on what information and codes the first page of an application form should contain, according to Osterwalder.—*J.G.*

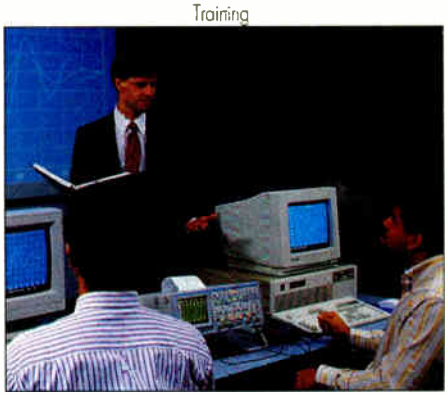
Data Acquisition Boards



LabVIEW ®



Training



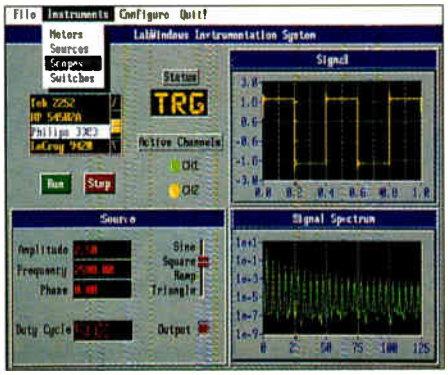
DSP Hardware & Software

VXI Controllers

GPIB Support Products

Technical Support

LabWindows ®



IEEE-488.2 Interfaces

MORE CHOICES, MORE ANSWERS

for data acquisition and instrument control

In the complex world of data acquisition and instrument control, National Instruments gives you choices. With our diverse range of products, you can choose the type of instrumentation you want to use, how to analyze your data to extract meaningful information, and how to present your data so that it makes sense. These choices give you more than a single answer to your application needs.

Our products–your choices–are part of a revolution in instrumentation technology, a revolution in which scientists and engineers use industry-standard computers running powerful software to build their own virtual instruments. These modular instruments are more cost-effective, more flexible, and adapt more readily to changing needs than the instruments of the past.

To find out more about your choices, call or fax for our free catalog.

NATIONAL INSTRUMENTS®
The Software is the Instrument ®

6504 Bridge Point Parkway
Austin, TX 78730-5039
Tel: (512) 794-0100
(800) 433-3488
Fax: (512) 794-8411

See us at ATE and Instrumentation, booth 108

Asian Offices: Australia (03) 879 9422, Hong Kong 7649901, India (0812) 346613, Indonesia (021) 414838, Japan (03) 3788 1921, Korea (02) 776 3340, Malaysia (04) 879584, New Zealand (09) 360 1239, Pakistan (051) 25 6698, Singapore 3364713, Taiwan (02) 7580280, Thailand (02) 2841901.

CIRCLE 201

feelings about the Community Patent, however. "Conceptually, we welcome the idea of having a single patent covering all of the Common Market and granting uniformly defined rights to applicants," says Knud Schulte, European patent counsel at Hewlett-Packard Co. in Böblingen, Germany. "We also appreciate the establishment of Copac, the common appeals courts."

However, Schulte points out that "obtaining patent protection in all countries rather than a few of them under the older European Patent Convention would not justify the filing of a high number of translations, nor the payment of excessive annual patent renewal fees to each country."

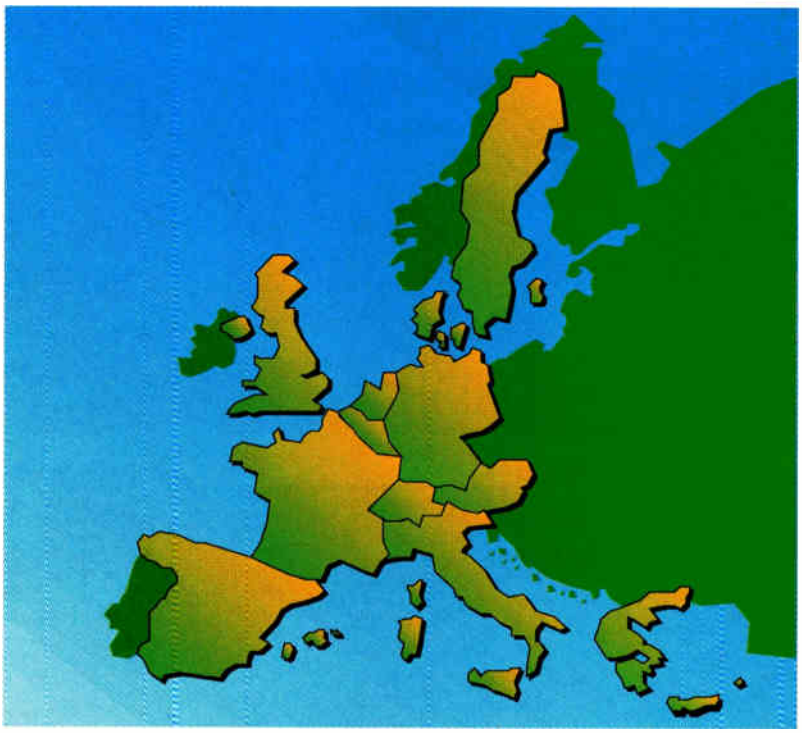
The issue of translating a patent into every language spoken in the EC is a political one; each country is eager to have patents published in its own language. The EPO is working to resolve this problem. It is also working on fees, which have yet to be determined. The agency wants to come up with a formula that takes into account the size of various countries and other factors. As regards patent protection in all countries, if a company objects to that, it still has the option of applying for the European Patent, which gives protection only in countries the company chooses.

For its part, the EPO thinks that U.S. firms will take to the Community Patent, and bases its optimism on the experience it has gained with the European Patent. The rate of increase of applications by U.S. firms is much higher than it is for European companies, an EPO official says. He sees no reason why it should be different with the Community Patent.

The 15 member states of Europe's patent organization are Austria, Belgium, Denmark, France, Germany, Greece, Italy, Liechtenstein, Luxembourg, Monaco, the Netherlands, Spain, Sweden, Switzerland, and the UK. These nations constitute a market with more than 350 million people, which makes it bigger than the Single Market with its 320 million consumers.

And the patent club is still growing. Portugal will become the 16th member on Jan. 1, 1992, and Ireland has agreed to join as well (its government must still ratify the agreement). Finland, Cyprus, and Yugoslavia have observer status and may also join, as may Iceland and Malta. "The club is open to everyone in Europe," Osterwalder says, "and that includes the former East-bloc countries." Three of them—Hungary, Poland, and Czechoslovakia—have expressed an interest. These nations, however, must first fulfill certain requirements: their patent legislation must be compatible with the EPO's, and they must have an open-market economy and a democratic form of government.

The procedure for drawing up and filing a Community Patent application is identical to that for the European Patent. First, however, the patent must meet three criteria. It must constitute a novelty (an invention is considered "new" only if it does not represent state of the art); reveal an inventive step or new principle (one that's not obvious to a skilled person); and be industrially applicable. Once granted, a patent is valid for 20 years.



THE 15 EPO MEMBERS

Austria, Belgium, Denmark, France, Germany, Greece, Italy, Liechtenstein, Luxembourg, Monaco, the Netherlands, Spain, Sweden, Switzerland, and the UK: a market of 350 million.

It now takes 44 months to get a European Patent, but "with the Community Patent we hope the process will take substantially less," Osterwalder says. But even the new process can't compare with the speed of patent practice in the U.S., where it takes 18 to 24 months, the EPO says.

If the number of applications filed by the country of origin is any yardstick for measuring technological prowess, then Western Europe does not stack up too well compared with the U.S. and Japan. Of the 62,778 patent applications that the EPO received last year, 17,152 came from the U.S. and 12,407 from Japan.

These two countries' total of 29,559 applications came close to the number of applications—30,627—filed by EPO countries in Western Europe (whose population is bigger than that of the U.S. and about three times that of Japan). Taking a look at Europe, the three major applicant countries last year were Germany, with 12,605 filings; France, with 4,909; and the UK, with 3,722.

