

March/April 1990

SILICON VALLEY Engineer™

Vol. 2, No. 2
Complimentary



GETTING OUT OF THE BOX

**How Carl Amdahl and Enzo Torresi
created NetFRAME**

SO YOU WANT TO START A COMPANY?

Read what engineer entrepreneurs Dick Allen, Marti Johnson and Klas Eckland have to say.

THOSE GLAMOROUS CONSULTANTS

Six Silicon Valley engineers describe the highs and lows of self-employment.

TAXES GETTING YOU DOWN?

Here is a strategy for engineers to reduce the IRS bite.

HIGH "E" ABOVE "C" AND A FRETTED FIFTH

A meld of music by engineers Jim Synder, Jeff Zias and Art Zias.

TWO WHEELERS

Commuting by bicycle is Mike Hardin's solution to traffic jams.

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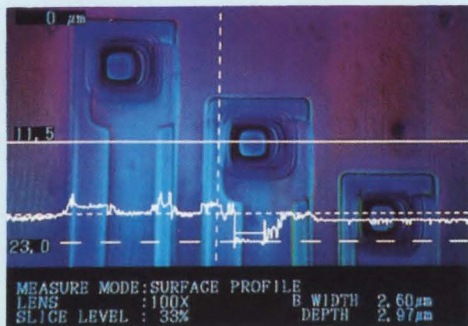
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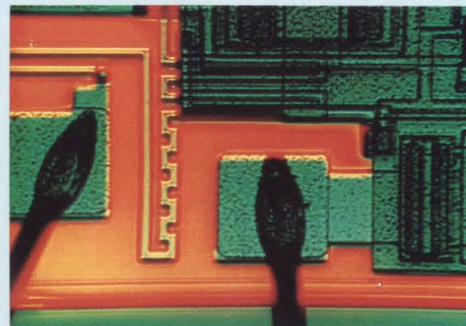
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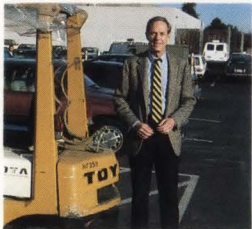


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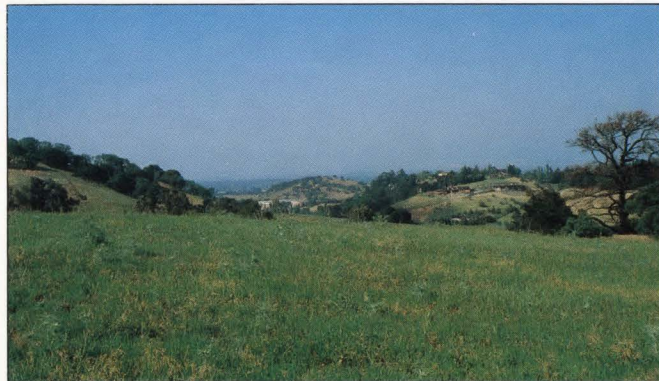
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*The Silicon Valley Engineering Council
announced the Engineering Hall of Fame at the
Annual Engineers' Week Banquet, February 22, 1990*



Front row, left-right: A. Louis London; Leo W. Ruth; Jay Pinson, Dean of Engineering at San Jose State University and President of the Silicon Valley Engineering Council. Back row, l-r: Jim Hill of FMC, V.P. of the Silicon Valley Engineering Council; Ed Zschau, CEO of Censtor Corporation and guest speaker at the 1990 Engineers' Week Banquet; Terrance Terman and Frederick W. Terman, sons of the late Frederick E. Terman.

FREDERICK E. TERMAN

Late Dean of Engineering, Vice-President, Provost and Vice-President Emeritus of Stanford University. Fostered government sponsorship of university research and provided university support of industry that helped spawn the "Silicon Valley." President of the Institute of Radio Engineers, now known as the IEEE. Held the Bachelor of Chemical Engineering Degree and the Engineer's Degree in Electrical Engineering from Stanford and the Doctor of Engineering Degree from the MIT.

A. LOUIS LONDON

Professor Emeritus of Mechanical Engineering at Stanford University. A pioneer in heat exchanger research resulting in advancements in aircraft engines and the miniaturization of electronic equipment. Author of monographs on compact heat exchangers and convection heat transfer. A Registered Professional Engineer in the State of California. Holds the Bachelor of Science and Master of Science Degrees from the University of California at Berkeley.

LEO W. RUTH

Founder, past president, and advisory director of Ruth and Going, Inc. Designer of Santa Teresa General Hospital and The Villages Adult Residential Complex in San Jose. A Registered Civil Engineer, Mechanical Engineer, and Licensed Architect in the State of California and a Registered Professional Engineer in five other states. Served in many positions in engineering education and accreditation. Holds the Bachelor of Civil Engineering Degree from Santa Clara University.

