

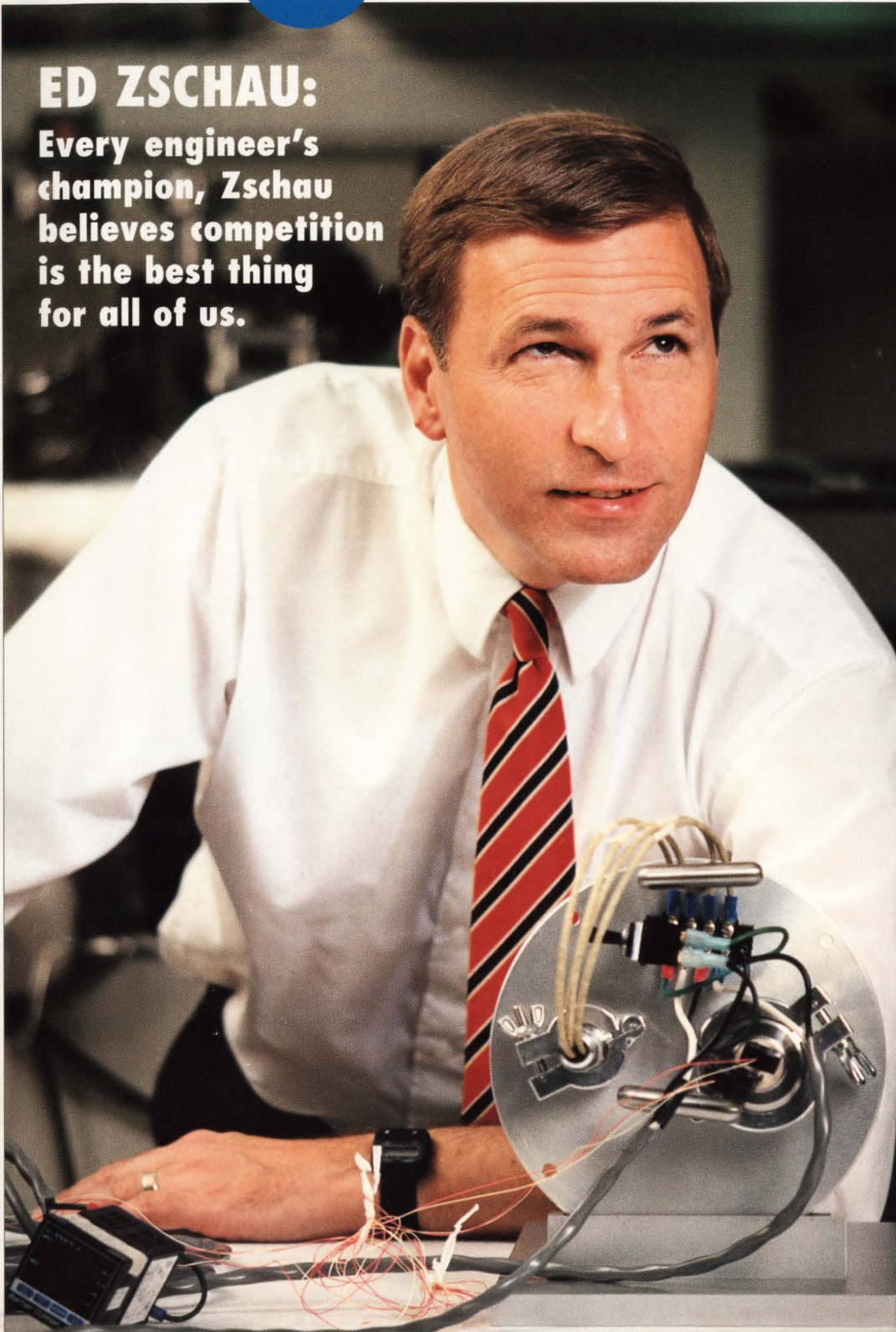
July/August 1990

# SILICON VALLEY Engineer™

Vol. 2, No. 4  
Complimentary

## ED ZSCHAU:

Every engineer's  
champion, Zschau  
believes competition  
is the best thing  
for all of us.



## BOB NOYCE REMEMBERED

His accomplishments  
and leadership touched  
us all. A eulogy by  
John Joss.

## WHITEWATER RAFTING

Tandem and Apple  
engineers team up to  
ride the rapids.

## CONTRACT ENGINEERING

Six engineers explain  
why money isn't the  
only reason to work  
as a contractor.

## SUPERPERFORMANCE

Michael P. Burwen  
says high tech firms  
find they just can't  
leave the valley.  
Find out why.

## EAST MEETS WEST

U.S. manufacturing  
is stronger than you  
think; international  
partnerships can  
make us even  
better, according to  
NUMMI engineers  
Denis Imazeki and  
Jerry Spann.



Technology  
keeps  
changing.  
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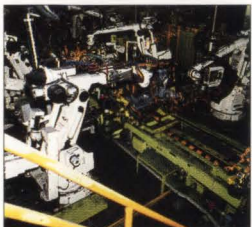
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## STATEMENT OF PURPOSE

*Silicon Valley ENGINEER Magazine is a new idea in publishing. Hundreds of excellent trade and technical periodicals exist for engineers, but until now none has focused just on engineers as people. Therefore this local magazine is devoted to the human interest side of the profession – right here in Silicon Valley. Its goal is to enhance the image of engineering, encourage professional and personal growth, and hopefully attract hundreds of young people to this exciting and rewarding career.*



Page 16 - Some fresh thoughts from the former Congressman and Senatorial candidate.



Page 10 - Sparks may fly when East meets West at NUMMI, but the work rolls out.



Page 6 - Bob Noyce: Leader, innovator, visionary: missed by many.



Page 22 - Teamwork helps these daring engineers stay out of the drink. Usually.

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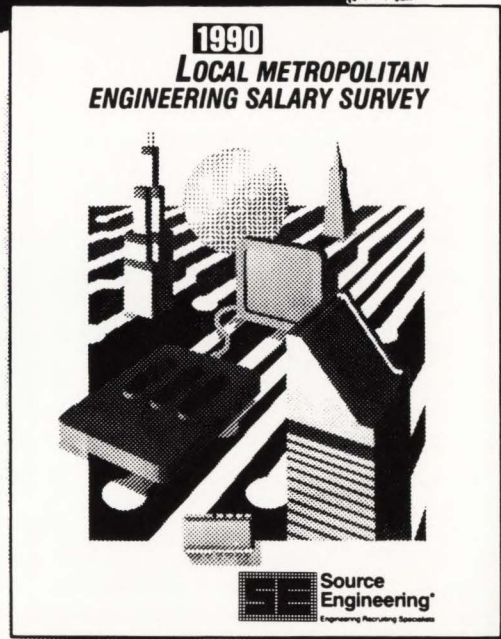
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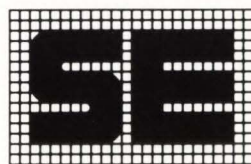
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# BOB NOYCE

*He and his accomplishments touched us all.*

By John Joss

Anyone interested in world technology knows that Bob Noyce and TI's Jack Kilby invented the integrated circuit, and what Noyce did at Fairchild from 1958 to 1968, at Intel until recently, then at Sematech. Though he was a tolerable team player, individuality sparked Noyce's life and interactions. He was impatient and passionate — working, inventing, flying, skiing . . . everything. He dared to risk and never shrank from his truths. His style and character matched his appearance: a raptor, proud and quick.

After Intel's founding — Noyce "got sick of sending carloads of earnings back to Syosset (Fairchild headquarters) for them to waste on losing divisions, not letting us do R&D and other vital stuff" as he put it — I came calling. Noyce was in a cast from a leg fracture suffered skiing at Aspen, every inch of the plaster covered with appropriate written 'greetings.' "What's an Intel, Bob?" I asked. The company had been secretive till then, in R&D for two years. Zero revenues and earnings.

Noyce dug out a photomicrograph. It was amazing — densely packed circuits beyond then current belief. "What is it?" I inquired further. Noyce smiled: "It's a 1,024-bit read-and-write random access memory ... call it a RAM." "What's it for?" Noyce cited 30 mainstream uses from computing to telecommunications. "Can you actually produce such a complex IC in volume?" Noyce laughed: "If we can, we'll be heroes. If we can't, Art Rock [an early Intel financial supporter] will never talk to me again."

I was considerate enough — as Noyce was sure I would be — not to tell the world. Later

Noyce was awarded the 'Golden Muzzle' award by Intel colleagues, leather straps and all, for indiscretions to the Press. Bob kept it on his desk, a reminder to hold his tongue lest he reveal sensitive company information.

Tom Wolfe profiled Noyce in *Esquire's* 1983 Golden Anniversary Issue ("Fifty Who Made the Difference — Celebrating Fifty American Originals"). But his recitation of Noyce's roots, education and career was disappointing, incomplete to those who knew the man, much as a demographic report of Northern California would hardly describe the special character of Silicon Valley, San Francisco, the Sierra and the Wine



**Bob Noyce: A leader, innovator and entrepreneur, conducting the Sematech Kazoo Band.**

Country. The greater essence of this marvelous man will be recognized eventually as making him one of the most influential men of 20th century technology.

Bob Noyce was kin to Malcolm Forbes, Picasso, Napoleon, daVinci — one of the most alive men who ever lived. He had the courage to show us his soul, with abandoned warmth and éclat. He embodied qualities many Valley pretenders to the technology throne cannot emulate — an infectious grin, catholic interests, a great sense of humor, and a generous spirit. The public scientist-businessman guided teams. The private man was idiosyncratic, imperfect. But to know him, to share his mind and heart, was to touch greatness. He wore the mantle gracefully.