The idea of a common European patent has been a long time coming. Plans date to 1949, when a proposal for establishing a European patent office was submitted to the Council of Europe. Years of meetings and conventions produced no concrete results until December 1975, when the EC, then numbering nine countries, agreed on a common patent. But political differences and certain flaws in the agreement prevented the accord from becoming effective. Renewed efforts at a conference in Luxembourg in December 1985 achieved only partial success. The final details weren't hammered out until December 1989.

For the Eurocrats, the Community Patent marks another step toward the Single Market. As industry observers see it, the new patent should help create a truly European technological community while establishing a better basis for exploiting and enforcing patents in Europe. ❑

REE
NFORMATION

se this card to
ceive free information
n the products
atured in this issue.

Name _____
Title _____
Company Name _____
Company Address _____
City/State/Zip _____

USE ADDRESS LABEL HERE OR PRINT IN CLEARLY

CIRCLE NUMBERS FOR MORE INFORMATION

1	21	41	61	81	101	121	141	161	181	201	221	241	261	281	301	321	806
2	22	42	62	82	102	122	142	162	182	202	222	242	262	282	302	322	807
3	23	43	63	83	103	123	143	163	183	203	223	243	263	283	303	323	808
4	24	44	64	84	104	124	144	164	184	204	224	244	264	284	304	324	809
5	25	45	65	85	105	125	145	165	185	205	225	245	265	285	305	325	810
6	26	46	66	86	106	126	146	166	186	206	226	246	266	286	306	326	811
7	27	47	67	87	107	127	147	167	187	207	227	247	267	287	307	327	812
8	28	48	68	88	108	128	148	168	188	208	228	248	268	288	308	328	813
9	29	49	69	89	109	129	149	169	189	209	229	249	269	289	309	329	814
10	30	50	70	90	110	130	150	170	190	210	230	250	270	290	310	330	815
11	31	51	71	91	111	131	151	171	191	211	231	251	271	291	311	331	816
12	32	52	72	92	112	132	152	172	192	212	232	252	272	292	312	332	817
13	33	53	73	93	113	133	153	173	193	213	233	253	273	293	313	333	818
14	34	54	74	94	114	134	154	174	194	214	234	254	274	294	314	334	819
15	35	55	75	95	115	135	155	175	195	215	235	255	275	295	315	335	820
16	36	56	76	96	116	136	156	176	196	216	236	256	276	296	316	801	821
17	37	57	77	97	117	137	157	177	197	217	237	257	277	297	317	802	822
18	38	58	78	98	118	138	158	178	198	218	238	258	278	298	318	803	823
19	39	59	79	99	119	139	159	179	199	219	239	259	279	299	319	804	824
20	40	60	80	100	120	140	160	180	200	220	240	260	280	300	320	805	825

Electronics
READER SERVICE CARD
12/91/490

TELEPHONE NUMBER
( ) _____

Check your one principal job function.
01 ☐ Corporate & Operating Mgt.
07 ☐ Engineering Mgt.
03 ☐ Manufacturing Mgr.
04 ☐ Purchasing Mgt.
05 ☐ Marketing & Sales Mgt.

How many people are employed in your entire organization?
1 ☐ 10,000 or more
2 ☐ 1,000-9,999
3 ☐ 100-999
4 ☐ Less than 100

REE
NFORMATION

se this card to
ceive free information
n the products
atured in this issue.

Name _____
Title _____
Company Name _____
Company Address _____
City/State/Zip _____

USE ADDRESS LABEL HERE OR PRINT IN CLEARLY

CIRCLE NUMBERS FOR MORE INFORMATION

1	21	41	61	81	101	121	141	161	181	201	221	241	261	281	301	321	806
2	22	42	62	82	102	122	142	162	182	202	222	242	262	282	302	322	807
3	23	43	63	83	103	123	143	163	183	203	223	243	263	283	303	323	808
4	24	44	64	84	104	124	144	164	184	204	224	244	264	284	304	324	809
5	25	45	65	85	105	125	145	165	185	205	225	245	265	285	305	325	810
6	26	46	66	86	106	126	146	166	186	206	226	246	266	286	306	326	811
7	27	47	67	87	107	127	147	167	187	207	227	247	267	287	307	327	812
8	28	48	68	88	108	128	148	168	188	208	228	248	268	288	308	328	813
9	29	49	69	89	109	129	149	169	189	209	229	249	269	289	309	329	814
10	30	50	70	90	110	130	150	170	190	210	230	250	270	290	310	330	815
11	31	51	71	91	111	131	151	171	191	211	231	251	271	291	311	331	816
12	32	52	72	92	112	132	152	172	192	212	232	252	272	292	312	332	817
13	33	53	73	93	113	133	153	173	193	213	233	253	273	293	313	333	818
14	34	54	74	94	114	134	154	174	194	214	234	254	274	294	314	334	819
15	35	55	75	95	115	135	155	175	195	215	235	255	275	295	315	335	820
16	36	56	76	96	116	136	156	176	196	216	236	256	276	296	316	801	821
17	37	57	77	97	117	137	157	177	197	217	237	257	277	297	317	802	822
18	38	58	78	98	118	138	158	178	198	218	238	258	278	298	318	803	823
19	39	59	79	99	119	139	159	179	199	219	239	259	279	299	319	804	824
20	40	60	80	100	120	140	160	180	200	220	240	260	280	300	320	805	825

Electronics
READER SERVICE CARD
12/91/490

TELEPHONE NUMBER
( ) _____

Check your one principal job function.
01 ☐ Corporate & Operating Mgt.
07 ☐ Engineering Mgt.
03 ☐ Manufacturing Mgr.
04 ☐ Purchasing Mgt.
05 ☐ Marketing & Sales Mgt.

How many people are employed in your entire organization?
1 ☐ 10,000 or more
2 ☐ 1,000-9,999
3 ☐ 100-999
4 ☐ Less than 100

Subscription Dept.

Affix Proper POSTCARD RATE Postage

Electronics
A Penton Publication
P O BOX 985008
CLEVELAND OH 44198-5008

Reader Service Dept.

NO POSTAGE NECESSARY IF MAILED IN THE UNITED STATES

BUSINESS REPLY MAIL
FIRST CLASS MAIL PERMIT NO. 25088 CLEVELAND, OH

POSTAGE WILL BE PAID BY ADDRESSEE

Electronics
A Penton Publication
1100 SUPERIOR AVENUE
CLEVELAND OH 44197-8128

Reader Service Dept.

NO POSTAGE NECESSARY IF MAILED IN THE UNITED STATES

BUSINESS REPLY MAIL
FIRST CLASS MAIL PERMIT NO. 25088 CLEVELAND, OH

POSTAGE WILL BE PAID BY ADDRESSEE

Electronics
A Penton Publication
1100 SUPERIOR AVENUE
CLEVELAND OH 44197-8128

Electronics SUBSCRIPTION AUTHORIZATION

*Prepayment is Required ☐ Payment enclosed

Name _____

Company _____

Address _____

City/Province _____

State/Country/Postal Code _____

Telephone Number _____

Charge my subscription to:
☐American Express ☐Visa
☐Mastercard . . .Interbank# _____

Account# _____

Date Card Expires _____

Signature _____

Date _____

Subscription Rates* . .	1 year.	2 years
U.S.	$ 60.00	$100.00
CANADA	$ 70.00	$120.00
INTERNATIONAL	$125.00	$225.00

INFORMATION CENTER

Use the postage-paid card on the facing page; circle the number of each company you would like to know more about.

COMMUNICATIONS

178 - **Anritsu**—As ISDN creates new possibilities, the need for Anritsu measurement capabilities is greater than ever.

190 - **Fujitsu**—It doesn't take a mathematical wizard to see the superiority of the NICE Ethernet solution from Fujitsu Microelectronics' Advanced Products Division.

COMPONENTS

206 - **Pico**—High-voltage dc-to-dc converters.

206 - **Pico**—Ultraminiature dc-dc converter transformers with power levels up to 40 W.

CONNECTORS

172 - **AMP**—.050 center line stackers: close, closer, closest.

197 - **Harting**—Once again, Harting innovation and support are to be seen in development and standardization of a high-density, multipin, hard metric connector system.

COPIERS

4 - **Canon**—The NP 1500, a new worry-free copier for those who have enough to worry about.