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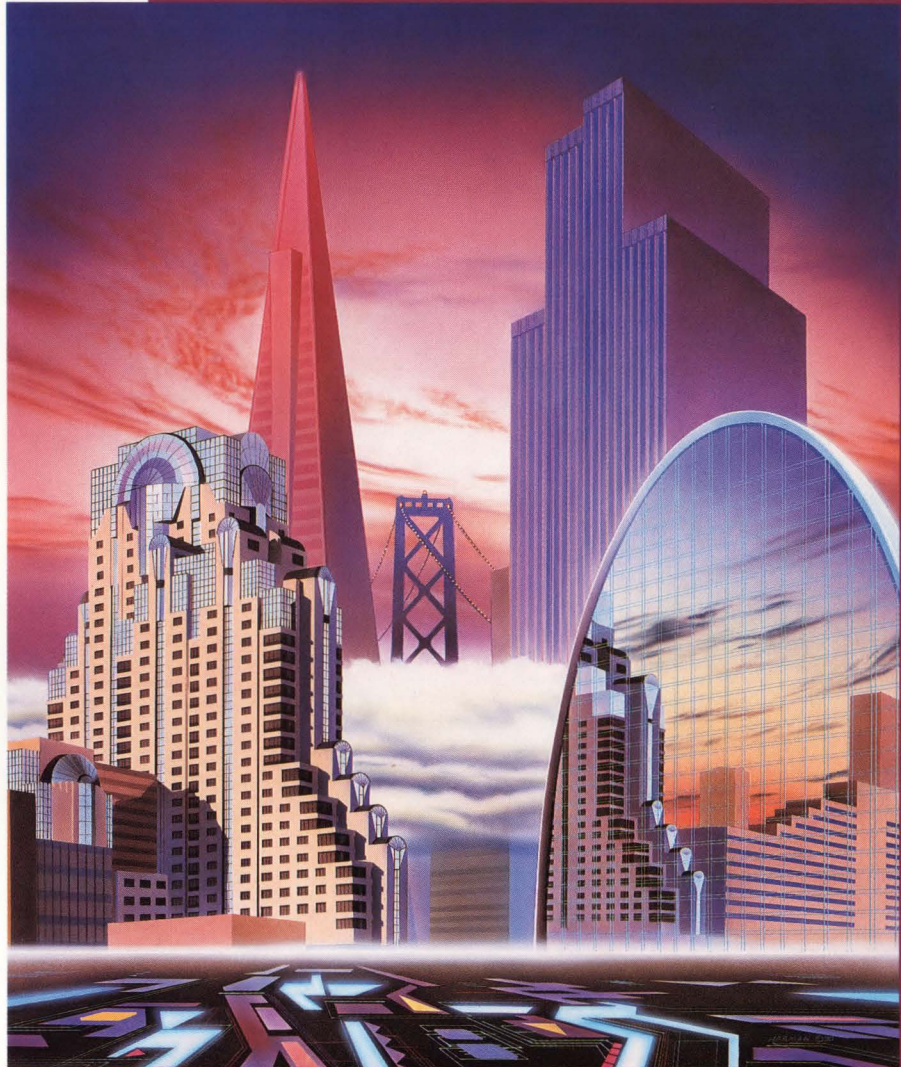
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DESIGN TEAMS DELIVER BIG RESULTS

At ACC, engineers work with marketing to improve productivity and marketability.

by Richard Davis

Parkinson's Law states, "Work expands to fill the time available." This axiom is taken seriously at ACC Microelectronics, in Santa Clara, a new entrant in the PC chipset market.

ACC's president, Wei-Tau Chiang or "W.T." as he is called by his co-workers, demands that chip design takes no longer than six months, about half the time normally taken at larger integrated circuit manufacturers. Such fast turnaround is essential to meet the fleeting marketing window and stay ahead of the competition.

Given the time, says Chiang, IC designers will "engineer" a product to death, diligently using every bit of that time to make the design better and more complete. But



W.T. Chiang - "Engineers can get burned out on projects."

often a simpler design can suffice.

For example, if an engineer is given the task of designing a memory controller chip, his first thoughts are typically to make it compatible with all types of available DRAMs, from 64 kilobits to 4 megabits. However, if 90 percent of all PC applications will only use one-megabit DRAMs, then the design task is simplified, and an eight-month design and debug task can be cut to four months.

A six-month design cycle is also good for morale, contends Chiang. "We find at

ACC that engineers often tire of projects that last more than six months. Worse than that, they can get burned out." He feels it's best to make engineers feel responsible for specific projects, performing a broad array of tasks as part of a small team effort.

Seeing the Big Picture

In order for ACC to implement a standard design cycle of six months, it is very important for design engineers to be aware of the importance of getting products to market on time. To accomplish this, each of ACC's engineers is teamed with an engineering manager. It's up to the managers to explain the economic factors before a project is started. The managers then prepare aggressive schedules and, after negotiating the milestones, the engineer is expected to commit 100 percent. "It must be total commitment to the schedule or the entire system can collapse," says Chiang.

Once milestones are established, weekly meetings are held to track performance, to deal with unanticipated problems and to allocate additional resources. Solutions for making up for lost time are also considered. A typical chip design allows two to three months for design, two weeks to eight weeks for fabrications and six to eight weeks for debug and final test. If any part of the plan slips, then it must be made up at the back end, which could require paying a premium to a foundry for a two-week turnaround. Any compromise is negotiated between the engineers and their managers.

Another rule at ACC is that the engineering design department is made up of equal numbers of computer system engineers and IC design engineers. "It's important we have on our team engineers with system design background, as well as chip design experience. That way the engineering teams know how to design ICs that best fit the customer's application."

Improving Versus Competing

How does ACC attract engineers to work in this high-pressure environment? The salaries and fringe benefits are only comparable to other IC design houses. "Our biggest draw," claims Chiang, "lies not in the compensation package, but in our small team approach to the job and the experience each engineer hopes to derive from it. Since we are a small company, we can't specialize like bigger IC companies and our engineers must know how to complete all the tasks required to make a chip, from initial logic design to debug."

ACC therefore seeks computer and chip designers who have 10 to 12 years of experience and who are genuinely interested in understanding all aspects of a chip's development. These professionals want to feel responsible for the products. This kind of strategy has been supported by Tom Peters and other industry pundits who say that before we educate more engineers we have to find better ways to deploy them. One way to improve engineering efficiency and improve U.S. competitiveness is to downsize development teams and give engineers responsibility for their products.

Chiang's philosophy to deliver good working products within six months has enabled ACC to compete effectively. Without such a competitive advantage a small firm simply can't survive. ▲

Richard Davis is a free-lance writer and editor with 20 years experience in high-technology communications.

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INSURING YOUR COMPANY

*For any venture, insurance is a necessary evil.
It could even be a corporate asset!*

by Steven E. Bonner

Like many engineers, you are talented and skilled at what you do. So you decide to open your own business, incorporate to protect yourself, put a sign up and go to work. You knew there were various insurances needed and figured you would add them as necessary. But you may not have counted on their complexity, variety and cost!

As with any business purchase, ask questions and know your options.