Bob, you departed too soon, with so much life left to live. You leave a void in our hearts that will remain forever unfilled. ▲

*John Joss is a seasoned Valley freelance writer and contributing editor to Silicon Valley ENGINEER.*

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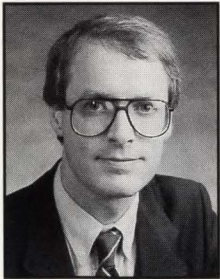
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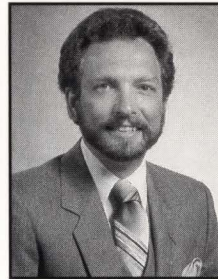
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# SUPERPERFORMANCE COMPUTING

*Silicon Valley leads the way.*

By Michael P. Burwen

**B**uilding on its leadership in high-performance semiconductor and magnetic storage technologies, Silicon Valley has, over the last few years, become the world's unchallenged leader in Superperformance computing technology. While some might argue that cities such as Minneapolis, Boston or Tokyo might lay claim to that honor, when looked at in its totality, the Valley is the undisputed champ.

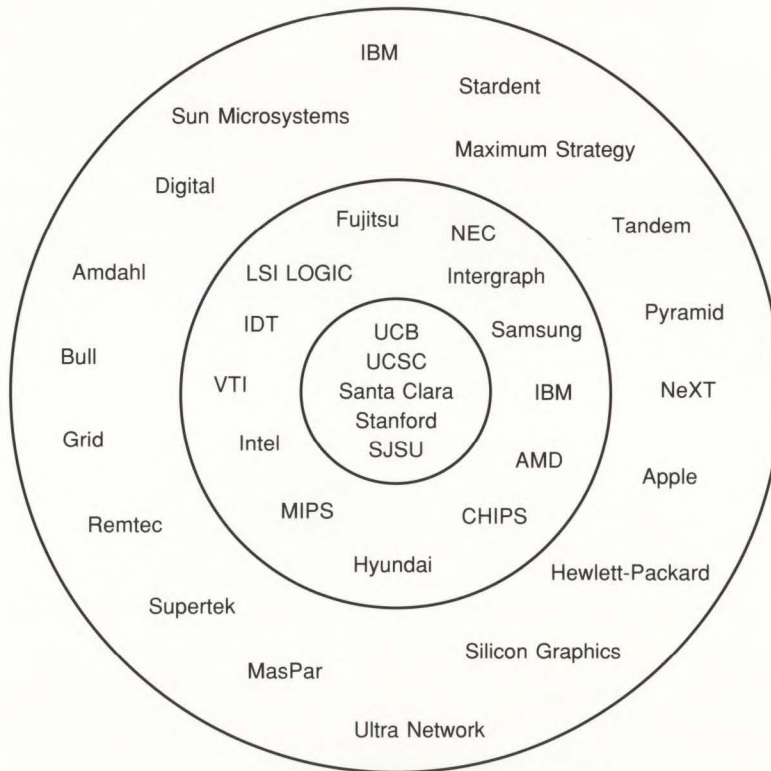
What do we mean by the term "Superperformance"? It is simply an adjective that describes a computer system or subsystem that offers superior performance at any given price point. Thus, there are Superperformance PCs, Superperformance mid-range systems, Superperformance mainframes and even Superperformance supercomputers! So, in this context, let's take a look at how the Valley stacks up.

## Early Adopters

Superperformance computing products are the first to emerge from the work of basic researchers. The Valley, with extensions to Livermore, Berkeley and Santa Cruz, has been blessed not only with three of the finest university research programs in computer science - Stanford, UC Berkeley and UC Santa Cruz - but is also home to leading government and corporate research institutions.

Lawrence Livermore National Laboratory and NASA Ames Research Center are

arguably the world's leaders in the use of Superperformance computing technologies. They are, typically, the first to try out a new technology and start the process of transferring new computing technology to the rest



**The Silicon Valley Superperformance Computing Establishment**

of the world. They are the earliest of the "early adopters." Without their patronage, few entrepreneurial Superperformance companies would last very long.

The Valley is the research headquarters for much of the corporate world as well. IBM, for example, maintains several research facilities in the area. Among these is

the Company's Palo Alto Scientific Center, which conducts intensive research in numerically-intensive applications, the kind best suited for Superperformance solutions. Digital Equipment Corporation does all of its RISC-based system R & D in the Valley, and, of course, Hewlett-Packard maintains several research facilities in and around its Palo Alto headquarters. The Valley is also home to most of the computing-related semiconductor overseas research facilities for foreign firms, including, for example, Hitachi, Fujitsu, Hyundai, and Philips.

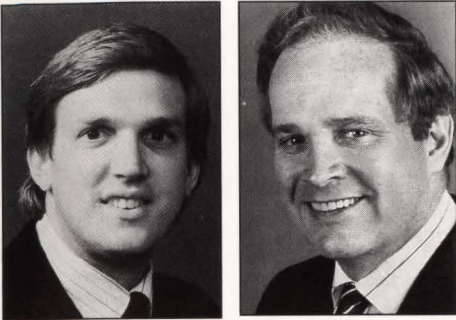
## The Unquestioned Pacesetter

There is a tendency for many people to think of supercomputers exclusively when high-performance computing is discussed. Since the U.S. supercomputer vendors, which include Digital, IBM and Cray Research, are located elsewhere, and the other three are Japanese, it may seem as if the Valley is not participating in this segment. But, hold on! This year, MasPar Computer (Sunnyvale) announced a new supercomputer, and later this year or next, Amdahl will be announcing a new system based on the technology it acquired from Key Laboratories (Fremont). Supertek, Inc. of San Jose is already one of the established minisupercomputer companies that has made its mark by exploiting the Asian connection. Norm Dawson, Vice President of Marketing, says that "in addition to the Valley's obvious local benefits, it sits on the crossroads between the U.S. and Asia and is clearly the optimum place to take advantage of Asian markets and manufacturing."

Besides supercomputers, the other key product area in Superperformance computing

is the workstation segment. The Valley is the unquestioned pacesetter. Three Bay Area companies - Sun Microsystems, Hewlett-Packard and Silicon Graphics - account for the lion's share of the market, and Digital's RISC workstations are also developed in the Valley. Several other companies either make or acquire key components of their





(Left) Thomas Jermolak feels that superperformance talent is more available here. (Right) Silicon Valley still provides the best environment for start-ups, according to Jeff Kalb of MasPar.

workstations from local divisions or companies so that the Valley's share of the worldwide workstation market is probably around 75 percent or more! Thomas Jermolak, Vice President of Silicon Graphics' Advanced System Division, says, "Coupling our Silicon Valley location with our reputation for superior visual processing systems has enabled us to attract the necessary talent to maintain our leadership position."

In addition to computers, there is a host of software, networking and peripheral products that are needed to convert computers from lumps of silicon and strands of wire to usable systems. The software operating system of choice for most Superperformance computers is UNIX. First developed at AT&T's Bell Laboratories, it was later refined at Berkeley. Now Sun Microsystems and AT&T are developing the next UNIX generation. In the network field, Ultra Network Technologies (San Jose) has developed the world's fastest standard product computer network system, providing more than ten times the capacity of other technologies. In the peripheral department, Maximum Strategies, Inc. (Santa Clara) has become the leading producer of mass storage systems based on the new RAID technology developed at UC Berkeley, while IBM designs and makes the world's fastest and biggest disk drives in its San Jose facility. These are just a few examples that demonstrate the Valley's position in the vanguard of the Superperformance computing industry. There are literally dozens of others.

#### High-Tech Companies Can't Leave

Nowhere else in the world does there exist a technology-based infrastructure compa-

*(Continued on page 25)*

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# EAST MEETS WEST AT NUMMI

*Partnerships are one way to meet the competition halfway.*

By Fred B. Carothers

Can two international competitors join together in a partnership that benefits both companies? Such was the case when Toyota Motor Corporation joined with General Motors Corporation in 1984 to create a new kind of auto manufacturing operation.

For years, the General Motors plant in Fremont had been so burdened with production difficulties and labor/management strife that it had been nicknamed "the Battleship." The plant was finally closed in 1981. On February 17, 1983, General Motors and Toyota signed an agreement to produce a subcompact car at the plant. The agreement ultimately resulted in the creation of an independent company that would adapt the production concepts and techniques developed by Toyota for an American manufacturing plant. The result of this meeting of Japanese philosophy and Yankee ingenuity was the formation of New United Motor Manufacturing, Inc. (NUMMI) in February 1984.

## Best of Both Worlds

NUMMI has adopted Toyota's manufacturing management philosophies and concepts while employing American labor and suppliers. The key factor in creating a successful manufacturing process at NUMMI is the team concept that is applied throughout the organization. The result is a unique management style that has a significant impact on the way engineers interact with both labor and management.

Everyday decision-making at NUMMI is based on majority rule, and requires a consensus of all the personnel affected. Only major decisions and policy decisions are the sole domain of top management. This management-by-consensus approach focuses on understanding the problem at hand and guarantees that all reasonable alternatives will be considered.

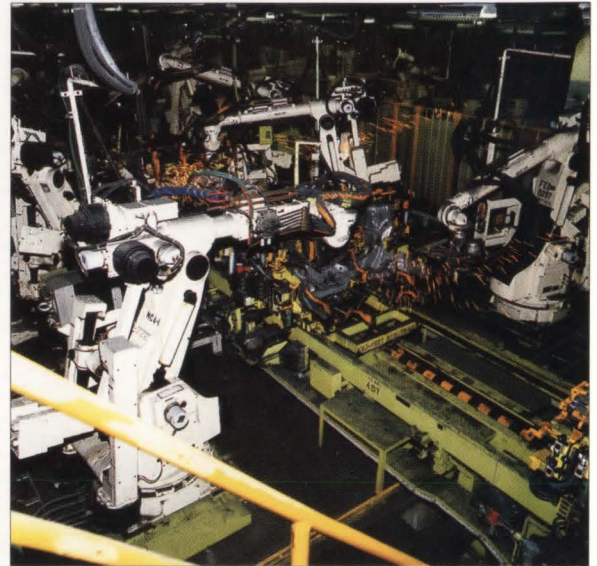
Clarence Pitts, an engineer working

with body and weld feels that one result of these philosophies is to make the engineer's job easier. He explains, "We have no industrial engineers in the body shop or in the plant. If the operators feel that they would like to move the machinery around, they make the layout for the move and we review it to make sure there is not some engineering problem hidden in the plan. When the decision is made, it's a mutual agreement with the team members. It actually makes the engineer's job a lot easier if they listen and accept input from the workers."