INFORMATION TECHNOLOGY

227 - **EDS**—Managing your information to help you find the time to concentrate on your business and your strategic plans for the future.

LICENSING

214 - **Western Design Center**—The microprocessor and license to create your own industry.

MICROWAVE COMPONENTS

187 - **Avantek**—RF/microwave components across the communications spectrum with no waiting: Avantek delivers today.

MEMORY

192 - **T. White**—Megabit memories as big as your imagination.

POWER OEVICES

211 - **Abbott**—Mil-pac high-density military power supplies now ac to dc; actual output 20 W.

205 - **Vicor**—Component solutions for your power system.

SEMICONOUCTORS

182 - **AEG**—As both end user and leading supplier of microelectronics, we know what end users want.

203 - **TRW**—With TRW's video encoder, anyone can produce professional videos without Hollywood budgets.

TEST & MEASUREMENT

185 - **GenRad**—We are about to change your thinking about low-cost board test.

180 - **Hewlett-Packard**—When quality depends on calibration, you can depend on HP.

217 - **Hewlett-Packard**—HP 3070 high-performance board test systems can help you win the race against time.

201 - **National Instruments**—More choices, more answers for data acquisition and instrument control.

219/220 - **Photo Research**—(219 for salesperson; 220 for literature) Perform NIST-traceable, spectrally based photometric and colorimetric measurements.

209 - **Programmed Test Sources**—Looking for a low-noise, fast-switching signal source?

223 - **Tektronix**—The prototype doesn't work? A complete line of scopes, logic analyzers, and signal sources that can quickly get to the core of your prototype's problems.

199 - **Teradyne**—Now you can test the theory that boundary scan is a breakthrough.

TOM CAMPBELL

SPEAKS OUT

CAPITAL FORMATION: THE HIGH-TECH KEY

When the subject of enhancing U.S. high-tech competitiveness arises in Washington, the debate tends to be misfocused. The talk usually centers around the pros and cons of an "industrial policy"—whether government should favor one particular industry over another. What we should be focusing on is what industry itself emphasizes over and over: reducing the cost of capital. To make capital more affordable, we must eliminate our huge federal budget deficit and cut the capital gains tax.

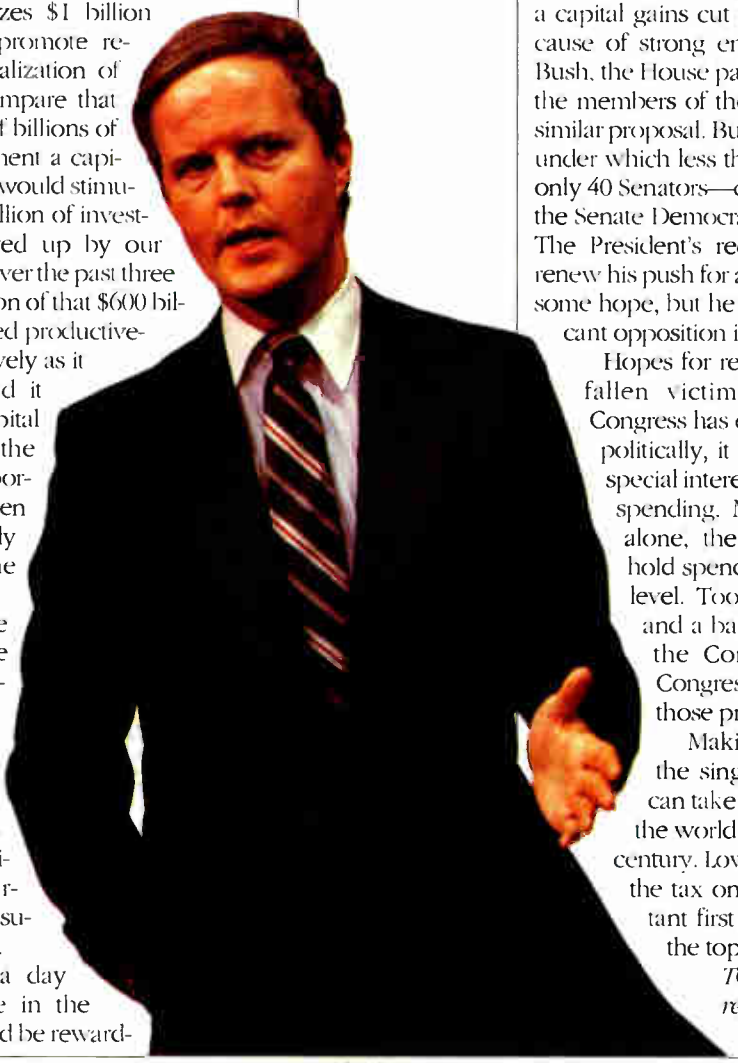
Government funding for basic research in high-tech fields can improve the state of U.S. competitiveness. But the amount of money the federal government can devote to R&D is relatively small; to add a few government dollars to the pool of available resources is only to dance around the periphery of our competitiveness problem.

The bill currently in the forefront of congressional debate authorizes $1 billion over three years to promote research and commercialization of new technologies. Compare that $1 billion to the tens of billions of dollars of new investment a capital-gains tax reduction would stimulate—or to the $600 billion of investment capital swallowed up by our federal budget deficit over the past three years. Granted, a portion of that $600 billion has been reinvested productively, but not as productively as it would have been had it been left for private capital markets. The money the government took by borrowing would have been used much more wisely and efficiently by the private sector.

The deficit is the biggest single issue we face. Accumulated federal borrowing has taken some $3 trillion in capital away from investors. That's $3 trillion that could have been invested in semiconductor manufacturing, biotechnology, or superconductor research.

There once was a day when the only place in the world where risk would be rewarded was the United States. That is no longer true. If you have a good idea, take it to Germany, and your long-term capital gains will be taxed at 0%. Take it to Japan, and your capital gains will be taxed at 5%. Or keep it in America, and you will be rewarded with a 28% top tax rate on your capital gain. It is no wonder investments in U.S. companies are lagging. And contrary to the ill-founded claims of opponents, a capital-gains tax cut would not increase the deficit. Past evidence indicates that a reduction similar to the one the President has proposed would actually increase government revenue by spurring new investments and causing the turnover of many existing investments.

IN GERMANY, CAPITAL GAINS ARE TAXED AT 0%; IN JAPAN, THE RATE IS 5%. IN THE U.S. IT'S 28%.



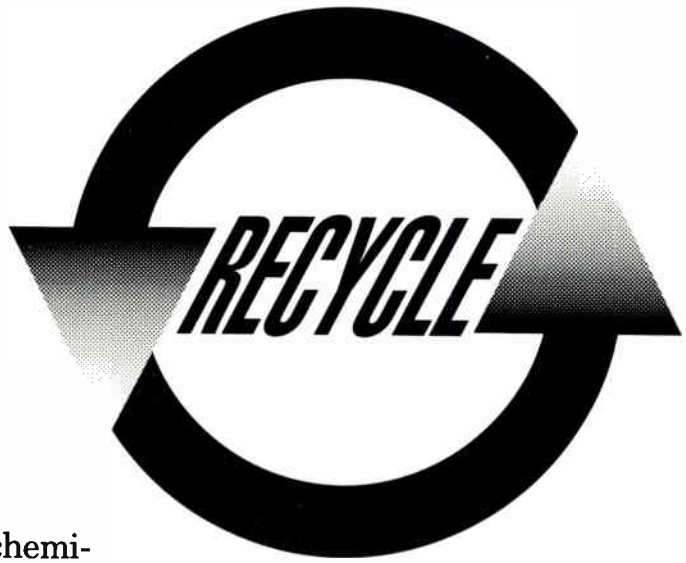
As important as deficit and capital-gains tax reduction are to U.S. competitiveness, one would hope they rank at the top of Congress's agenda. Unfortunately, efforts toward both goals face significant roadblocks. Two years ago, prospects for a capital gains cut were bright. In large part because of strong encouragement from President Bush, the House passed a cut, and more than half the members of the Senate vowed to vote for a similar proposal. But through a technical provision under which less than a majority of the Senate—only 40 Senators—can keep a matter from a vote, the Senate Democratic leadership killed the plan. The President's recent indications that he will renew his push for a capital-gains tax cut provides some hope, but he will have to overcome significant opposition in Congress.