Identify Your Insurance Philosophy

Many business owners judge insurance by how it covers little things, such as a \$30 medical prescription or a lost shingle on the roof. If you want coverage that provides all the frills, your business had better be profitable, really profitable.

The recommended philosophy is to insure for catastrophe only to protect you from being wiped out. For example, if you become disabled, it would destroy you financially. If you develop cancer, which may incur debts in excess of \$1 million, but your insurance policy is limited to \$500,000 or carries a non-stoppable co-insurance, you would also be wiped out. These are the things that must be considered when developing an insurance/benefits plan.

Once you have identified a philosophy, find a broker who is knowledgeable and specializes in the area of insurance you need. If you want the best disability insurance, don't go to an auto insurer. Also, make sure your broker is not a captive agent who sells for only one company; you may not get the best value.

Start with the most essential coverage for your company: workmen's compensation, medical, disability, liability and life. Some of these insurances will not apply to every business situation, but they are generally important.

Workmen's Compensation: If you hire employees, you are required by law to carry workmen's compensation. If you do not

have it and you have an audit or an employee becomes disabled, you are subject to fines as well as personally paying the employees' disability benefits.

Medical: First, check the prospective carrier's rating with the insurance analysts. Also learn the lingo: preferred provider organization (PPO), health maintenance organization (HMO), co-insurance, standard indemnity, cost containment, etc., so you can make an intelligent buying decision. Identify the style of plan you want, and the deductible based on the terms.

The most popular medical plans have a \$500 deductible with 80/20 co-insurance (the insurance company pays 80 percent) to \$5,000. Above \$5,000, the insurance company pays 100 percent. Such plans usually have a PPO option that provides medical treatment for a minimal charge when employees go to a physician approved by the plan. This approach tends to be cost-effective while providing excellent catastrophic benefits and good day-to-day coverage.

There are things to watch out for:

- 1) Limitations in the contract (ailments that aren't covered).
- 2) Low UCRs. UCR means usual, customary and reasonable and sets maximum rates for standard treatments, such as fillings.
- 3) Poor conversion to single policies for terminated employees.
- 4) Third-party administrators, or brokers who resell insurance. Rates and insurance payouts may fluctuate when they have to buy from different carriers.
- 5) Excessively low premiums. This normally means the company has limitations in the policy or rates may increase.

Disability: Disability coverage is the most important insurance investment since

it covers your most important asset — your ability to earn an income. According to the FHA, 48 percent of all the mortgage foreclosures last year were due to disability. A 35-year-old engineer has a 41-percent chance of becoming disabled for 90 days or more, with the average disability lasting for more than five years before age 65.

Look for a non-cancelable, guaranteed renewable policy. If you are providing coverage for employees, choose an adjustable annual renewable disability insurance (ARDI) that bases premiums on attained age to save premium dollars.

Long-term disability (LTD) is another option which is less expensive, but also less effective. However, for a startup company, it may be more cost-effective. You may want to apply for a non-cancelable first, then an LTD to maximum coverage.

Life: Generally, life insurance is provided for employees at \$10,000 or equal to one year's salary. On the business side, life insurance can help fund buy-sell agreements between partners, for key-man agreements to protect vital employees, for business debt protection and for non-qualified deferred compensation.

Life insurance is unique because you can build up cash reserves at a good tax-deferred interest rate and use it to guarantee retirement savings program in case of disability.

Liability: Professional liability is important, but for many engineering firms, especially startups, it is too expensive. Liability coverage should be provided for the premises and company cars (if applicable). Shop carefully for liability insurance and stick with a reputable company for future considerations.

These insurance considerations are essential for most businesses, however there are several circumstances that can alter these needs. When making a buying decision, ask yourself, "If I don't have this coverage and something happens, will it wipe me out?" If the answer is "yes," then you need coverage. However, if you can recover from a loss and you are on a budget, think twice before purchasing. ▲



Bonner: Ask yourself, "If something happens, will it wipe me out?"

Steven E. Bonner is president of Allied Financial Network in Santa Clara, offering insurance, pension and investment services.

Is Your Career on a ROLL?

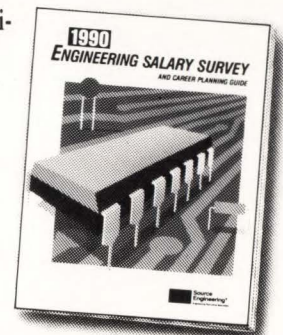
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FREEDOM THROUGH CONSULTING

As these self-employed engineers have found, there's more to becoming a consultant than meets the eye.

by Karl D. Haas

Why does it seem so glamorous? We have all worked with consultants. Perhaps it's the romance of self-employment that makes us envy them. Or maybe it is the high pay, flexible hours and freedom from office politics. But before taking the consulting plunge, take a lesson from those engineers who have gone before you.

The Price of Independence

A consultant is not an employee, but an expert brought in to fulfill a specific contract. IRS Publication 539 lists 20 "when, where and how" statements to distinguish consultants from employees. For example, consultants do not work as part of the staff and do not receive employee benefits. They must make quarterly tax payments, pay double Social Security and have the required business licenses and certificates.

Insurance is another consideration. As Christina Robinson, a water and wastewater engineer based in San Jose, explains, a third party may feel injured and sue anyone associated with a project. Therefore, consultants often carry another kind of insurance similar to malpractice insurance, "errors and omissions," which can cost several thousand dollars depending on the specialty.

A prudent consultant would also take certain steps to reduce the risk of being sued. Have colleagues check your work to avoid problems or embarrassing mistakes. Robinson, for example, has a working relationship with several other firms to provide a mutual quality check. Robinson believes in working with professional groups. Networking is also a good way to stay on the cutting edge of technology, as well as garnering new clients.