New engineers at NUMMI work for thirty days as production operators on the line. And all employees wear the same uniforms. Pitt believes that these are some of the things that make this system better. "When engi-

facturing technology," asserts Denis Imazeki. "In fact, we might be ahead in technology. Where we fall behind is in the management of our manufacturing plants." Denis speaks from experience, having worked for General Motors at the Fremont site for sixteen years until GM closed the site in 1981.

"Under the old system, the team member's opinion wasn't even considered during process changes," recalls Imazeki. "There wasn't any expectation of input



Sparks fly on the assembly line at the NUMMI plant.



Left to right: Clarence Pitts: The team approach can work here as well as in Japan. Denis Imazeki: The U.S. doesn't lag in manufacturing technology. Jerry Spann: U.S. engineers bring innovative ideas to this partnership.

neers get off their pedestals they see what the realities are. Here all of the people work together - it's a team effort, not one based on superstars. This approach can work in our culture as well as in Japan."

Another area that Pitt feels that we can learn from the Japanese is in scheduling. Americans tend not to be very structured about planning and implementation. The preplanning that goes into one of the Japanese-run projects is quite detailed. Such detail and preplanning means that changes in procedures occur much more smoothly.

"The U.S. doesn't lag behind in manu-

from labor. Now, we get that input from all team members. The person closest to the operation has the best knowledge — maybe not engineering-wise, but he knows how he performs the operation and what helps him or doesn't help him. It's a matter of coming to an agreement as to what is really the best solution. I think it's the only way to go. But it is hard for a company like GM to fully utilize the 'core' lessons from NUMMI. It's much easier to use the effects - such as the light boards which display production quantities - than to deal with some of the real issues."



Now a managing engineer where he directs and advises manufacturing department engineers, Imazeki does find that there are some drawbacks to working under the new system. "Most of the engineering processing decisions are made in Japan. At General Motors, each plant had much more decision-making power," recalls Imazeki. "For an engineer, a lot of the enjoyment of the job is in making your own decisions, so in that respect, there isn't complete engineering satisfaction."

#### Fine-Tuning the Process

"Manufacturing encompasses a lot," states Jerry Spann, a General Motors engineer on rotation at NUMMI. "Technologically, we're in front of the Japanese. But in manufacturing management many American companies lag behind. We haven't taken a good enough look at how technology and people fit together in the manufacturing environment. You can't just throw automation into a plant without considering people's technical background and needs. The Japanese are very patient. They let people work through issues on their own in order to have people buy in."

"You have a person who's working out there on the line day in and day out who becomes an expert at it. He may not know the technical name for it, he may not know exactly how it should be designed, but he can give you some very good ideas about how we can make the process and the product better. I think that's the key point that our engineers have to understand: don't think that because you've got an engineering degree that you have all the smarts. Those people out there on the line have some very good ideas."

Spann believes that there are several other areas in which we can learn from a partnership such as NUMMI. "The relationship between the supplier and the plant in the Toyota philosophy is quite different. The Japanese look at the supplier as an extension of the plant - the Americans simply look at the end product produced by the supplier. The Japanese approach tends to make these relationships into long-term partnerships."

"Toyota also has this philosophy of not putting in a new process for a new product with new people," says Spann. "The technology for this plant, for example, was first

(Continued on page 13)



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# INTERNATIONALIZING YOUR INVESTMENTS

By Theo Burger

An international focus is becoming part of effective investment strategies in the '90s. As a single global village emerges, you may want to reevaluate your investment plans to take full advantage of the opportunities of the changing economic and political climates abroad. And while the concept of buying foreign securities may be "foreign" to some Americans, it is an idea whose time has come. In fact, many investment experts now recommend placing 5% to 10% of your assets in foreign securities.

Including foreign stocks in your portfolio can increase the horizon of investment choices. The U.S. stock market represents only about half of the publicly traded corporations in the world's equity markets and a third of the total value of the world's equity markets. And since the movements of foreign stock markets are not necessarily correlated with the movement of the U.S. market, investing abroad can also help maximize returns.

Because economic growth, profitability and political environment are not identical around the world, foreign countries and regions often enjoy higher long-term growth rates than the United States. Over certain periods of time, many industries and companies in foreign countries may experience superior sales growth and profitability than their U.S. counterparts. And while change is at work in every corner of the globe, the regions that currently present the potential for investment opportunities are Eastern and Western Europe and the Pacific Basin.

Should you decide to invest internationally, a variety of choices are available. You might purchase individual foreign stocks yourself, or buy shares of mutual funds that concentrate on foreign stocks. You also have the option of purchasing foreign bonds as well.

When investing in foreign stocks, it is highly recommended that you work with a registered investment representative, since the full range of foreign issues available to him or her may not always be available to you. Just over 100 non-U.S. companies are listed and traded on the New York and American Stock Exchanges, although many more trade in the over-the-counter-market. However, if you buy anything other than

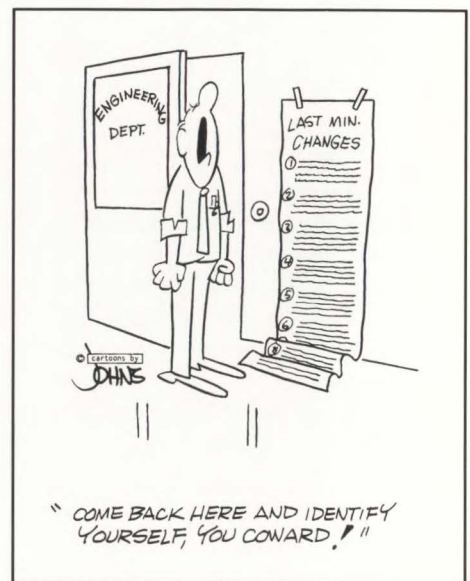
foreign blue chip stocks, you will probably not get much financial information on the company, and what you do get may not always be in English.

For the average investor, mutual funds may be the most sensible option. International mutual funds provide all the advantages of standard mutual funds (diversification, professional management, liquidity and exchangeability) while seeking investment opportunities around the globe. You can choose a fund that invests only in foreign securities (called an international or foreign fund) or one that may also invest in U.S. issues (called a global fund).

When you invest in a global or international mutual fund, you don't have the headache of converting dollars to purchase foreign shares, or determining what portion of your gains are taxable under U.S. law. The mutual fund provides you with a summary of this tax information.

As with any investment, there may be drawbacks depending on the valuation of the dollar against foreign currencies and the volatility of exchange rates. You should discuss this with a registered investment representative before investing abroad. ▲

*Theo Burger is a Financial Consultant and Second V.P. at Shearson Lehman Hutton in Menlo Park. For further information, contact him at (800) 456-0914.*





**NUMMI** (continued from page 11)

tested in a plant in Japan on the same model. After it was operational they brought it here and trained the new people on it. This method has distinct advantages.”

#### Communications Is the Watchword

“At NUMMI engineers need to have communication skills and the ability to be flexible,” says Imazeki. “You have to be very patient because a lot of the engineering job is working with guys on the line and with Japanese engineers where there may be a language barrier. The main thing that American engineers can contribute is their individualism. We’re not as prone to taking information from Japan without questioning it. By questioning, maybe we can make improvements.”

Spann affirms that view. “American engineers working here have the ability to take the blinders off and look at problems in an innovative way. I’m not saying that the Japanese don’t. What I’m saying is that when you’re given a lot of freedom all of your life, that transfers over into what you do in your work also. If somebody gives you a problem, you don’t go back and thumb through the records to see how the problem was solved before. I think that’s what we bring into this partnership — a lot of innovative ideas.”

So at NUMMI, a partnership with an international competitor has led to better communication and teamwork. Designers aren’t making changes and issuing orders based on theory and calculation, nor are engineers isolated in cold cubicles. Superstars and seat-of-the-pants, throw-it-over-the-wall engineering are being replaced by direct communication and a spirit of cooperation which respects the input of others.

Obviously this industry, at the level of an assembly plant, is not usually characterized as the cutting edge of science and technology, but it offers a model that could benefit even the most lofty state-of-the-art company. In the end, communication through mutual respect, understanding and encouragement can benefit us all. ▲

*Fred Carothers is a Cupertino-based freelance technical and business writer. He is also President of Safety Standard Engineering Company, a consulting firm serving manufacturers requiring product safety testing.*



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## AND THE SOUTH!

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# GETTING A CLEAR PICTURE OF HIGH-DEFINITION TV

*Will HDTV go the way of TV's and VCR's?*

by Thomas M. Woolf

Is high-definition television in Silicon Valley's future? A few Silicon Valley companies have already made significant contributions to the development of this fledgling technology. However, the birthing process for any new technology is painful, and while the midwives for HDTV have been Japanese, European, and American corporations, the real question being asked by industry observers is what will this new consumer electronics child look like, and who will adopt HDTV as its own?

The firm foothold that the Japanese hold in the home video market gives them a distinct edge in the HDTV race, but is it a race? The rules have yet to be established. Before any vendor can approach the American HDTV market, a broadcast standard will have to be chosen.

## The State of the Standard

It is up to the Federal Communications Commission to select a domestic HDTV broadcast standard. The Advisory Committee on Advanced Television Services, which will advise the FCC, has begun testing for a U.S. transmission standard and the recommendations are expected in 1991.