Hopes for real deficit reduction, too, have fallen victim to procedural obstacles. Congress has established a system whereby, politically, it is much easier to cater to the special interest desires than hold the line on spending. More than 24 times last year alone, the House rejected attempts to hold spending to just the previous year's level. Tools such as the line-item veto and a balanced budget amendment to the Constitution would help, but Congress lacks the will to enact even those procedural changes.

Making capital more affordable is the single most important action we can take to ensure America will remain the world economic leader into the 21st century. Lowering the deficit and reducing the tax on capital gains are two important first steps. Those items belong at the top of Congress's agenda.

TOM CAMPBELL, a Republican, represents California's 12th District, including Silicon Valley.

PENTON CONTINUES COMMITMENT TO RECYCLING



Penton Publishing's Camera Department started recycling chemicals from film wastewater 25 years ago... long before the ecologically-smart idea was widely recognized.

For almost as many years, the Penton Press Division has been recycling scrap paper, obsolete inventory, and printing press waste materials. In 1991, Penton Press will recycle some 5500 tons of paper, 9 tons of aluminum plates, and 3 tons of scrap film negatives. Furthermore, the Press Division has invested $500,000 in air pollution control equipment.

Company-wide, the recycling spirit has spread from Cleveland headquarters to offices throughout the country. Penton employees are enthusiastic participants in expanding programs to re-use paper, aluminum cans, and other waste materials.

Penton Publishing believes these practices make a significant quality-of-life difference for people today... and will help create a safer, healthier environment for generations to come.

Penton Publishing

Electronics

New and Current Products Presented By the Manufacturer

DIRECT CONNECTION ADS

To Advertise Call Brian Ceraolo (201) 393-6260

INTRODUCING RACK MOUNT AND RUGGED SUN SPARC WORK STATION

Standard Features Include:
- Spark Engine 2 CPU with 16MB RAM
- 207 MB Hard Disk, 150MB Tape Drive
- 644 MB CDROM, Removable Hard Disk
- 1.44 MB Floppy, 2 RS-232 and S Bus Ports
- SCSI-2 and Ethernet Interface
- 16-inch Rack Mount Color Monitor
- Keyboard, Mouse and SunOS 4.1

For further details contact:

IBI Systems Inc., 6842 NW 20M Ave., Ft. Lauderdale, FL 33309, 305-978-9225, Fax: 305-978-9226

IBI SYSTEMS CIRCLE 142

Instrument Control and Data Acquisition

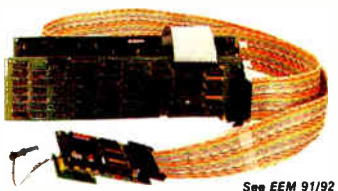
Free 1992 catalog of instrumentation products for PCs, workstations, and more. Features IEEE-488.2 interfaces and software, plug-in data acquisition boards, VXIbus controllers, DSP hardware and software, and signal conditioning accessories. Application software for complete acquisition, analysis and presentation of data, including graphical interfaces. Application tutorials and training classes also detailed.

National Instruments
6504 Bridge Point Parkway, Austin, TX 78730
(512) 794-0100 (800) 433-3488 (U.S. and Canada)
Fax: (512) 794-8411

NATIONAL INSTRUMENTS CIRCLE 131

68HC11

PC-based emulator for 68HC11



See EEM 91/92 Pages D 1300–1303

- PC plug-in or RS-232 box.
- Pull-down menus with full window support, combined with command-driven User Interface.
- Up to 16 MHz real time emulation.
- No intrusions to the 68HC11's resources.
- 64 bit wide 16K deep trace. All functions usable without disturbing emulation. Time stamping. Two level trigger.
- Symbolic and C Source Level Debugging, including in-line assembler and disassembler.
- Supports A, D, E, F, G, J, K and L parts

Prices: 64K Emulator and pod $2590; 4K Trace $1995 (US only)

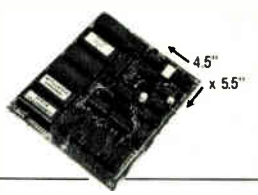
CALL OR WRITE FOR FREE DEMO DISK!

nohau CORPORATION
51 E. Campbell Avenue
Campbell, CA 95008
FAX (408) 378-7869
(408) 866-1820

Call 408-378-2912
Nohau's 24-hour information center to receive info via your FAX

NOHAU CORP. CIRCLE 153

ALL THIS ONLY $99.00!



Complete 8088 Embedded Controller System

- 23 digital inputs
- 23 digital outputs
- Onboard EPROM Programmer
- 8 channel 8 bit A/D
- RS-232 port
- Only +5V power required

Connect your PC for a complete development environment in BASIC, C or Forth.

VESTA TECHNOLOGY, INC. •7100 W. 44th Ave.•Suite 101 Wheatridge, CO 80033 • (303)422-8088 • VISA & MC

VESTA TECHNOLOGY CIRCLE 110

VOLTAGE SELECTABLE INTERNATIONAL SYSTEM

Z-LINE TPC 884

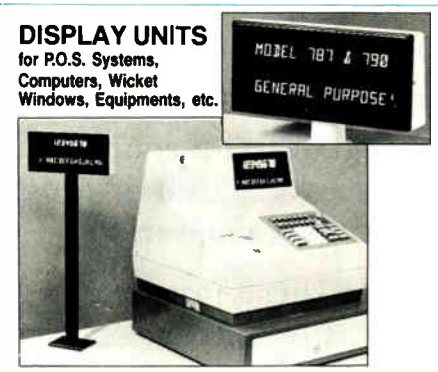
The TPC, a voltage-selectable power distribution and control system, can have either 120 or 240 volt input and output. Designed with IEC-, UL-, CSA- and VDE- approved components, operating up to 16 amps in Europe and 20 amps in North America. Size: 19.0" x 1.75" x 7.0". EMI/RFI filtering, spike/surge suppression and overload curcuit breaker protection are standard. Remote on/off is optional.

Pulizzi Engineering, Inc.
3260 S. Susan St.,
Santa Ana, CA 92714
714/540-4229 FAX: 714/641-9062

PULIZZI ENGINEERING CIRCLE 129

DISPLAY UNITS

for P.O.S. Systems, Computers, Wicket Windows, Equipments, etc.



Stand-alone, attractive units with serial or parallel interfaces, bright green display, 1 or 2 lines of 8, 16, or 20 characters. Scroll, line blink, Msg. MEM, pass-through features. Can be mounted on equipment or poles.

Inquiries from overseas distributors are also welcome!

Advanced Digital Machines Ltd.
610 McMurray Road, Waterloo,
Ontario N2V 2E7 Canada
Tel (519) 888-6811 Fax (519) 888-6256

ADVANCED DIGITAL MACHINES CIRCLE 114

PARTZ

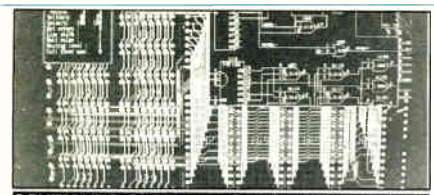
The Complete Engineering/Purchasing Database Manager for Electronic and Electro/Mechanical Manufacturers

Runs on your PC or Compatible

FEATURES:
- Automatic Checking for Duplicate Entries
- Electronic Buy Cards, or
- Continuous Form Computer Buy Cards (forms available)
- Simple to Use – Function Key Driven
- Creates Physical as well as a Computer Parts Book
- Deluxe Version Includes:
  Starter Catalog Rack Parts Book
  Organized System with 8 Libraries Preprogrammed into system – Perfect for start-ups
  Classified/Random parts system – Combines best features of both systems
  Conventions are designed for all common electronic and electro/mechanical manufacturers
- Standard Version Includes:
  Software for use with your numbering system

Chablis Systems
P.O. 801 Green Valley Station
Saugus, CA 91350

CHABLIS SYSTEMS CIRCLE 112



SCHEMATIC CAPTURE TO PCB LAYOUTS $795

Before buying P-CAD, PADS-2000, PROTEL, etc you owe it yourself to check out our End-to-End **ONE SYSTEM** Solution.

Compare Specs for yourself...