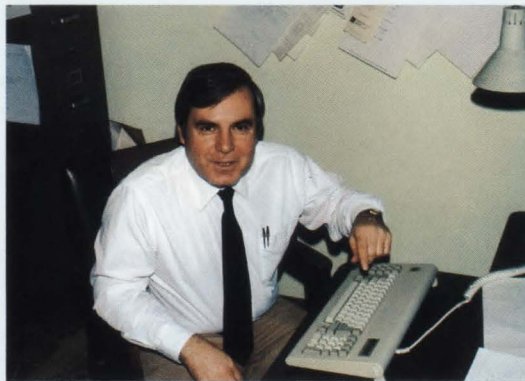
Obviously, a consultant should use an attorney for contracts. Samuel Phillips, an independent product design specialist based in Portola Valley, points out that an engineer knows what he wants to do, but it takes a lawyer to say it in legal terms. Phillips also cautions that, in most cases, an independent consultant doing engineering work in California must be a registered Professional Engineer in order to use the word "engineer" in his business.

Communications Is the Key

Communications between parties must be clear, complete and timely so that neither you nor your client is ever surprised. Remember that communication is a two-way

street. Mari Stober, proprietor of The Cad Department in Sunnyvale which provides PC board design services, requires that everything be put in writing unless it involves R&D, for which she bills at an hourly rate. Documenting everything is applicable to all aspects of consulting, and make sure that the job done is what the client expects. In other words, don't design a typewriter when the contract says printer.

Like most consultants, Stober feels a responsibility to alert clients to problems that fall outside of the contract. Offering more than what the contract demands is just good business. Carl Angotti, a San Jose electronic engineer, adds that you must learn to tell clients in a kinder, gentler fashion,



Angotti: Use a kind, gentle manner with clients.



Phillips: Get registered as a professional engineer.



Robinson: The key is successful networking.



Ferrier: You can stick to the technical side.

rather than the "call them as you see them" manner engineers often use.

Time Is Money

The workload of a consulting engineer will vary. Scotty Craik, a safety and health engineer in Cupertino, averages only three to four hours of consulting a week. Since he is semi-retired, that suits him just fine.

Stober is at the other extreme, working "seven days a week — the day shift is overhead work and the swing shift is designing." Robinson finds her successful networking leads to a 12-hour work day.

Angotti's work schedule is less strenuous. He aims at a 40-hour work week that is 50-percent billable; a scheme that provides for a lifestyle that offers more time for study, reading and travel. Herman Ferrier, a control systems engineer in Los Gatos, says he averages 40 hours of work per week, but it's all billable time. He hasn't had to do any sales since the slump of '82.

Prices are affected by competition from in-house departments and other consultants. A successful consulting engineer will probably be able to bill at an hourly rate between 200 and 350 percent of the salary

earned by a comparable employee. On an hourly basis, fees are lucrative. Setting the exact figure is an art. For example, one of Angotti's clients asked him to raise his bid to avoid questions about competence from upper management.

Of course, these rates only apply to billable hours. Many hours are spent keeping up to date on the engineering discipline and related fields, making prospect calls and doing other work.

Fixed-Fee Contracts

The fixed-fee contract can be tricky. Bid too high and you don't get the job. Bid too low and the client will assume you don't know your business or understand the scope of the project.

As Phillips points out, a consultant must have the project goal in writing to provide a benchmark to compare to what is actually accomplished. Otherwise, the solution may not match the problem. This statement of objective is an important part of a fixed-fee contract.

Unless the project can be defined in every detail, an hourly rate is more practical. Ferrier points out that a fixed-fee contract to develop and deliver a device is usually not in the client's interest since there is a tendency to go for the "quick-and-dirty" approach rather than the best solution.

The Intangible Rewards

In addition to the money, there are other, less tangible benefits to consulting.

When he worked as an employee, Ferrier was getting frustrated with his increasing managerial load. As a consultant, he has found that he can stick with the technical aspects of engineering. As Ferrier points out, consultants are seldom given menial work since they are so expensive.

Craik likes being able to turn down work when he feels he is not the expert. He also likes the idea of working only a few hours a week to stay active.

Robinson finds she gets more respect as an independent contractor than she did as an employee. She also likes the idea of being able to walk away from clients who appear to be acting unethically.

Knowing there is an end to each job, Phillips feels that he is in a better posi-

tion to give an honest assessment of problems and solutions.

Stober says she likes being her own boss, making good money and doing quality work. In fact, she feels like a fish out of water without a heavy workload.

Angotti likes being able to refuse impractical projects, work that he couldn't refuse as an employee.

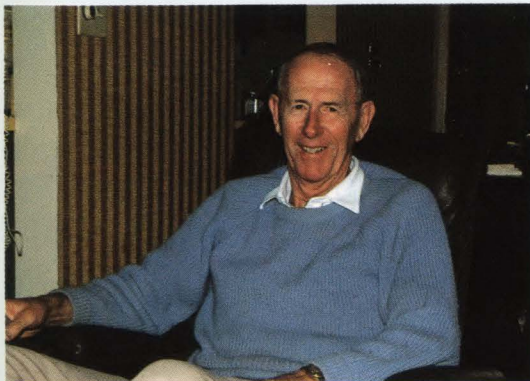
Although many people fear the lack of security in consulting, is there any more security in a "permanent" job? Most consultants feel there isn't. As Phillips points out, "having only one source of income is death! If I lose a client, I only lose part of my income."

In fact, all the consultants profiled here have had offers of employment from clients, which is the nicest compliment a consultant can get. But Angotti seems to speak for them all when he says that becoming a full-time employee again "would be the last step before destitution." ▲

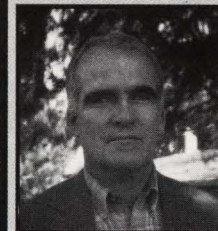
Karl D. Haas is a free-lance writer and successful consultant in mechanical engineering based in San Jose.



Stober: Offer more than the contract demands.



Craik: An ideal way to "retire" yet stay active.