One of the oldest proposed standards is 1125/60, which has already been defined by the U.S.-based Society of Motion Picture and Television Engineers (SMPTE) as the TV production standard. 1125/60 specifies 1125 scan lines per frame (as opposed to the 525 lines currently used for NTSC, the North American TV broadcast standard) at a field refresh rate of 60 Hz.

Other contenders include a 1050/59.94 standard espoused by NBC, Philips, and others. NBC is also backing a standard that is 525 lines progressively scanned, which would precede the 1050/59.94 approach as an interim standard. Zenith and NHK, the state-operated Japanese broadcaster, each

have their own systems, and MIT also has a proposed HDTV system.

To some extent, choosing a U.S. HDTV transmission standard is a chicken-and-egg problem. According to Jim Gaspar, Senior Staff Engineer with CBS in New York who is involved in the standardization process, the SMPTE's 1125/60 standard has already been widely adopted by the production community, which may give 1125/60 an edge on the transmission side. However, Gaspar says that you can produce pictures using 1125/60 and convert to another broadcast standard with good results.

The Japanese already have a strong lead in HDTV production equipment, Gaspar says. "Sony has already developed its second generation camera and second generation digital recorder, and they are pure 1125/60."

Who's going to prime the pump for HDTV demand? Gaspar notes that much of the development in HDTV was done in video imaging — producing motion-picture quality video images for special effects. "It seems to me that where the pump priming will be is in VCRs," Gaspar says. "VCRs will be available that use 1/2-inch tape, but they will be extremely expensive at first. But just as with audio, where there are enthusiasts willing to spend almost anything to upgrade their systems, high definition will have a similar following. As prices come down due to upscale manufac-

turing, the market will begin to catch on. There is a tremendous amount of software already out there — films. With high-definition, you get to see a film the way it was intended to look." Of course, the Japanese are driving the VCR market — "they jumped into that very early on," Gaspar says.

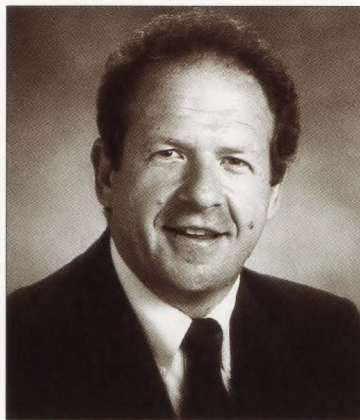
What's holding the broadcast community back from the HDTV brink is that, no matter what high-definition system is selected, it will probably have to be simulcast with the existing NTSC broadcast signal. That means broadcasters will have to duplicate much of their current broadcasting equipment, but the fiscal return is limited — high-definition TV commercials won't sell more cars or perfume.

## The Politics of High-Definition

George A. Merrick, President of Ampex Recording Systems Corp. in Redwood City, states that HDTV is no longer a technological issue. Even though Ampex invented video recording technology, the company has no specific plans to enter the HDTV arena. However, the company is interested in HDTV. Ampex recently ran a series of informational advertisements in the New York Times, the Wall Street Journal, the Washington Post and other publications to send a message to government that HDTV has become a political and economic issue.

"There are going to be multiple standards because of economics," Merrick says. "The Europeans want a protected market to sell TV sets and VCRs. The Japanese want an open architecture so they can sell everywhere. Standards are therefore political and economic. The pot of gold at the end of the rainbow is in replacing all the consumer TV sets in the world." That's why companies like Sony, Philips, Thomson, and Matsushita are pushing HDTV production and preparing to supply HDTV consumer products. Because the data rates of the various standards are close together Ampex can build video production equipment that can be modified for any transmission standard.

"HDTV is a technology driver," Merrick notes. "It should drive chip capacity to a higher capacity." He adds that "we must make sure that we have equivalency when



George Merrick of Ampex: HDTV is a technology driver.



we set a standard. We don't want to see the technology in the U.S. set at a lower level than it is in Europe or Japan. From a purely technical standpoint, we want to make sure we keep technical standards in the U.S. as high as possible so we don't start at a disadvantage."

### Why Reinvent the Signal?

One Silicon Valley firm, Faroudja Laboratories Inc. of Sunnyvale, is working around the standardization problem by improving the current NTSC signal with an Enhanced Definition TV system, SuperNTSC.

"SuperNTSC improves the present standard to the best of its ability," states French-born engineer Yves Faroudja, President and Founder of Faroudja Laboratories. Some have said that Faroudja hopes to do for television what Dolby did for audio. "We don't want to change the studios, or the cable system or the transmission path. We want to add to them. We want the existing TV systems to work as well or better with the new transmission and the new TV set we are manufacturing to deliver an exceptional picture."

In essence, SuperNTSC uses an encoder and decoder to double the number of NTSC scanning lines. All for an additional \$300 per television set.

With regard to HDTV competitors, Faroudja says that the driving factor has been "the need for the Japanese to sell something else." The Japanese have already saturated the

Japanese public to upgrade its existing receivers.

"In the U.S., the main motivation has been fear," he adds. "There is the fear of losing another market to the Japanese, and fear on the part of the broadcasters that they will have to redesign the whole television network, so they are seeking compatible solutions. One thing is for sure, the consumer is not a driving force; there is no public outcry for more scanning lines."

However, Faroudja does not see HDTV as a competitive issue, but a problem where Japanese and American groups are striving toward a common objective. "We have good allies in Japan that account for a good portion of our income," he says. Faroudja already has 12 licensing agreements with Japanese companies, including Sony and JVC, especially for VHS recorder systems. "You can't escape the fact that most TV sets will continue to be made in Japan or Korea."

### Betting the Chips on HDTV

One technological area where Silicon Valley has a clear edge is in microprocessors,

and one company that is honing that edge in HDTV is Vanguard Semiconductor, the Milpitas-based division of California Micro Devices Corp. According to company president and electrical engineer Narpat Bhandari, "For the high-definition TV market, the components are the key."

Vanguard has developed a 1.2-micron BiCMOS silicon chip that can do the work previously required by 40 to 50 components,

suit any HDTV camera, recorder, or receiver.

"As a small startup company, we asked ourselves what we could do to bypass the HDTV standardization process," Bhandari says. "So we've designed the components so they are compatible with the standard chosen three years from now."

The stakes in consumer HDTV are high with a prospective market size of \$20 billion. But where others predict that high-definition will reach U.S. viewers in the next few years, Bhandari believes vendors will have to wait a full decade to get the brass ring of consumer sales. He sees two stumbling blocks: standardization and the additional broadcasting cost. Meanwhile, Bhandari is marketing his HDTV chips and chipsets to the high-end computer workstation and medical imaging markets.

As for competition from overseas, Bhandari notes, "The Japanese are coming here. There are Japanese motor plants here. They are coming to the consumer."

"No matter how dominant the Japanese manufacturing of HDTV becomes, they will be fully dependent not only on our market, but also on our high performance semiconductors. Innovative marketing, aggressive investments and creative R&D (Read & Do it) ... in other words, the best of Silicon Valley will allow us to stay on top." He adds that HDTV systems will be Japanese made, but they will be made for American consumers with American semiconductor components.

So whose child is HDTV? The issue is no longer whether products are made in Osaka, New Jersey, or Munich, but rather how the technological strengths of American, Japanese, and European companies will converge to serve the consumer market at large. Different HDTV standards will emerge for the U.S., Japan, and Europe, and the Japanese will continue to make equipment to cater to the needs of each consumer market using components developed in the United States and elsewhere.

However, we can take comfort in the fact that there is one aspect of HDTV where America will continue to dominate — programming. No other country in the world can compete with the Hollywood moviemaking machine. ▲

*Thomas M. Woolf is a Silicon Valley-based freelance writer and editor.*



*(Left) Yves Faroudja of Faroudja Laboratories: There is no public outcry for more scanning lines. (Above) Narpat Bhandari of California Micro Devices: HDTV will be dependent on Silicon Valley's high performance semiconductors.*

existing TV market with products, and NHK, which licenses its televisions much like the BBC, is seeking a way to get the

delivering three times the speed and twice the bandwidth with one third the power. These computer chips can be modified to



A Conversation with Technology Champion

**ED ZSCHAU***Staying competitive requires changing government, education and business.*

By Stuart Gannes

**W**ith a resume that could have been crafted by a Hollywood casting office, Ed Zschau has achieved many of the dreams associated with Silicon Valley, and then some.

As a newly minted PhD, Zschau taught at Stanford's Graduate School of Business, before starting his own company in 1968. In the 1980s, he embarked on a political career that culminated with his election to Congress. In 1986, after his unsuccessful run for the U.S. Senate against Alan Cranston, Zschau returned to the Valley with his wife and three children and became general partner at the venture capital firm of Brentwood Associates.

Today the affable Zschau is Chairman, President and Chief Executive Officer of Censtor, an ambitious San Jose start-up which specializes in magnetic storage technology. With his background in academics, business, and politics, Zschau brings some veteran wisdom to the hot button of economic competitiveness. Recently, he invited writer Stuart Gannes to his offices to discuss these issues.

**Q: You've had a remarkably diverse career. What is the theme that carries through all these endeavors?**

A: Still trying to find a job I can hold (laughs). I guess the theme is being an entrepreneur, which I define as being a builder. Entrepreneurs don't just rearrange

things. They take risks and bring new ideas to make something better. That kind of approach works anywhere. In business, venture capital is creating things out of nothing. What intrigues me is trying to do things nobody has ever done before for a useful purpose, such as to advance the state of the technology. Serving in government is a way of trying to be a builder too.

**Q: What changes do you see affecting Silicon Valley and the opportunity to be a builder in the 1990s?**

A: Clearly markets have become more internationalized. It used to be that you could pretty much sell in the U.S. and be a big success. All your competitors were U.S. companies. Now you have to be competitive in foreign markets in order to be competitive here at home. At the same time, manufacturing scale is more important in a lot of fields. But when you say "international" and "scale" it seems to go against the paradigm of the company starting in the garage and becoming successful.