GUARANTEED to out-perform other PC based systems costing much more with Superior Analog, SMT & Digital features such as:

- Integrated Schematic Capture & 2 Sided SMT support **(Not an add-on).**
- Integrated 2-D Drawing editor for mechanical, Outline, Fab, etc dwgs.
- Design PCB from a host of Nelist formats, or on the fly without a nelist.
- Unitd grids, pads & trace sizes; GND plane shapes, 1 μm resolution etc
- Curved & straight traces. Parts, Blocks, etc rotation in 1° increments.
- Forward & Backward annotation, On-line DRC, SCH/PCB diff. check etc
- Dynamic EMS memory support (Not 640K Limited) for large designs.
- User definable Menus, Keys, & Macros; Gerber & Laser plots included.
- A choice of 3 optional powerful Autorouters assures 100% completion.

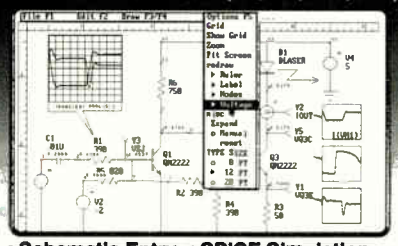
√ **FULL FUNCTION evaluation package with over 850 pages of well illustrated manuals (5 books) for $75 (USA & CANADA ONLY)**
√ **30 (45 intl.) days Money back Guarantee.**

INTERACTIVE CAD SYSTEMS
2352 Rambo Ct, Santa Clara, CA 95054
Call: (408) 970-0852 Fax: (408) 986-0524

INTERACTIVE CAD SYSTEMS **CIRCLE 166**

Analog Circuit Simulation

SPICE FOR THE PC (XT, AT, 386, 486)



- **Schematic Entry**
- **SPICE Simulation**
- **Model Libraries**
- **Waveform Graphics**

Intusoft has it all at an Affordable Price!

INTEGRATED, EASY TO USE SIMULATION ENVIRONMENT, FEATURING:
A powerful SPICE (IsSPICE) simulator performing AC, DC, Transient, Noise, Fourier, Distortion, Sensitivity, Monte Carlo, and Temperature analyses. Extensive model libraries, Schematic entry, and Waveform processing. Starting at $95 for I-SPICE, complete systems are available for $890.

Call Or Write For Your Free Demo and Information Kit!
Tel. 213-833-0710

intusoft

P.O. Box 710 San Pedro, CA 90733-0710
Fax 213-833-9658

INTUSOFT **CIRCLE 117**

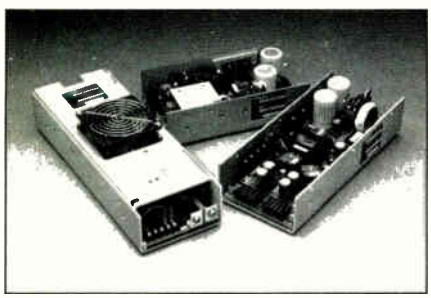
Power Supplies, Amplifiers and Meters

Broad range of easy-to-use instrumentation including adjustable DC Power Supplies, Amplifiers in small in-line modules and miniature chip packages, $3\frac{1}{2}$ and $4\frac{1}{2}$ Digit Panel and Handheld Meters, as well as complete rack mounted Signal Conditioners. Many available from "OFF-THE-SHELF" stock.

ENTRAN DEVICES, INC.
10 Washington Avenue, Fairfield, NJ 07004

CALL TOLL FREE (800) 635-0650
Fax 210/227-6865

ENTRAN DEVICES, INC. **CIRCLE 140**



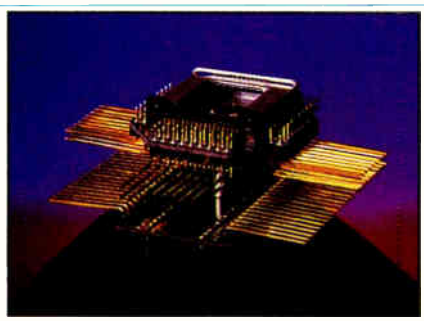
TODD Switching MSC Power Supplies for Mass Storage.

Dual or triple outputs power up to 15 high-capacity drives. 30-sec peak current for disk spin-up. 1% reg. +5V at high current for logic and memory, −12V for DC fans. Remote sense and on/off. AC auto-line select option. 350, 400, 750W.

TODD PRODUCTS
50 Emjay Blvd., Brentwood, NY 11717
516 231-3366 **800 223-8633**

The 911 of the power supply industry.

TODD PRODUCTS **CIRCLE 136**



Quick, Fast Socket Conversion

- **Convert-A-Socket™ makes it a snap to convert a production socket to a test socket and vice-versa.**
- **Complete line of male/female sockets for LCC, PLCC, PGA, PQFP, and DIP circuits.**
- **A must if you're inserting circuits repeatedly in low insertion force sockets.**
- **Quick turnaround on custom engineering services, if needed. For a free catalog, contact:**

Emulation Technology, Inc.
2368-B Walsh Ave. Santa Clara, CA 95051
Phone: 408-982-0660 FAX: 408-982-0664

EMULATION TECHNOLOGY **CIRCLE 120**

SPOTLIGHT: DESIGN & DEVELOPMENT

Finally, attendees determined the most impressive product of the show was CAD Software's PADS.

Each vendor provide[s] ... bench[mark]

PE&I News 6/90 on CAD Showdown Results

PADS SETS THE STANDARD

for CAE/CAD design on Personal Computers

Complete thru-put logic capture and board design functionality including:

- A true multi-sheet database for Schematic capture with hierarchical design capability
- Both automatic and interactive PCB layout tools
- Most complete set of autorouters for Analog, Digital and SMD designs
- Cam outputs including database ASCII In and ASCII Out format
- ***NEW!*** PADS-2000, board designs with no system limits. 1 micron database, copper pouring, T-routing. Workstation capability at PC prices!

Call today for a free demonstration package, and for your local Authorized PADS Reseller.

CAD Software, Inc. *Call Today!*

Inside MA: **(508) 486-8929**
Outside MA: **(800) 255-7814**

119 Russell Street, Littleton, MA 01460

CAD SOFTWARE **CIRCLE 126**

CUPL

PLD/FPGA Design Software

Now Featuring Mach™ Support

Get the popular CUPL development software with the newest and latest features for PLD/FPGA logic design and shorten your time to market. CUPL's powerful "C-Like" syntax allows you to develop custom logic design quickly. CUPL starts at $495.

Call your order in TODAY - Start customizing Tomorrow!

1-800-331-7766
or (305) 974-0967.

LOGICAL DEVICES, INC.

LOGICAL DEVICES, INC. **CIRCLE 145**

RUGGED AND HIGH PERFORMANCE COMPUTER SYSTEMS WITH FOLD DOWN KEYBOARD AND VGA MONITOR FOR RACK, BENCH OR PORTABLE APPLICATIONS

STANDARD FEATURES INCLUDE:

- 12 SLOT PASSIVE BACK PLANE, 250W POWER SUPPLY
- 80386 CPU CARD AT 20/25/33 MHz, UP TO 8MB OF ZERO WAIT STATE RAM
- SONY TRINITRON TUBE, HIGH RESOLUTION VGA (640X480) MONITOR AND CARD
- ROOM TO MOUNT THREE HALF HEIGHT DRIVES
- 2 SERIAL, 1 PARALLEL PORT, MS DOS/GW BASIC

ALSO AVAILABLE WITH 80486 OR 80286 CPU CARDS IN VARIOUS CONFIGURATIONS, FOR FURTHER DETAILS CONTACT:

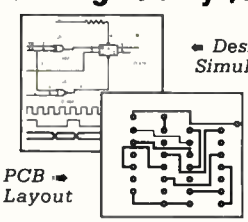
IBI SYSTEMS INC., 6842 NW 20 AVE.
FT. LAUDERDALE, FL 33309. 305-978-9225
FAX: 305-978-9226 TELEX: 529482 IBI SYSTEMS

IBI SYSTEMS **CIRCLE 128**

Low Cost CAD Software

for the IBM PC and Compatibles

Starting at only $99



- ★ Easy to use schematic entry program for circuit diagrams (SuperCAD)—Only $99. Includes large library, netlister and dot matrix printer output.
- ★ Powerful, event-driven digital simulator (SuperSIM) starting at $99.00. Operates directly from SuperCAD menu and displays waveforms in built-in "logic-analyzer" display.
- ★ Circuit board artwork editor and auto router programs, starting at $99 each.