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REDUCE YOUR TAXES, INCREASE YOUR CASH FLOW

*If you are looking for ways to cut your taxes,
why not sell some of those high-tech stocks?*

by Carol N.S. Brown

If you've been looking for new ways to reduce your 1989 tax bill, you have probably discovered there aren't too many avenues open to you. In 1990, Congress may lower the capital gains tax rate and possibly reinstate the IRA. As for the 1989 tax year, you can still use the same devices you did for 1988 - 401(k) plans, tax exempt municipal bonds and money market funds, deferred and variable annuities, SEP/IRAs or Keoghs, or prepaying property taxes and your mortgage. But here's a little known tax strategy that may help engineers who have stock or other taxable assets.

How would you like to sell your appreci-

ated assets, such as real estate and securities, with no capital gains tax, increase your cash flow and get a tax deduction while reducing your estate tax liability?

Sound too good to be true? It's not. Let's look at one couple and see how they reduced their taxes.

Charity Begins at Home

The Smiths, both age 45, work at a high-tech company and have been able to reduce their taxes somewhat by using the 401(k) plan at work, their home mortgage and tithing to their church. Both of them own stock worth \$300,000 purchased at a cost basis of \$20,000 which yields \$4500 annually at 1.5 percent. They would like to sell this stock to provide additional income to help pay the college tuition expenses for their two children, but they have hesitated because of the high capital gains taxes.

A charitable remainder unitrust can solve the Smiths' problem. Once established, the charitable trust receives the gift of the appreciated stock. Because the charitable trust is a non-profit entity, the stock is sold with no capital gains tax due, and the money creates additional income for the Smiths.

Since the gift will go to charity after both of them are deceased, the Smiths receive an immediate charitable deduction for the gift. This charitable deduction is based on their ages, the current market value of the gift, and the percentage of payout selected.

In their particular situation, the charitable deduction is roughly \$18,400. In a 35-percent tax bracket, the Smiths may save more than \$6,400 in income taxes. Any deduction not currently used can be carried forward for five years for future income tax

savings. By using the charitable trust, they may save up to \$98,000 in capital gains taxes, and their cash flow will increase from \$4,500 per year to \$24,000 if they choose an 8 percent annual payout on the trust. If the trust yields a higher return than it pays out to the Smiths, say an annual yield of 10 percent and annual payments of 8 percent, then the annual income from the trust will continue to grow as the trust grows (in this case, 2 percent annually).

Security for the Future

So now the Smiths have converted \$300,000 of stock. Their estate tax liability has been reduced, but they may also have some unhappy children who were hoping to get that \$300,000 some day.

How can the Smiths replace the wealth they are tying up? Take out a life insurance policy for \$300,000. Since their children won't be the ultimate beneficiaries until both parents are deceased, there is no need to insure Mr. and Mrs. Smith individually.

When both parents die, the insurance company pays \$300,000 or more to the beneficiaries. And if the policy ownership is properly structured, there will be no estate and no income taxes due.

Since the Smiths plan to tie up \$300,000 in assets, it is prudent to obtain the \$300,000 of insurance before setting up the charitable remainder unitrust.

By using this strategy, the Smiths protect their children in the event of their untimely deaths before the children have completed their education. By using the charitable remainder unitrust, they can also sell their property without incurring capital gains taxes to have more money to increase their cash flow, while reducing their estate tax liability at the same time. An added benefit is that the Smiths find that they are able to give more to their church than they ever imagined possible. Maybe you can learn from the Smiths' example and gain a higher yield from those taxable assets! ▲



Carol Brown - "Invest your assets."

Carol N.S. Brown, CFP, is president of the Brown Financial Group in Los Altos, which specializes in wealth accumulation and preservation.

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**THE FORCE
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A Conversation with Startup Veteran **CARL AMDAHL**

Computer visionary Carl Amdahl discusses his failures, his successes, and what it takes to launch a successful company.

Carl Amdahl is no stranger to startups. NetFRAME systems marks his third venture, which he is now running with seasoned professional, Enzo Torresi, who is pictured with Carl on the cover. Unlike his first two companies, Trilogy Ltd., which he started with his father, Gene Amdahl, and Magnuson Systems, Corp., Amdahl has orchestrated NetFRAME's entire business operations as well as doing product design and development.

This time, he has launched a company that is making "network mainframes," a new hardware concept that combines the reliability and security of mainframe technology with the compatibility and accessibility of personal computer hardware in a local area network environment. The company is four years old, employs 85 people (half of them engineers) and shipped its first product in the fourth quarter of 1989.

We asked Amdahl how he came upon the idea of the network mainframe, and to share his experiences as Chairman and Chief Technical Officer of this fledgling high-technology company.

Q: What did you learn from starting Magnuson, and especially Trilogy?

A: The most important thing I learned is to pick the right market and the right product strategy first. Without a market, there isn't much reason to build a company. The number one mistake that most companies make in the Valley is they become enamored with the technology and don't view it from the standpoint of real market and customer needs or competitive positioning.

There is a lot of missionary activity that goes into creating a new market; educating people, developing new technologies and

so on. The interesting thing about the network server market is that it was already in place but it was not considered a discrete, separate market. We were able to educate people to look at this as a separate market with separate product requirements.

Q: What is it that drives you to continue to start new companies as opposed to working with an existing corporation?

A: Startups are addictive. It's like an adrenalin high. They certainly don't offer the same security as a larger company. But you get to make your own mistakes, and the successes are your own as well. I also enjoy working with small teams of motivated people, and that environment is much more difficult to create in a larger organization.

"Startups are addictive – like an adrenalin high."

Q: In the other startups in which you have been involved, you were primarily involved in creating the technology. Why the move to the broader business role with the creation of NetFRAME?

A: After Magnuson and Trilogy, I decided there was more to success than technology. I wanted to move beyond engineering and gain a broader management perspective. So I took a year to get my Master's degree in Science and Management at Stanford as a Sloan fellow.