**Q: Is that old paradigm still going to work?**

A: Yes, it's still going to work but it's not going to be sufficient. We have to figure out how we keep the creativity and entrepreneurship of the companies that start out in garages, and we also have to develop the ability to compete in this market of new realities.

**Q: Any suggestions on how to do this?**

A: One way of addressing this may be more partnerships among U.S. companies. It used to be if you saw another company that had a complimentary activity you talked to them about merging. Usually when that happened you ended up killing what it was that you wanted because you lost their entrepreneurial spirit. The new approach should be partnerships among com-

panies. A good example is in the semiconductor industry where people understand that they don't need a fab in order to be a player.

**Q: Do you apply these ideas to your own business opportunities?**

A: Yes. We have recently changed our strategy here at Censtor. Originally we were going to develop and manufacture our products. But we concluded that's not very practical because the cash required to be a manufacturer is huge. It's hard for a young company to develop new technology, to stay at the cutting edge, and also to develop manufacturing scale. We decided that if we tried to do it all, we would do it all badly. So we're concentrating on the R&D and entering into relationships with other companies to fund that R&D.

I think there can be specialty companies who can get their return by working with others who can exploit that technology. A licensing strategy gives a small company the capability to receive a percentage in royalties on a much larger revenue base than it might produce alone.

**Q: But isn't manufacturing a key area where U.S. competitiveness is lagging?**

A: Yes. In the 1960's we took our eye off the manufacturing ball entirely. I was teaching at Stanford Business School when it deleted manufacturing courses as a core requirement for getting an MBA. That move reflected a feeling in the business community at that time that manufacturing wasn't very important - that it was sort of like turning the crank - and that the emphasis should be on strategy, marketing, and financial structures. We've learned our lesson and we're seeing a renewed emphasis on quality, manufacturing, and productivity.

**Q: How does the new competitiveness impact schools of engineering?**

A: Engineering schools must give their students a broader view. Engineers need to learn about the competitive factors that make a difference to success, such as time to market, time to profitability, manufacturing scale, quality and cost. They need to appreciate not just the beauty of the design, but also the time and process it takes to get it into manufacturing and to the customer.

**Q: What about the geopolitical changes taking place?**

**Name:** Ed Zschau

**Born:** January 6, 1940 Omaha, Nebraska

**Family:** Wife, Jo Ann nee Wiedmann; children Ed Jr. 26, Liz 25, Cameron 19.

**Hobbies:** Running, Reading, Writing, Politics, Music, Community Service Projects, Family, Working At Home.

**What I'd do on a free day:** "Any or all of the above - I rarely do other activities."

**The most exciting event in my career:** "I've been blessed with many exciting experiences - among them are running the New York marathon and winning the Republican nomination for U. S. Senate. And I'm looking forward to the opening of the Technology Center "Garage" in San Jose this Fall."



A: The reduction of defense spending that people anticipate over the long term — given that the Cold War is over and won — is going to have a positive impact long term, because it will enable more resources to be available for commercial activities.

Not all the adjustments will be easy. In basic research the Department of Defense has an excellent history of sponsoring work which had enormous commercial value, from time-sharing to computer networking and artificial intelligence. A lot of the computer industry in the United States owes its life to military spending. It would be bad if there isn't a funding source to pick up the slack. A lot of those R&D grants have gone to universities and help offset the costs of graduate students. Our ability to train people to do research will be impacted unless that spending is maintained or picked up by some sort of commercially oriented entity.

**Q: What else should the government be doing?**

A: People in government have to appreciate how technology is advanced and applied. I don't believe that government can force innovation. It can foster innovation; it can create an environment in which innovation, entrepreneurship and economic growth take place. But if we count on government to do the job, it won't happen. Companies have to take the responsibility to win in world markets. It's not possible, in my view, for government to make companies competitive. It can only create the environment that encourages companies to be competitive.

**Q: You've told a number of people that you will probably run for the U.S. Senate in 1992. Are you sticking to that plan?**

A: I said when I lost in '86 that I would run again in '92 and get the job done right. Since then, I've taken on responsibilities here at Censtor. Now it's not clear that I would be in a position in 1992 to be a candidate. Moreover, I don't believe that a person needs to be in government in order to be in public service. I think individuals and companies can play an unprecedented role in the public sector over the next decade, particularly in education. ▲

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*Stuart Gannes is a strategic analyst for MIPS Computer in Sunnyvale. He was previously an associate editor for Fortune magazine covering high technology.*





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# CONTRACT ENGINEERING

*A viable option in an uncertain world.*

by Karl Haas

**W**ant a job that pays well, involves a variety of tasks, and gives you freedom from office politics? Do you think that the legal and paperwork requirements of independent consulting is a bother? Join the over 30,000 engineers in the Bay Area who work on contract!

Contract Engineering has come a long way from the "brokerage houses" and "job shops" of the past. Today's temporary technical firms provide Silicon Valley with a service that many companies have come to depend on to supplement their in-house technical talent for special projects and peak production periods. After all, no one can predict the future of a firm or even of a project—particularly in the volatile world of the Valley.

Contract engineers give companies options. Contract engineers work at various firms on a contract basis through temporary technical service firms. They are paid on an hourly basis to work on specified projects. If a project works out the contract engineer may be offered a job to "go direct" or have their contract extended. If things don't work out, they can be let go easily since they are employees of the service firm.

Companies aren't the only ones with flexibility. A good contract engineer can choose to work for whom they want and to take extended time off between assignments. While on contract they are paid at an excellent rate. Of course, contractors can only choose from those jobs that are currently available and some of the time off between jobs may not be by choice. An assignment may last two weeks or five years or anywhere in between.

### Jobs From Sea To Sea

George Pettigrew is a "road-shopper." He travels about the country working on what

job appeals to him. "Several publications which list service providers needing engineers. You send in your resume and within a couple of weeks you can be interviewing over the phone. If both parties like the set-up—"

Pettigrew is now working on Space Shuttle experiments concerning acquisition of celestial objects. His most distant job was at a satellite tracking station

in Hawaii. He has also worked on an anti-submarine trainer development contract at Sanders Associates in New Hampshire and for the FAA finding ways to eliminate the flight engineer from the 747-400.

"Contracting suits my purposes fine. It's a good way for me to build up my own retirement. It is well suited for the older engineer who wants to go a lot of places and get a variety of experiences. Most of the firms where I have been have offered to take me on direct, but I would rather follow the job around. You get involved with the exciting parts and are gone by the time it gets boring." Pettigrew keeps busy while on contract, "While on assignment I often will work sixty hours or more a week."

### In Large Firms And Small

Contract work is not just for the old hand. Tony Powell, a San Jose State grad, worked only two years with Atari before beginning contract work. "Right now I prefer it. You get a variety of atmospheres and you don't get involved with the company politics. But if I found a situation I really liked I would consider a job offer." Currently at Varian, Powell has worked for Lockheed, Boeing, UC Berkeley, Stanford Linear Accelerator, HP, IBM and some smaller firms over the past seven years. "Medium to large companies have the resources and flexibility, but



"Roadshopper" George Pettigrew with his latest boss, Gay Leon.



small firms are interesting to work in because there is a lot of responsibility — you can wear more than one hat.” A degreed Mechanical Engineer, he is now doing some



**Tony Powell finds that successful assignments require advance work.**

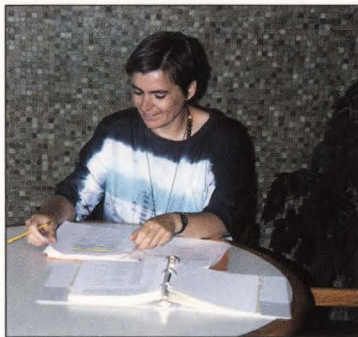
Industrial Engineering work and hopes to move into management eventually. Powell always checks out a firm beforehand to make sure there is a good fit. “I have never had a work problem. I get a full understanding of what they want and let them know what I want. Like a salesman, you have to sell yourself.” He enjoys the greater variety of work as a contract engineer. “I find myself learning a lot. Different firms have different CAD systems, but they have a lot in common. I find out what system they have, get it and learn it before going to the job.”

#### Always Something New

Montreal native Carole Sierpien worked for three years at Data General in North Carolina’s Research Triangle after graduating from McGill University and doing grad work at UNC, Chapel Hill. She turned to consulting after being unable to arrange part-time work with her employer. “I woke up one morning and saw myself at 45 in the same job and I thought ‘NO!’”

Being able to take time off was attractive. “I found work really soon. I was quite a pioneer in that part of the country as a woman consultant ten years ago.”

She moved here from North Carolina a year ago. Without contacts, consulting was

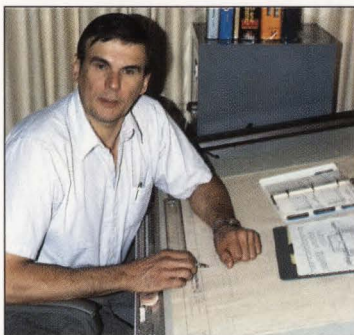


**Carole Sierpien admits that proving yourself each time is stressful — but worth it.**

hard to continue, so she began working as a contractor. What does she like about contract work? “There is always the opportunity to learn something new. From that I grow, which is probably the thing I enjoy the most. The drawbacks are that you don’t receive the same benefits and there is no job security. The challenge of having to prove yourself each time and starting out with a new group of people can be stressful. And sometimes I miss the feeling of belonging.”

#### The Rewards Outweigh The Risks

Brian Geyer has spent about 70 percent of his twenty year career doing temporary work both as a consultant and as a contractor. One contract was scheduled for two months, but lasted only two weeks after Geyer found that the cost of producing the product they were developing would be so



**Brian Geyer feels that the financial and emotional rewards make up for the inherent risks in temporary work.**

high that the proposed selling price would have to be increased ten fold! Geyer sees this as indicative of the need for mechanical expertise in electronic-based startups.