Write or call for free demo disks:

MENTAL AUTOMATION, INC.
5415 - 136th Place S.E.
Bellevue, WA 98006
(206) 641-2141

MENTAL AUTOMATION, INC. **CIRCLE 138**

EMPLOYMENT OPPORTUNITY

RESEARCH COORDINATOR II, Remote Sensing Specialist: PhD or ABD Ecology & documented knowledge req'd of:

- Developing computer models for simulating soil erosions & sedimentary determinations;
- Geographical information systems (GIS) applications;
- Remote sensing & image data processing;
- GIS models for Non-Point Source Pollution;
- UNIX C program;
- Use of ARC/INFO & Desktop Mapping System Software packages.

Coordinate activities of Research Scientists involved in remote sensing, mapping and geographic information systems (GIS) applications for natural resources inventory and environmental studies; correlating field investigations; develop computer models $26,855/yr. Submit resume to the Georgia Department of Labor, 788 Prince Ave., P.O. Box 272, Athens, GA 30613 or to the nearest GA Job Service Center. Job Order #GA 5511897.

CONSULTANTS

Circuit Design & Development

Analog, RF, signal processing, power supply, A/D and D/A interface circuit design for military industrial or commercial applications. Turn-key development, from initial specs to production.

PEDA® Tel. : 519-837-1646 (9 to 5 EST)

FOR SALE

UNIVERSAL MICROPROCESSOR SIMULATOR/DEBUGGER 1.2 each set **$55**. Simulates 6811, 8051, Z80 and popular processors. Features line assembler, disassembler, and debugging utilities. The **Romy-8 EPROM EMULATOR** (32K, 8-bit) works with simulator **$135. J&M Inc.,** 83 Seaman Road, W Orange, NJ 07052, TEL: 201-325-1892.

SOFTWARE

RELIABILITY PREDICTION SOFTWARE

ARE YOUR ELECTRONIC PRODUCTS RELIABLE?
RelCalc 2 automates MIL-HDBK-217E on your IBM PC!
Very easy to use. Try our Demo Package today for $25.

T-CUBED SYSTEMS 31220 La Baya Drive. #110
(818) 991-0057 Westlake Village, CA 91362
FAX: (818) 991-1281

CIRCLE 258

QUALIFIED CANDIDATES
Recruit the Best and the Brightest Talent with Penton Classifieds.
Call (216) 696-7000

Advertiser's Index

* Domestic only
** International only

The advertisers's index is prepared as an additional service.
ELECTRONICS does not assume any liability for errors or omissions.

Electronics

2025 Gateway Place, Suite 354
San Jose, California 95110
(408) 441-0550....(408) 441-6052FAX

Sal F. Marino....*Chairman and CEO*
Daniel J. Ramella....*President and COO*
James D. Atherton....*President, Electronics Group*
John G. French....*Publisher*

BUSINESS STAFF
Ken Long....*Research Manager*
Kathy Torgerson....*Promotion Manager*
Bob Clark....*Circulation Manager*
Doris Carter....*Ad Serv/Production Manager*
Brian Ceraolo....*Cardecks and Quick Ads Manager*
Mary Lou Allerton....*Reader Service Manager*

SALES OFFICES
Regional Vice Presidents:
David M. Woodward....*Cleveland*
Chandler C. Henley....*New York*
Richard B. Cutshall....*Chicago*
Harmon L. Proctor....*Atlanta*
George M. Horrigan....*Los Angeles*

GENERAL MANAGER, EUROPEAN OPERATIONS:
John Allen
Four Seasons House
102B Woodstock Rd., Witney,
Oxford OX8 6DY England...0993-778-077 FAX: 44-993-778-246

SAN JOSE
Tina Ireland (N. California)
Blair Heath (N. California/Northwest/N. Canada)
2025 Gateway Place, Suite 354
San Jose, CA 95110....(408) 441-0550 FAX: (408) 441-6052

LOS ANGELES
Chuck Crowe (S. Calif/Arizona/Colorado/Utah)
(Orange County/San Diego County)
16255 Ventura Boulevard, Suite 300
Encino, CA 91436....(818) 990-9000 FAX: (818) 905-1206

CHICAGO (Midwest/Dallas)
Julie Harter
2 Illinois Center Building, Suite 1300
Chicago, IL 60601....(312) 861-0880 FAX: (312) 861-0874

BOSTON
John J. Fahey (New England/Eastern Canada)
400 5th Avenue
Waltham, MA 02154....(617) 890-0891 FAX: (617) 890-6131

NEW YORK
Rit Teeling (Mid-Atlantic Region & Southeast)
Brian Ceraolo (Direct Connection Ads)
611 Route 46 West
Hasbrouck Heights, NJ 07604....(201) 393-6060
FAX....(201) 393-0204

JAPAN
Hirokazu Morita, Japan Advertising Communications Inc.
New Ginza Building, 3-13 Ginza 7-Chome, Chuo-Ku Tokyo
104 Japan....FAX: 81 3 5718710

AUSTRIA, GERMANY, SWITZERLAND
Friedrich K. Anacker, Intermedia Partners GmbH
Katernberger Strasse 247
5600 Wuppertal 1, West Germany....(02) 271-1091
FAX....49 202 712431

FRANCE
Claude Bril, IDG Communications France
Cedex 65 92051, Paris LA DEFENSE-France....(04) 9047900
FAX....33 149 047800

HOLLAND
W.J.M. Sanders, S.I.P.A.S.
Oosterpark 6–P.O. Box 25
1483 ZG DeRyp, Holland....(02) 997-1305
TELEX: 13039 SIPAS NL....FAX: 31 2 997 1500

ITALY
Cesare Casiraghi, Via Cardano 81
22100 Como, Italy....031/536003 FAX: 031/536007

KOREA
Young Sang Jo, President, BISCOM
K.P.O. Box 1916, Seoul, Korea....FAX: 82 2 7323662

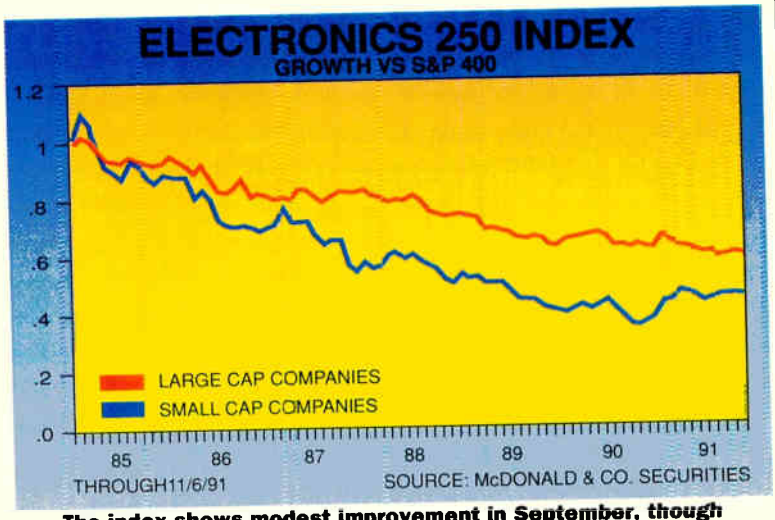
TAIWAN
Charles C.Y. Liu, General Supervisor
United Pacific International, Inc.
No. 311, Nanking E. Rd., Sec. 3
Taipei, Taiwan, R.O.C....FAX: 886 2 7169493

UNITED KINGDOM, SCANDINAVIA
John Maycock
Huntons Bldgs., 146 West Street
Sheffield, S14ES, England....742 759186 FAX: 44 742 758449

CHINA
CCI Asia - Pacific Ltd.
Ste 905, Garden House, 32 Oi Kwan Rd.
Happy Valley, Hong Kong....FAX: 852 834 5620
Media Developments Ltd.
13/F Jung Sun Commercial Bldg.
200 Lockland Rd., Hong Kong

BPA Published by PENTON PUBLISHING ABP

GOOD NEWS FOR MANUFACTURERS, BUT WHERE ARE BUYERS?