After that, I didn't want to get back into the market by joining an existing company. On the other hand, I didn't want to build a company around the first good idea. So in 1985 I put together a consulting firm focused on high-performance system design,

and I gathered a core group of technologists and system architects. We priced our services so we could split our time between client work and research. As consultants, we could watch market and technology trends in a methodical fashion. We weren't forced to come up with a good idea that could be funded to stay alive. That consulting company became NetFRAME Systems.

Q: Any particular obstacles you have run into in creating this organization that you may not have anticipated?

A: We didn't anticipate the October 1987 market crash. That set us back a good six months. In terms of the other aspects of the business, the company has grown remarkably according to plan. We have continually met projections, budgets and schedules, and that's a real rarity in the Valley. That's helped us build credibility, with our investors and with customers and vendors.

Q: What pieces did you have to assemble before going out for venture capital?

A: Although we had not built a prototype (with the larger systems, prototypes are too expensive to create and debug), the design for the product was virtually complete at the time that we sought the first round of funding. And we had built a stellar team of technical professionals to give us credibility. We also had a very tightly focused plan with straightforward objectives. And we had established relationships with the investor community. Virtually all the people who put money in the initial rounds were people I had personally dealt with in the past.

Q: Did you have the marketing strategy in place before capitalization?



Carl Amdahl in the NetFRAME test lab with his brainchild, the NF300 network mainframe.

A: You have to have the marketing strategy. I was fortunate enough to work with people like Enzo Torresi [NetFrame CEO and previously Vice Chairman and Senior Vice President of Businessland] who helped put together those strategies. One of the key factors in our success in getting funding was the relationship we have with Businessland and being able to draw from their marketing and distribution expertise.

Q: *How do you go about getting the market research needed for venture capitalists?*

A: The textbook example is to get the market research figures from firms like Dataquest, but they're all after-the-fact numbers. I think the most important thing is to have the individuals who make markets happen stand up and say, "This is the right approach." It is also important to have the technologists forecast which technologies will make a difference over the next several years. The technologist and the marketer have to work together. There is a lot of "gut feel" in this process, along with making sure that you don't bite off more than you can chew and setting the right focus with achievable targets.

Achievable targets are very important.

plans that are set up like that and they are not pleasant to execute because you end up disappointing a lot of people.

Q: *Do you have to give away too much company control to the venture capitalists in order to get money?*

A: That happens. Of course, all of us would like to have a greater percentage of equity than we end up with. I think employees and inside owners of this company account for 30 percent of the stock equity, and that is a pretty decent percentage.

Q: *Startup companies have a predictable growth path. Where does NetFRAME stand right now in terms of life cycle?*

A: NetFRAME has just completed its first product — it's being sold, installed and used. So right now we are in a maturing phase, supporting products that are in the hands of customers. We're also starting the next series of products, and if you look around the Valley that has been a notorious stumbling block for many companies — the Second Product Syndrome. Companies suffer from constipation as they mature, become more organized and disciplined. That can have a negative effect on getting products out the door. So that's the phase

Every venture capitalist has seen the "billion-dollars-in-five-years" plans, and you almost never realize those. It is important that the plan be credible. That is a real chicken-and-egg problem when it comes to funding the company; the more realistic you get, the smaller the numbers are and the less likely it becomes that you'll get funded. The challenge is to strike the right balance between optimism and reality.

Q: *Do startups often have two plans: an in-house plan and the plan you show the investors?*

A: That is probably the most common strategy.

I have lived through

we are in now — to support the existing products and maintain the development momentum. That's a challenge because you have to think in two different ways at the same time.

Q: *How do you maintain both product support and development?*

A: Typically an engineering organization splits; part of the group handles support and part of the group handles new product development. At NetFRAME, we have a philosophy that espouses cradle-to-grave engineering — if an engineer developed a portion of a product, he owns support of that product throughout its lifetime.

I think it is an important philosophical issue. There are a number of engineers who just want to do development. They don't want to become involved in support and making it work for the customer. The engineer who developed a product should own that product and take responsibility for it. It is important that the job of supporting the product has the same status as creating a product. Otherwise you are saying the product is delivered but it's not supported.

As Thomas Edison said, "Genius is one percent inspiration and 99 percent perspiration." That's really true in the engineering discipline. Anyone who tries to segregate the glamour jobs from the real work is doomed to failure in the long run.

Q: *How do you create a culture that fits that philosophy?*

A: We use an interdisciplinary approach. We try to get everyone involved in every aspect of product development. We get people interacting with others in less-related disciplines and try to come up with new approaches as a team effort. One of the things that I like about being Chief Technical Officer is that I can look across the organization and make sure that different groups are working in the same direction. The biggest challenge of my job is to coordinate all that activity with finesse without having to resort to bureaucratic processes.

Q: *Are there any other caveats you would offer to the would-be entrepreneur?*

A: Take your time and be conservative. Don't just jump into forming a new company because you think you have a good idea. Starting a company should be approached very carefully — always with an eye to the market and an understanding of the customer's needs. ▲

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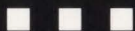
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It's O.K. To Be an Indian!

by Jean A. Hollands

The glory of an entrepreneur is not always bestowed upon the individual contributor who actually enjoys what he does, is content with a lower profile, and is absolutely essential to a "chief's" project.

Why avoid the excitement, stress, press, ego-enhancement that the entrepreneur reaps? Because you like it this way! The only thing, perhaps, that doesn't feel good is the pressure to join the ranks of the anointed risk-takers. But you as an individual contributor, worker bee, or team player may choose this course for the following reasons:

Technical results give you satisfaction.

Your technical projects may be more rewarding to you than the administration of the big picture. Keep it that way. You're good. You want to focus on the intricate design or development of an idea. Tell the others to back off. "I cannot do it all. If I divert myself to the management of this design, I will lose my focus. I am also not as good at marketing or administration, so let me do what I am best at!"

You do not like to manage others.

You are not a good coach. You would rather do it yourself. You are put off by personalities different from your own. It takes a lot of energy to be in the presence of conflict. You are uncomfortable with anger; you spend more energy avoiding the challenge of compromise than you do managing it. You do not like to teach and you have little expertise hearing the personal issues of those who work for you. They detract from the problem to be solved and you usually say the wrong thing.