“In addition to being paid overtime and being able to distance yourself from the job when you go home at night, there are the rewards that come from interesting work,” says Geyer. “After contracting at Ford for two and a half years it was exciting to see my work show up on production cars years later.”

Geyer has found that contracting does have some drawbacks. “Often overtime is needed and, as professionals, we must be prepared to do the hours and put personal needs aside. Yet there’s always the chance that the client will cancel the contract at any time. Planning time and finances can be iffy this way. One psychological drawback is that you may make an important contribution at a critical time, yet you won’t get the special reward  
(Continued on page 20)

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### CONTRACT ENGINEERING

(Continued from page 19)

or credit an employee might."

Geyer notes that benefit packages vary between different temporary technical providers. "Some services have very good benefits: health insurance, paid vacations, paid holidays." But the contract engineering industry in general does not attempt to compete with the benefits offered by direct employment, although some temporary firms do offer basic core benefit options. But for many contract engineers the opportunities and the hourly wages offered through a temporary technical firm are more important than the benefits available.

### Happiness Is A New Job

"So far the fill-in work has been quite pleasant," claims Howard Gorlin, an analog/digital engineer with a lot of military system engineering experience. Most of Gorlin's thirty years has been spent in R&D, which he credits with keeping him technologically current and adaptable. He job-shopped in the early 1980s and went back to it about six months ago.

Gorlin enjoys the challenge of the tasks and being in the different corporate cultures.

"Usually when you start a new job you find it quite stressful because you have to prove yourself. But I'm sort of used to that now." Gorlin claims that he would consider a job offer but also he would be quite happy being at a new company every six months for the rest of his working days. "Right now I seem to have a lot of different opportunities. I'm no longer concerned about being out of work."

### A Faster Way To A New Job

After being 'rified' from Applied Materials after thirteen years, Carol Wyatt took a long vacation then found that it was not easy to find a new job. "I had lots of interviews, but found that I was either over or under-qualified or didn't know the right CAD system.



Howard Gorlin says that he *isn't concerned anymore about being out of work as a contract engineer.*

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*Carol Wyatt cautions that you have to consider what kind of benefits you need.*

I signed up with a couple of contract firms and got a job as a PC designer right away. Recently I have started doing some mechanical parts of the system as

well. You learn a lot from the different companies. I am now at Stellar Systems on a job that was supposed to last three months but has lasted a year."

"I rather enjoy working through job shops," states Wyatt, "but if I were younger I wouldn't consider contracting. Many young people need benefits — vacations, bonuses, and so forth. If you are sick as a contractor, that's just tough."

The fact is that no job is really permanent nowadays. If the life of a contract engineer attracts you, talk with firms providing this service. There are many firms that place temporary personnel—both generalists who handle many classifications and others who specialize in engineering and technical disciplines. Use technical temporary listings—which are available in publication and electronic form—to see what types of jobs are currently available from different agencies. Shop around and find several firms to work with. Select ones that are established and have solid reputations in your field. "You need to build a rapport with three to four good places in order to get the proper representation," says Sue Bragg, President of the local chapter of NTSA, the National Technical Services Association.

Like all professions, contract engineering has its pro's and con's. Contract Engineering can provide excellent company selection, variety, flexibility and challenge for those in pursuit of "cutting edge technology" in their respective fields. If you are seeking a viable alternative to the status quo—Contract Engineering may be for you! ▲

*Karl Haas is a freelance writer and mechanical engineer who feels there are advantages and disadvantages to working as a consultant, contractor or as a direct employee.*

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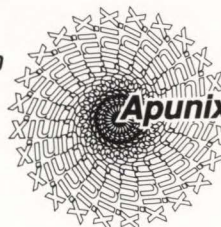


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by K. C. Chan

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**P**addle right twice—now **DIG IN HARD!** our river guide yelled out. The next thing I knew, my friends and I were through “Maytag,” a Class V (very difficult) rapid in the North Yuba river, aptly named after the washing machine. I felt like I had gone through the rinse cycle and my stomach had jumped out of my body. I was scared and excited and soaking wet. Everyone on the raft cheered—we had made it through another one!

Many Californians planning their sum-

Yuba in a paddle raft. Bob, a member of the Engineering Staff at Apple, enjoys the heart-stopping thrill of running the rapids. He says, “It’s a thrill - there is also an element of danger. Getting through it together makes it a fun and wonderful team experience.”

### Whitewater and The Grand Canyon

While most people start rafting on small rivers, others go for the big ones. Keith Hamburg, a software designer at Tandem, recently dove into whitewater rafting with



*K.C. Chan and friends raft through a rapid on the South Fork of the American River.*

an eight-day trip down the Colorado River in the Grand Canyon. Unlike the rubber raft used in most trips, his river experience was on a dory, a wooden boat with its own boatman. According to Keith, the breathtaking beauty and the peacefulness of the river (when he wasn’t rafting through a rapid), “made philosophers out of everyone. It was great to be completely away from

mer’s outdoor adventures think the drought has seriously curtailed the whitewater rafting season. This may be true of “Spring rivers”—those dependent on snow melt—but for the “dam release rivers”—those fed by upstream reservoirs—this is certainly not the case. Those dams will be responsible for providing a long summer of whitewater rafting fun. Let’s hear it for those dam engineers!

everything I was used to.” He’s already planning his next trip.

### Enjoying Whitewater Rafting Trips

If you are new to whitewater rafting, here is some key information that will help you make your first outing more enjoyable. Most rivers are classified in a scale from I (easy) to VI (unrunnable). Many people start with a class III river (low to intermediate in difficulty), such as the South Fork of the American River. Those are easy and fun trips which most people find comfortable and enjoyable. Want to try some more challenging rivers? There are many options in Northern California within four to six hours from Silicon Valley. The North Yuba or the Main Tuolumne rivers would be two good choices for class IV rapids. For class V and V+, try Burnt Ranch Gorge in the Trinity

### A Rafting Wedding Party

Bob Herold was introduced to whitewater rafting nine years ago when his sister invited the entire wedding party for a trip down the Kennebec River in Maine the day after the wedding! The following year, he rafted down the Penobscot River (Maine). Last year, he had his first California whitewater rafting experience—down the North



River or Cherry Creek in the Upper Tuolumne River.

Most companies will offer you the option to paddle or to sit back and ride in an oar raft navigated by the river guide. On the more challenging rivers, you are often required to wear a helmet and a wetsuit. The whitewater rafting season generally starts in March and lasts through August or September. Experienced rafters prefer to go during the high flow season in the Spring when wet suits are mandatory. During the summer the weather is warmer, but the river flow will be lower and the rivers more crowded.

When you are evaluating a trip, ask the company about their guides' experience, their safety records and how long they have been in business. There are many rafting companies, each offering something unique. Find the one that is most comfortable for you! Talk to people who have gone rafting recently and ask for recommendations. While most prices are competitive, the quality of food and service do vary. Prices range from around \$100 to \$400. Some operators offer discounts for groups of 10 or more people. Below are a few of the whitewater rafting outfitters experienced rafters prefer. Happy rafting! ▲

**American River Touring Association (ARTA)** (800)323-ARTA. 30 years old ARTA offers regular and theme trips on rivers in California, Oregon, Utah, Idaho and Arizona.

**Friends of the River (F.O.R.)** (415) 771-0400. F.O.R. books commercial trips on popular rivers in the western states of the U.S., Alaska, Nepal, and Costa Rica. A percentage of the fees go to save rivers in the National Forest System.

**Whitewater Voyages** (415) 222-5994. Offers trips on 20 rivers. They popularized Class V rafting in the 1980's and now offer guide schools and manuals.

**Sierra Mac River Trips** (209) 532-1327. Sierra Mac specializes in the Tuolumne River. Trips vary from one to three days. Also offers a gourmet dinner and wine trip.

*Between whitewater rafting trips, K.C. Chan, MBA, is principal of Geneva Consulting Group, a San Francisco-based management consulting company specializing in marketing, training and organization development. K.C. holds a BSCE from UC Berkeley.*

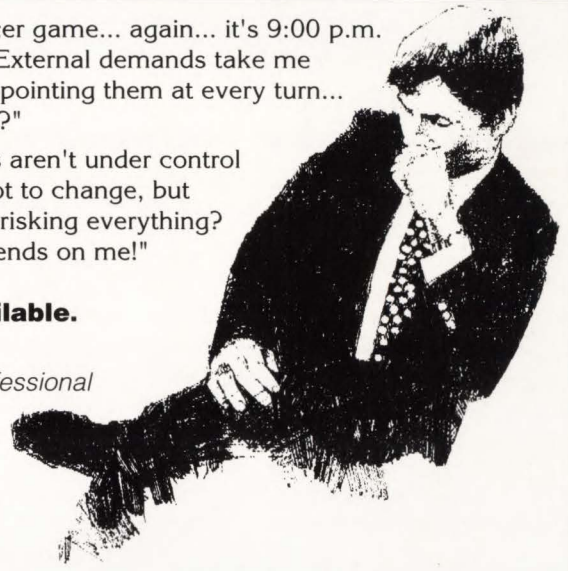
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# SILICON SLICES

Engineers in the news...**Tom North** was recently named president of Aspen Semiconductor, a subsidiary of Cypress Semiconductor. Although North has spent many years in semiconductor sales and marketing - with Cypress and Xicor - his undergraduate degree is a BSEE from Stanford. Another local engineer made good - albeit via a circuitous route.