The index shows modest improvement in September, though weakness in major industry sectors continues to be worrisome.

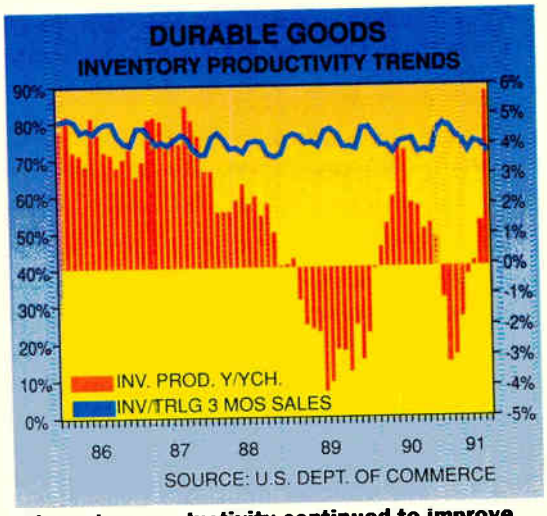
There's some good news–but there's also some that's not so good. Good: industry is beginning to benefit from lower capital costs and better access to equity markets. Combined with the dramatic productivity enhancements and renewed competitive strengths garnered over the past decade, U.S. industrial might is once again on the upswing. Not so good: the missing ingredient is end demand. Good: September saw a continual modest improvement in new orders. Not so good: computers and office equipment are a glaring exception, with orders plunging to make the month the worst since the 1985 electronics recession.

But automotive orders are gaining momentum, helping to fuel a recovery in overall durable demand. Most automotive suppliers experienced very strong order momentum through mid-November. However, production significantly exceeds selling rates: unless there is a major pickup in auto sales by January, production will likely drop significantly.

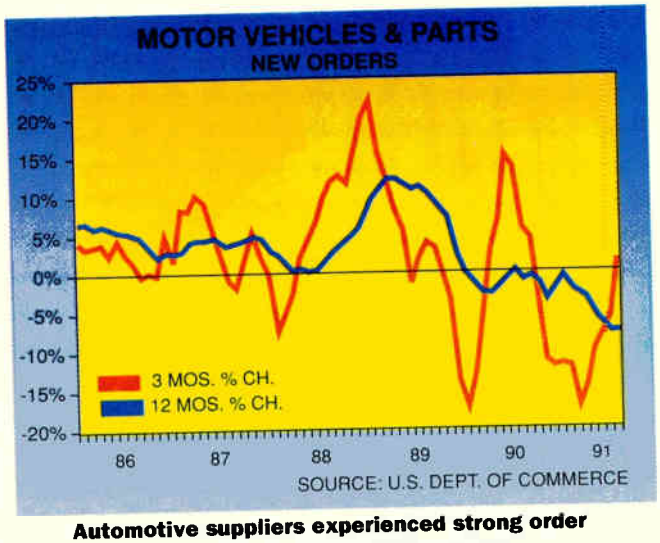
Order trends in other areas improved considerably in September. Component companies gained normally during September to November, but inventories are tight. Also, weakness in Europe and Japan is essentially offsetting the modest domestic gains. In computers, inventory productivity continued to improve despite depressed orders.

Concern in Washington in an election year could lead to some consumption incentives by early 1992. The dollar has weakened in recent months after strengthening sharply during the war. However, the trade-weighted dollar still remains well above year-earlier levels, which could mean increasingly lower exchange rates through the first quarter of 1992. Finally, the lowest interest rates in more than a decade appear to be forcing investors back into the stock market for the first time since 1987. ❑

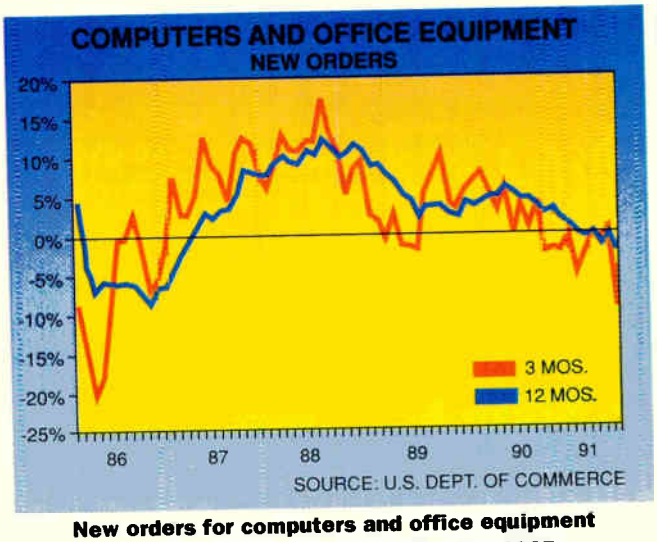
By Mark Parr, McDonald Securities Inc., Cleveland (216-443-2379)



Inventory productivity continued to improve, even in computers.



Automotive suppliers experienced strong order momentum through mid-November.



New orders for computers and office equipment nosedived in the worst month since 1985.

MIKE EVANS

LAST WORD

TAXES WILL BE CUT, BUT JUST HOW?

"The most likely political/economic forecast for 1992 calls for higher spending and lower taxes," I concluded last July. Since then, the economy has weakened even further, shortening the odds on a tax cut as each month ticked past. By now, it's a foregone conclusion. Of course, that doesn't answer the question of what kind would be best for the economy, and there are two issues involved here.

The first is that the combination of federal, state, and local tax increases in 1991 amounted to $30 billion pulled out of consumers' pocketbooks. Raising taxes during a recession is one of the world's dumbest ideas. In fact, the last time it was tried was 1932, when the results weren't so hot either. The second is the anemic rate of productivity growth in this economy—down to 1% per year. The cause is not that mysterious: the ratio of GNP devoted to saving and investment is the lowest of any major country.

That is why a tax cut to spur savings, such as expanding IRAs, makes some sense. However, it is not the best choice. Since most of the investing in plant equipment is done by businesses, it follows that if the aim is to stimulate investment and productivity, tax incentives ought to be restored for capital formation, such as the time-tested investment tax credit and accelerated depreciation.

However, there has not been a murmur of interest on Capitol Hill in this direction. So although the short-term issue of reversing the tax mugging that took place this year is being correctly addressed, the longer-term issue of stimulating productivity growth is not. But half a loaf is better than none at all, and at least Bush isn't talking about raising taxes in an election year.

As far as the type of individual tax cut that is being promoted, some voices have been raised indicating that a cut in marginal rates would have a more positive long-run effect on the economy than a tax credit. From an economic viewpoint, it is difficult to argue with that. On the other hand, any such bill would end up in a political swamp, releasing all of the pent-up hatred for the Reagan Administration's tax cut from the liberal side of the aisle.

THE IDEA IS TO GET MONEY BACK INTO THE CONSUMER'S POCKET FAST AS POSSIBLE.