You are not patient with incompetence.

You do a very good job. You never let up or let down. You are conscientious and want perfection. You cannot understand why others don't. You are easily discouraged by the colleague who just doesn't seem to get it. You become disgruntled with others who display lackluster performance or low level vigor. The impatience eats at you if

you suppress your resentment, and you ultimately "blast" the other person. Then you both lose.

You are not persuasive by nature!

The entrepreneur is always selling his ideas, company, projects, theories. Those persuasive skills escape you and the task of persuasion bores you. You believe that intruding your theories on another is invasive and unfair. You are wary of the sales types and

Do you prefer to "do it yourself"?

you avoid having to be one. (It might help, though, to have some persuasive skill tools just to sell your point of view, especially if it is: "Don't insist I manage when my time is best spent programming or designing this complex system or component.")

You love your work!

The curious, ever-seeking solo player is driven by interest in ideas. You are willing to research, think independently, crawl through the deepest holes to create the project, finish the job, make it work! You are in love with the technology, or the writing, or the design. You don't want to be interrupted with tangential issues around the project. Your focus gives you life, passion, satisfaction.

Out of management - For now.

You are burned. Sometimes a good entrepreneur or manager burns out. The responsibility for others, the burden of the big picture, the numerous balls in the air, finally wear you down. You can't think, be creative, jog, read or make love. You are in the nearly final stages of emotional exhaustion. This is the time to ask for a finite task, one focused job, so that you can sleep nights without worrying about the auditors, the venturers, the marketing group, quarterly sales - just your one responsibility.

The change may save your life. It may be the relief you need. It's all right to be

tempted by those who thirst for your entrepreneurial energy. And it's O.K. to say "no" to them!

Get An Emergency Kit

Indians make companies and products. They are steady, unilateral and directed. I do suggest that you learn the skills of management, conflict resolution and persuasive tactics, for the time that your project is so seductive to you that you must rise up and sell the project to others.

I witness this syndrome in my office every day. You leave your company because they won't listen. You become a consultant, and now you still have to sell your idea. Sometimes it's easier than you thought it would be. But most of the time you need to persuade difficult people, to cajole immature workers and use skills of delegation and negotiation that have been unnecessary before this period.

Indians Need Strokes Too!

One of the problems for the "head down" engineer is that you are probably not good at tooting your own horn, at taking credit when it is due you. You and your fine work can be ignored just because nobody has really been appraised of its merit. Unless you do it, your exceptional efforts may go unnoticed. That's why, unless you have that valued champion, that excellent boss, you may need to credentialize and "press" you, for yourself.

Although you do not, in general, seem to need the constant reinforcement that the sales personality does, you still need some strokes to continue high efforts. Check your own ego temperature, and if you are feeling under-appreciated, remind colleagues just how good you are — but, be realistic about your claims.

I know. Having to ask for strokes is not as good as getting them automatically. All too often, though, you are saddled with a poor manager or you are with or around people who cannot even comprehend that you need reinforcement. You are confusing to the outside observer, you know. You seem so self-sufficient, so independent, so removed from needing the pats on the back.

If you manage an Indian, risk on the side of praising too often. Sometimes this person will hardly respond at all, and you may feel a little frivolous or silly, wondering if

you were too effusive.

Even though your individual contributor seems very self-contained, he or she also needs some reinforcement. Even Indians like to be told they are doing a good job. Sometimes they even like to be told that they are good. Period. ▲

Jean A. Hollands, Director, Growth & Leadership Consultants, Mountain View, is an

entrepreneur herself. She has been an international advisor in Germany, Japan and France. Her book, The Silicon Syndrome:

How to Survive a High Tech Relationship, inspired her corporation niche.



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**ENGINEERING...
AND ALL THAT JAZZ**

by Cate Corcoran

Jim Snyder remembers applying for a job at IBM after he got his Master's degree in computer science: "The interviewer quickly scanned my resume, then said, 'What? You don't play an instrument?'" In fact, Snyder plays three — the piano, organ and saxophone — but at the time he hadn't heard that musicians were supposed to make good programmers.

But since he joined Apple Computer, he finds engineer-musicians are common. "I think musicians are drawn to Apple," he says. "The corporate culture — the casual dress, the lack of hard-and-fast rules — appeals to musicians." Snyder and three other Apple engineers play in the Nightflies, a five-piece jazz fusion group that performs at Cafe Jazz in Cupertino.

Sometimes Snyder is frustrated that he can't spend more time at his music, but not playing full time means that he "never tires of it. It's definitely different from programming," he says. "Both are creative processes, but programming is guided by rational thought and rules. If you just apply rational thought and rules to writing a piece of music, it would come out sounding pretty mundane."

Music comes naturally to Snyder. He started in the second grade on a Heathkit electric organ his dad built. In high school in Cupertino, Snyder played in both the jazz and concert groups, as well as an off-campus band called the Blue Saints, which toured Europe in 1976. "That was really a good experience for me," he reflects. "I've been into music ever since."

Music Meets Programming

Like Snyder, Jeff Zias is a veteran of the Blue Saints and works at Apple. He plays trumpet and electric bass in the Nightflies and a big band called A Touch of Brass. Zias finds playing music is an agreeable

change. "Playing music is a way of expressing yourself. Engineering is creative in a different way," he says.

Zias thinks there might be a link between music, math and science, but he's not sure what that link is. "Perhaps it's the ability to see patterns and keep them in your head. Of course, computers and music are much more related than they used to be."



Apple's Jeff Zias — "Innovative engineering ideas aren't as dynamic as music can be."

The marriage of technology and music also means there is less demand for musicians, a situation that Zias says was partially responsible for his decision to go to college rather than trying to make it as a musician. "I saw a decline in demand for

trumpet players. Studios were using smaller bands and more synthesizers."

So he went to Berkeley, where "I ended up with applied mathematics with a lot of electives in applied engineering and physics." Upon graduating he joined Apple and has been there ever since.