Another Stanford grad - **George Perlegos** - was profiled in the *San*



**Art Money, president of ESL, was honored by the SJSU Engineering Alumni Association.**

*Jose Business Journal* several months ago. Perlegos, who spent almost ten years attending part-time to get his MSEE, developed the EPROM chip, his latest of a series of inventions. After working for seven years at Intel, he was a co-founder of Seeq Technology in 1981. He then moved on to found another firm, Atmel Corporation in San Jose, where he is currently Chief Executive. His view on our competitiveness? "We have demonstrated that we have the know-how and the manufacturing capability to compete on a world-wide basis, which many people in the past did not think the United States could do."

Among the many ceremonies commemorating **Bob Noyce's** death was one at the Foothill Electronics Museum. **Andy Grove** of Intel and **David Packard** both spoke last month at the dedication of an integrated circuit processing

exhibit honoring Noyce. The Foothill Electronics Museum is on the Foothill College campus in Los Altos Hills and is operated by The Perham Foundation. Other exhibits include original equipment from de Forest, whom we all remember as the inventor of the vacuum tube triode, and the first commercial radio broadcasting station - KQW of San Jose - the forerunner of KCBS of San Francisco. Also available through the Museum is **The Radio Collector** - a five part PBS video series on the history, collection and restoration of antique radios. For additional information contact **Donald F. Kojjane** at (415) 949-7383.

**Art Money**, President of ESL, was one of three honored recently at the 11th Annual San Jose State University Engineering Alumni Awards Banquet because of his outstanding accomplishments in engineering, management and service to others. Engineering Awards of Distinction were also presented to **Jane G. Evans**, an H-P retiree and **Dale W. Pilgeram**, V. P. of Development at the General Products Division of IBM who were both profiled in *ENGINEER* last October. **Robert Puette** of HP who is currently the chair of the SJSU Engineering Advisory Council was given the Dean's Service Award for his contributions to the school. Three SJSU Engineering professors, **Thalia Anagnos**, **Richard Duda**, and **Nicholas Pappas**, were also honored at the dinner for their excellence in teaching - as judged by the students! Dean **Jay Pinson** shared with us some of the advice he usually gives to his students,

"Always have a Plan B because life is a series of experiments - most of them failures." Apt advice for all of us in Silicon Valley!

**David Pregeant** of Source Engineering was recently named Area Manager for Silicon Valley. He holds a BSEE from Louisiana State University and worked for GE, Intel and Future Electronics prior to joining Source in 1982. Guess that's why he's right at home talking to the engineers he places through Source!

Civil and structural engineers turned out in force to welcome the new District Director of CALTRANS District Four, **Preston Kelly**, at a dinner held in his honor in June by the Coalition of Minority Business Organizations. Kelly was the first black engineer to attain the post of District Director in the state. His 32 years with the Department include serving as District Director of District 10 in Stockton - a position that may have given him just a taste of the complex issues that face him in his new role. **Bob Graham** of Bechtel, **Will Kempton** of the SCC Traffic Authority, **Harry Yahata** of CALTRANS, **Keith Meyer** of DeLeuw, Cather & Co, **Sam Zullo** of Mark Thomas and **Dick Karn** of Bissell & Karn were among

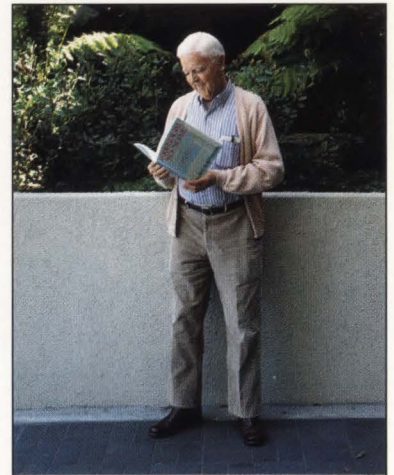


**Harry Yahata of CALTRANS and Will Kempton of the Santa Clara County Traffic Authority welcome the new CALTRANS District Four Director, Preston Kelly.**

those who turned out to welcome him to the San Jose area. As might be expected, Preston Kelly, keynote speaker Assemblywoman **Delaine Eastin** and CALTRANS director **Bob Best** all fielded a num-

ber of questions from the group about MWBE contracts for state transportation work. Welcome to the Valley, Preston!

Ever wonder about the behind-the-scenes engineering involved in the fatal Challenger shuttle? In his book, *Freedom to Soar*, Mechanical Engineer **John Kimball** has



**Mechanical Engineer, John Kimball, Stanford Engineering Coach and author of Freedom to Soar.**

pieced together memos, articles, drawings and documents that tell the story of the engineering of the flawed seals - and how the engineers themselves warned their management of potential problems with the design - but their warning was not heeded. Through this and his personal mini-vignettes from the aerospace industry, Kimball shares how engineering design can benefit from having a "free" in-house design consultant who can offer design analysis and expertise without fear of political ramifications. We all learn from failures - and Kimball has included quite a few among the cases he presents in this book. Hearing what actually happened in a real case is a rare opportunity - and one that Kimball hopes can help inspire engineers and engineering students to gain broad experience in design either before or instead of moving into engineering management.

Got a "Silicon Slice" for this page? Write or fax your input to us, c/o Slices Editor. Fax (415) 941-6263.



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**Welcome to the Corner...**

by John Reed



**John Reed**

and our selections for this month reflect that fact...

Seán O'Riordan, an Irish import, has been working in the mental health field for the past 25 years. He has done much to promote understanding of Viet Nam veterans and their families...

We engineers are supposed



**Dennis Briskin**

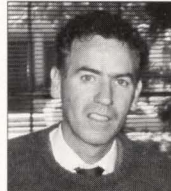
Mario Baratta, V.P. of ANWEST, Inc., says that his company, with 3 offices in Northern California, and 2 in Arizona, has been in business since 1972, having completed projects virtually all over the world. Their services range from conceptual/final design, to construction supervision/management...

To clear up any misunderstandings possibly arising from any earlier advertising in this mag, to the many people who've commented, **The Reed Company** deals with semiconductor memories and related problems/issues; We provide *no* services for *amnesia victims*...▲

Judging from our first edition of May/June, you might perceive that this a "high-techy" kind of column, catering only to people with technical needs. Well, even engineers have needs that range outside of the technical arena,

to be illiterate, right? While we all recognize and deplore that silly stereotype, still, some of us could use some help, sometimes maybe more than we think! Enter **Dennis Briskin**, "The Friendly Ghost," who stands ready, willing, and able to help...

Seán O'Riordan



**Seán O'Riordan**



**Mario Baratta**

**Seán O' Riordan, M.A.**

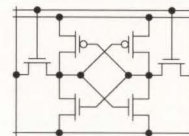
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**Superperformance Computing**  
(Continued from page 9)

rable to that of Silicon Valley. The situation is comparable to that of the film industry in Los Angeles or the garment industry in New York. No matter what the technological product, service or expertise is or how quickly one needs it, it is available here.

This is the reason why high-tech companies that try to leave the Valley because of the price of real estate find that they can't leave. Either they can't find the people elsewhere or they can't conduct business efficiently because of a lack of one or more key support services.

No discussion of Silicon Valley's high-tech infrastructure would be complete without mentioning one of the area's greatest at-

tractors - venture capital. Possibly half the leading technology-oriented VCs in the world are located in and around the Valley. *Institutional Investor* magazine says that more than a third of all the venture capital spent on technology-based enterprises is placed here. As a result, the entrepreneurial spirit flourishes in the Valley as it does in no other place in the world. The evidence is underscored by the enormous influx of foreign money, particularly from Japan and Europe. Jeff Kalb, President of MasPar Computer Corporation, says "The infrastructure of the Valley is one of the greatest assets a small startup can have. It provides leverage for your investments, specialty operations to supplement scarce internal resources, and a wealth of accessible expe-

rience that helps you avoid pitfalls."

Silicon Valley is the core of the Superperformance Computing World. Given the entrepreneurial spirit that has pervaded the Valley since its inception at the dawning of the transistor age, it is likely to remain so for the foreseeable future. ▲

*Michael P. Burwen is a principal of the Superperformance Computing Service which is the world's leading research-based information service program devoted to analyzing issues of concern to government, academia and industry that are involved with high-performance computing and related technologies. For details, contact The Superperformance Computing Service, Tel: (415) 968-4657.*



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## **FOREIGN OWNED FIRMS: FRIEND OR FOE?**

By Roy Brant

**S**hould a graduate engineer pursuing career alternatives in leading edge technology seriously consider joining a company that is owned and directed from another country? To what extent can foreign ownership be a limiting factor in one's career? These questions are becoming increasingly important given the significant foreign investment in technology in Silicon Valley.

In our last issue we presented a dilemma to our readers that addressed these issues.

### **THE SITUATION:**

Jennifer graduates from college with an MSEE degree and sets about finding a prospective Silicon Valley employer that will offer her an opportunity to work with state-of-the-art technology.

After extensive research and several interviews she finds a foreign company that not only meets, but exceeds her technological requirements. She is offered an entry level engineering position that she feels has exciting possibilities. But before she can accept the offer she is confronted by a family friend who is also a senior engineer who suggests that she should reevaluate her career decision.

He describes his own experience with a non-U.S. employer where he progressed through the engineering ranks only to find that the higher level jobs were occupied in the main by expatriates who were regularly recycled from the parent company in another country. Furthermore, he claims that the majority of the key engineering assignments were reserved for this group with the practical effect of severely limiting growth opportunities for all other engineers as well as those seeking roles in management.

Should this potential situation be a factor in Jennifer's career decision?

### **THE RESPONSE**

Our reader responses varied as to whether or not Jennifer should seriously consider the senior



engineer's advice, but the overall indication was that she should pursue her near term technical objective and not be unduly concerned as to where this initial position may lead her.