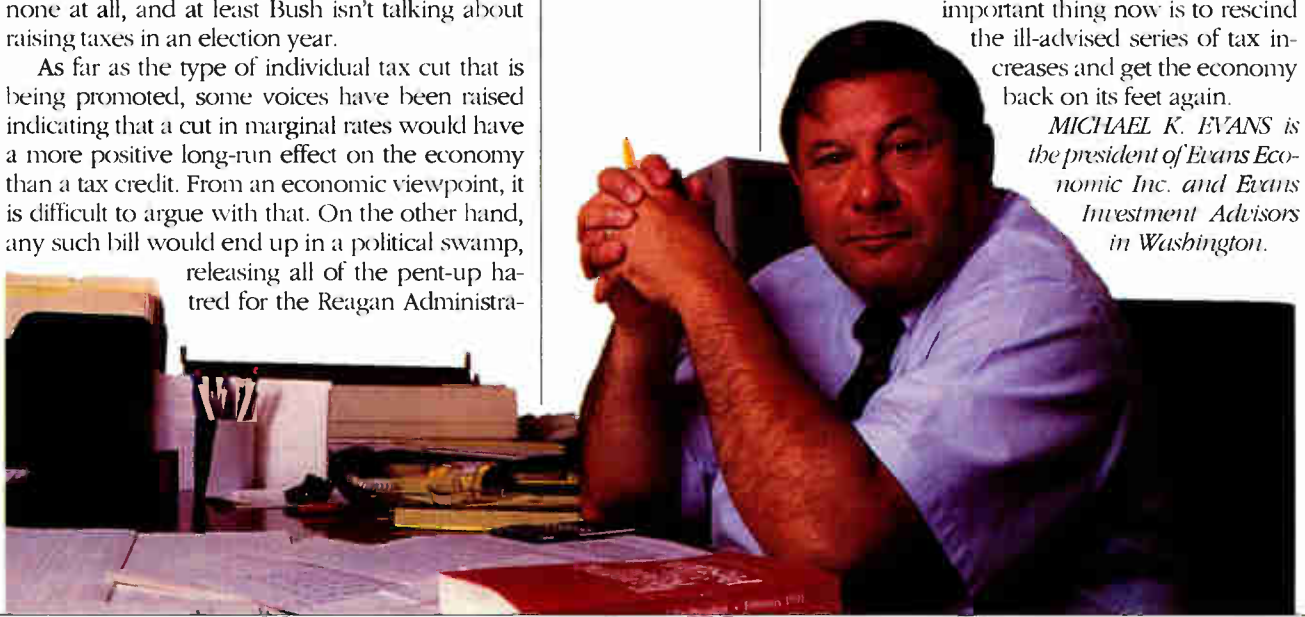
Considering that the economic situation these days is relatively serious, the main aim ought to be to get the money back into consumer pockets as soon as possible instead of arguing all year about whether the "rich" benefit disproportionately.

Will the tax cut do what it is supposed to do, namely pull the economy out of recession? Absolutely. Tax cuts always work in the short run. Most middle-class consumers are up against the wall; their wages are not keeping pace with inflation, many of them have lost high-paying jobs and have had to take more menial employment, and virtually everyone faces higher taxes. So almost all of the tax cut will be spent, and the stimulus will have an unusually large multiplier effect. The side effect of this will be to increase the deficit somewhat, but that's too bad.

This might be construed as a rather cavalier attitude to take about the deficit, which was expected to be $362 billion in fiscal year 1992 even before the tax cuts were proposed. The tax proposal has already caused long-term interest rates to back up slightly, although that may be because bond markets realize the tax cut will signal the end of the recession and the related concern over a bigger deficit. This isn't a perfect world; if it were, the deficit would be balanced in nonrecession years. But the damage caused by a tax cut in 1992 will be far less than leaving consumers dangling and prolonging the recession indefinitely.

As tax-cut bills move toward passage, the Bush Administration will try to tack on a modified capital gains tax cut. I favor such a move, but the most important thing now is to rescind the ill-advised series of tax increases and get the economy back on its feet again.

MICHAEL K. EVANS is the president of Evans Economic Inc. and Evans Investment Advisors in Washington.



FLIGHT CRU.

They are the wines of Connoisseur Class,[SM] United's new international business class. They come from the hallowed provinces of Bordeaux, Burgundy, and Champagne. From the legendary vintners of the world to please the most discriminating tastes.

And, to accompany them, you'll find such names as Chivas Regal, Glenfiddich, Wild Turkey, and Courvoisier.

Connoisseur Class, offered only by United. Where attention to detail elevates international business class to its highest form of civility.

Come fly the airline that's uniting the world. Come fly the friendly skies.

UNITED AIRLINES

HOW SUN SNAPPED UP THE LEAD IN SPARC MULTIPROCESSING.

Sun Microsystem's™ new 90 SPEC thruput multiprocessing SPARCserver is powered by our new SPARCore Modules.

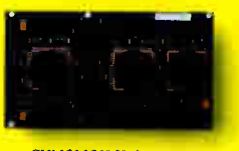
We have consistently delivered a performance advantage in SPARC RISC chipsets. Now, we are introducing SPARCore™ high-performance uniprocessing and multiprocessing *Modules*. Cypress modules provide you (and Sun) with significant competitive advantages based on innovative technology:

CYM6001K Uniprocessor SPARCore Module

1. Short-Cut to Market. With this much complexity running at 40+MHz speeds, there are non-trivial issues to integrating the CPU chipset. Using our fully integrated, tested SPARCore modules, you save time, not to mention manufacturing and testing costs. We deliver fully tested modules, with MPU, FPU, MMU, and Cache, for the price of the chipset.

CYM6002K Dual Processor SPARCore Module

2. Plug and Play on MBus. You design your system to the MBus standard, and you can plug in modules offering a range of speed/power options, to keep your product current without major redesign. This modular approach provides a designed-in upgrade path to keep you on the leading edge.

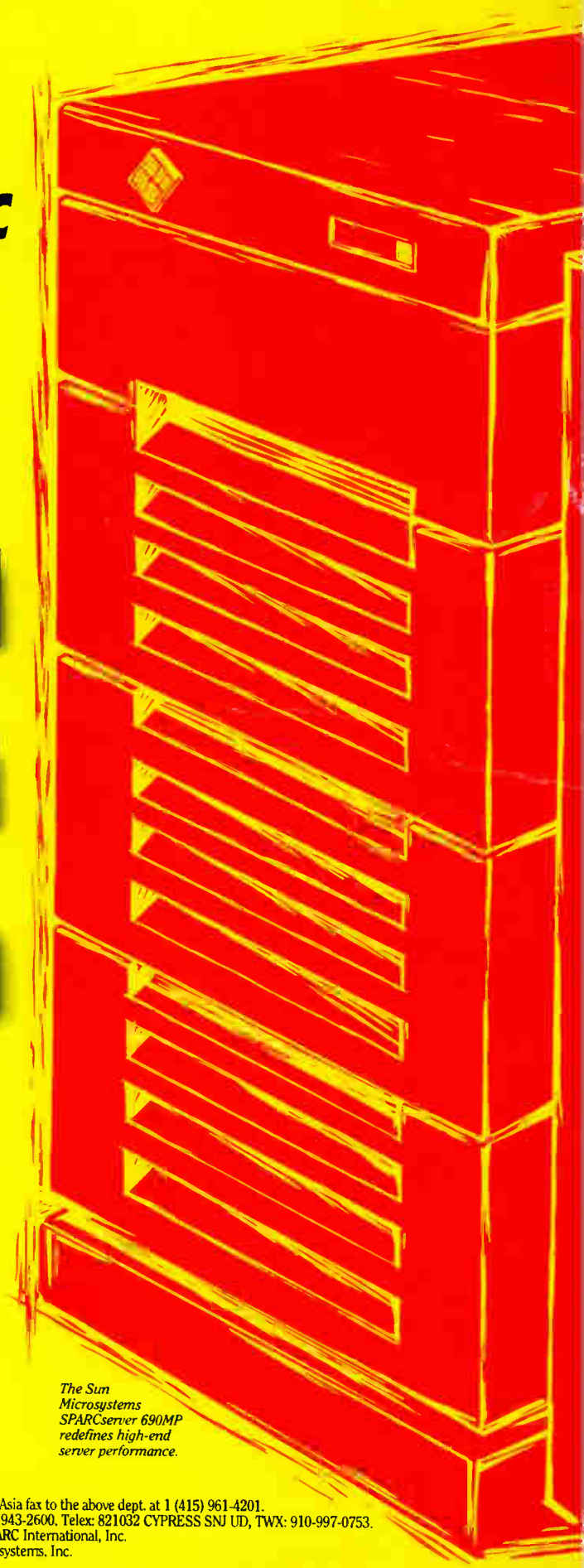


CYM6003K Uniprocessor SPARCore Module for Multiprocessing systems

Call for your Free SPARCore Whitepaper and Data Sheets. Hotline: 1-800-952-6300.* Ask for Dept C9W.

SPARCore
ROSS TECHNOLOGY

CYPRESS SEMICONDUCTOR



The Sun Microsystems SPARCserver 690MP redefines high-end server performance.

*In Europe fax your request to the above dept. at (32) 2-652-1504 or call (32) 2- 652-0270. In Asia fax to the above dept. at 1 (415) 961-4201.