*Jennifer is looking for high caliber experience, not a marriage. She should take the position to learn and make professional contacts while keeping an eye out for her next employer.*

Ted Goeders

This response reinforces the notion of a fickle Silicon Valley workforce that considers jobs as transitory experiences, where the individual is continuously looking ahead to the next relationship. While I would concede that a job is not a marriage, I don't see the value of a series of jobs that could be characterized as brief affairs totally lacking in commitment of any kind. It would be better to prolong the search to find a company that is compatible with the job seeker's own aspirations and career objectives.

*As an entry level engineer, this would be an ideal job for her since it provides her with state-of-the-art technology experience. If at a later time she wishes to enter management levels, she can still do so. Evaluating future management possibilities with this company is a little premature since her MSEE will gear her towards the technical end of the engineering spectrum.*

Duke La

This response realistically addresses the near term objectives of an engineer launching his/her career. I would agree that management aspirations should not even be considered until the individual is sufficiently grounded as an individual contributor.

*I would check the foreign company's track record with respect to customer service (do they just sell or do they support?) and stability (do they leapfrog through the U.S. fields of business?). Also, are they a single company conglomerate member or what? If the answers to these questions seem fine, then go for it Jennifer!*

Lisa Zeise

The question of whether or not the company is going to be around over the long haul as well as customer perceptions and general reputation should always be significant factors in making a career decision regardless of the position sought.

We also received an anonymous reader response recommending that Jennifer should reconsider her career decision because women working in foreign firms lacked status, were more likely to encounter culturally based prejudice, and had little hope for real career progressions.

We are left with the unanswered question as to whether or not foreign firms and expatriate managers representing multiple cultures have a particular problem operating within the equal employment opportunity framework that has evolved in the U.S. over the last twenty-five years.

Our newest dilemma looks at a related concern in that it deals with a prejudice in the technical community that is not protected by law, but could be key to the future of engineering firms in the Valley.

#### A NEW DILEMMA:

*What would you do?*

**Dave graduates with a bachelor's degree in engineering from a local college having maintained a "C" average throughout his four year undergraduate program. He then looks for an entry level engineering position at a Silicon Valley firm.**

**He participates in three on-campus interviews by local employers, distributes resumes and transcripts to more than 50 companies and follows up with personal telephone calls to 16 firms that have positive reputations as places to pursue an engineering career.**

**Over the next several weeks he receives a number of form letters from companies thanking him for his interest while indicating that there are no opportunities presently available related to his experience and background. Dave is confused because he has heard that engineers are in short supply, which he thought meant that positions were readily available.**

**He is finally able to obtain interviews, only to be rejected again. A particularly candid corporate recruiter tells him that his firm prides itself on its engineering excellence and wouldn't even begin to consider a "C" student, especially a "C" student not graduating from one of the "better schools".**

**Given this response, what are Dave's alternatives?**

**To respond, use the reader response form on page 29 or Fax to (415) 941-6263. Responses received before August 17th will be considered for inclusion in the next issue.**

*Roy Brant is president of People Performance Programs, a human resources consulting company in Los Altos.*

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## TEAM BUILDING: AN OXYMORON FOR ENGINEERING?

*If teamwork is the key to staying competitive,  
then why is it so hard to do?*

by Jean A. Hollands

In this era of technical specialization, one engineer sometimes must team up with another. At other times, the whole engineering team must collaborate with manufacturing, marketing and sales departments. Does it work? Do engineers play team? Why can't engineers do team easily?

**Engineers are trained in the scientific method.** You are taught to look for flaws. You are coached to consider the problems before accepting the possibilities. These patterns conflict with basic "group think." It is hard to stay open to the sales director's ideas without considering the improbabilities of his suggestions. The brain-storming theory of listening without judging is a forum for cognitive dissonance!

**Solution:** Learn the value of brain-storming and conceptual block-busting with courses and books which stress the productivity of group think. Of course there are times which call for complete one-dimensional concentration, but learn to stifle your

reflex reaction to this comfortable mode, for the "good of the order."

**Engineers are trained to think in uni-focus.** This unilateral focus provides for the ultimate concentration on creative tasks, without the distraction of other dimensional pulls. The price, though, is missing out of some early strategic "big picture" thinking. The rush to the problem at hand, especially if it is technically provocative, screens out people and other ideas.

**Solution:** Train yourself to hold back. Don't zero in on one aspect of the problem. Leave it open. This is crucial in the planning stages of any project. Re-program yourself with self talk. Use more right brain and add the dimension of being an artist to being the scientist. Practice driving and talking, being

Rushing to the problem at hand, especially if it is technically provocative, screens out other people and their ideas.

on a serious phone call and adding columns, or deliberating on two or more projects at a time.

**Engineers are inherently introverted.** By personality many engineers are introspective. If you are not prone toward interaction and high communication skills you may add on to the "contagious reserve" which can prevent group interaction. Like a convention of shy people, not much happens. Everyone waits for the "stimulator" to start the action!

**Solution:** Practice communication. Practicing interaction with others actually changes patterns. Fear of rejection, inability to "small talk," and lack of experience in being vulnerable all prohibit interactive behaviors. The introvert processes events, problems and people internally, while the extrovert translates and works on the problem with others out loud. Letting others know how you think and draw conclusions is vital to your team.

**Engineers don't sell themselves or other worthy causes!** Some engineers lack persuasive skills and top that off with a value that prohibits invading others with our own theories. With the notion that everyone, including you, always has a right to come to his own conclusions, it is difficult to "push" your ideas on the team. This "holding back

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position" in a team creates tension and dis-sension and ultimately hurts everyone.

**Solution:** Take sales courses. There are many trainings for non-sales personnel. Don't be afraid to ask for a personal evaluation about your ability to sell your ideas, projects, objections. The inability to persuade or the reflex to pull back or away when your attempt is thwarted are major handicaps. Fix this by taking team building training.

**Interdependency is not coached.** Engineers tend to look upon dependence as weakness. Unable to distinguish what alternating dependency would look like, the "do it yourselfer" has difficulty believing or relying on the expertise of others. This is why so many of you do your own taxes! But teams turn sour when alternating dependency doesn't happen.

**Solution:** "Anchor" on to past events in which you have felt like a team player. Take classes in team building. Read *Styles of Thinking* by Bob Bramson and push yourself into collaborative projects, some non-threatening if possible, just for practice! Learn to trust and appreciate the skills of your teammates.

Engineers, you make good teammates because you believe in the ultimate systems approach to problem solving. You can learn to adjust your personality, patterns and behaviors when it will advance the company or yourselves. Teams work when individuals want to play. Individuals need to give up control, shift power, and sometimes take responsibility for the whole darned team. Push your own ideas, pitch for what you want. We know that it is easier to do it yourself. But only in the short term... ▲

Jean A. Hollands, Director, Growth & Leadership Consultants, Mt. View, author of *Silicon Syndrome: How to Survive a High Tech Relationship* advises and trains executives and engineers in companies like GM, Apple, EDS and HP. Her career began as a Programmer/Systems Analyst for IBM and she is happily married to an engineer. He is too. (Happily married.)



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**B. Ethical Dilemma Solution.** Here's what Dave should do (Page 27).

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# ENVIRONMENTALISM:

## *Is the cost too high for Silicon Valley?*

by Marshall McCormick

**S**ilicon Valley is becoming more environmentally conscious every day. Environmental groups formed in the Santa Clara County area such as the Silicon Valley Toxic Coalition, Citizens for a Better Environment and the Environmental Defense Fund have catalyzed and focused the public's attention on the Valley's environmental problems. The efforts of these groups have resulted in legislative action such as the Toxic Gas Initiative and a rewriting of the facility requirements in Silicon Valley. In addition, they have focused public attention on high technology corporations in order to minimize any additional environmental contamination.

Silicon Valley is now considered one of the most polluted areas in the United States, primarily because of the high technology industry located here. Santa Clara County has more superfund sites than any other county in America. There are now 28 superfund sites and the list is continuing to grow at the rate of one or two per year. This is a problem that almost all of the major corporations operating in Silicon Valley have been dragged into. The environmentally responsible companies that agree to clean up their spills incur significant liabilities. The south San Jose IBM spill alone is projected to cost IBM in excess of \$200 million.

It is true that some of the most stringent environmental regulations in the world exist in Silicon Valley. It would appear that it

should therefore cost more to produce products in the Valley. But is this significant in the long term?

The environmental problems associated with high technology industry are beginning to be recognized all over the world. New York, Massachusetts, Oregon, Cali-

ants like it because fewer chemicals are purchased and there are significantly lower disposal costs. The environmental department likes it because it reduces their chemical waste. And without environmental pressures such equipment might have never have been developed!



**Marshall McCormick claims that Silicon Valley is fast becoming the leader in cost-effective environmental solutions—reducing the need to dispose of toxic wastes.**

fornia, Japan, Germany, England and France have all strengthened their environmental regulations over the past few years. Because of this, new equipment and new designs have been developed. For example, semiconductor chemical reprocessors have been developed that can produce the cleanest chemical in the world. The capital cost of this equipment is paid back within 5 to 24 months because of the reduced cost of chemical consumption and waste disposal. The process engineer improves yields by using the cleanest chemical. The account-

The environmental movement has forced Silicon Valley industry to respond. As the rest of the world becomes more environmentally conscious, they too will need cost effective solutions. Here in Silicon Valley we are already developing ways to solve such environmental problems. A whole new industry is being created that is leading the way in environmentally responsible products and designs. And the sale of products from this industry will assist in reversing the U.S. balance of trade.

From problems come opportunities. And as we all know, Silicon Valley is known for taking advantage of opportunities. Environmentalism isn't killing Silicon Valley – it is challenging us, and in the process giving us a chance to lead the way in another major new technology. ▲

*Marshall McCormick is the President of Alameda Instruments of Pleasanton, maker of sulfuric acid reprocessors for the semiconductor and other industries. He has a Chemical Engineering degree from UC Berkeley and an MBA from the University of Connecticut.*



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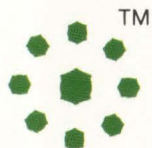
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