Like Father, Like Son

Art Zias, Jeff's dad, is a physicist and consultant who has started six small solid-state transduction companies and is now working on his seventh. He is also a musician. At 17 he played with the Jimmy Dorsey band in New York, and he played with them again when they performed in Santa Cruz in the 1980s.

As a child in Coney Island, his interest in the performing arts was less focused. "I was involved in drama, comedy and music very early," he says. He described his neighborhood as "Russian-Jewish, really the heart of what made Hollywood, Broadway — the music-entertainment industry." He picked up the clarinet at age nine, the sax at 12, and by high school "my only interest was mu-

sic," he says. By the mid-1950s, he was playing in nightclubs in New York and hotels in the Catskills.

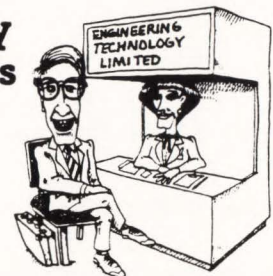
Concerned about his future, he asked a few musicians if they thought he would make it. "They said I was an A student, that I didn't need to do this, which I interpreted as 'No'." So he went on to the Polytechnic Institute of Brooklyn, where he majored in mechanical engineering. Later, he received his Master's in physics at Syracuse. "It's easier to succeed as an engineer than as a musician," says Zias. "To succeed as an engineer, you only have to be in the top .02 or .03 percent. But to do so as a musician you have to be in the top .01 percent of your idiom!"

Zias credits music for "keeping me sane where normal conditions might not have." Nonetheless, he enjoys his high-tech career. "If someone dumped several million dollars on me tomorrow, I have a feeling I would do the same things. I really like both parts of my life." ▲

Cate Corcoran is a San Francisco-based free-lance writer and copy chief for MacWeek.



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Authors will be notified of paper or panel acceptance, with instructions for publication by **May 30, 1990**. Manuscripts are required for both paper and panel presentations, and are expected to be from four to eight pages, including diagrams, figures, and photographs. Papers of archival interest will be reviewed for possible publication in the *IEEE Transactions on Engineering Management*, or the *IEEE Transactions on Components, Hybrids and Manufacturing Technology*.

INTELLECTUAL PROPERTY — TO WHOM DOES IT BELONG?

When must you sign a confidentiality agreement?

by Roy Brant

Often one of the greatest opportunities an engineer may face in his/her career is a chance to join a new venture or startup team. But unfortunately, "opportunities" often fail because of legal entanglements.

In our last issue we presented a dilemma facing an individual who quits her job to join her coworkers in a new venture.

THE SITUATION

After working for several years as part of a design engineering team at XYZ Company's state-of-the-art product applications department, Janet Wize, a design engineer, is informed that the technology she has been working on will be abandoned, her team will be disbanded, and she will be assigned to another design group.

Several of her fellow engineers from the same project leave the company to continue their development efforts in a new startup company. Janet is offered an opportunity to participate.

She decides to accept the offer and when she tenders her resignation and provides two weeks notice at XYZ, she is asked to leave immediately. Two weeks later when she arrives to pick up her final check, a personnel representative asks her, as a condition of receiving her final paycheck and vacation pay, to draft a letter to include that she will not work for a competitor, that she will not use any proprietary or material information gained during her employment at XYZ in future design applications on behalf of any company, including any intellectual knowledge that she may have acquired during her efforts to date.

Since Janet has been hired to continue her efforts in the same technology she developed at XYZ company, what should she do?

THE RESPONSE

Our readers responded to the two issues that face Janet as she leaves the XYZ Company.

1) What should she be prepared to do to receive her final paycheck, and 2) will any agreement that she signs as a condition of her departure impact her ability to perform on behalf of her new employer?

Janet Wize's final paycheck is earned and due to her under her existing employment contract.

—Matt Young

Janet is entitled to what she has earned within two or three days of severance.

—Pat Markle

The California Labor Code provides that "employees without written contracts who quit must be paid within 72 hours, unless 72 hours notice was given, in which case payment must be made at time of quitting." (Sec. 202). Although the average Silicon Valley employee does not have a written employment contract, Janet could demand her wages on the basis of existing California legal requirements. The only question is whether the company offered to pay Janet two weeks pay in lieu of notice, which would mean that her full entitlement in wages and vacation would be payable the day she picked up her check.

I would walk out, after telling them I would see them in court.

—Phil Burnett

While your instincts were absolutely correct, litigation should only be considered as an absolute last resort. You should do everything in your power to convince your employer to settle your valid claim without having to resort to the labor commissioner and/or the courts which can quickly use up time and money.

Assuming Janet has not signed a non-disclosure/non-competitive agreement, she should do what she feels is right.

—Pat Markle

Regardless of whether or not she has signed an agreement, if her work directly duplicates XYZ's technology, she and her company would be subject to legal action. She can use her intellectual knowledge to create a new product, but not the same product she was working on.

If the previous company is not going to pursue the technology, I would recommend that the management participate in a posi-

tive manner with the new venture by some form of equity sharing.

—Matt Young

An agreement with XYZ prior to launching a new company based upon its fundamental technology could avoid one of the most significant obstacles a new technology company has to face - the possibility of costly and time consuming litigation.

Of course she can't use proprietary information, but that's it.

—Anonymous

Unfortunately, that isn't it. She still has to be concerned about any potential legal actions taken against her.

It really pays to cover all the bases before making a significant career change. The ability to deal with the unanticipated is the basis for our next dilemma, which relates to difficulties in making a mid-career change.

NEW DILEMMA

What would you do?

After working more than 15 years as a Silicon Valley engineer, James Hirt, relocates to the east coast to be near his aging parents.

Upon arriving in the New York area he applies for several engineering job openings, for which he is clearly qualified, only to be rejected as a candidate.

Though most of his prospective employers are unwilling to say why they wouldn't hire Hirt, one corporate recruiter informs him that his resume, showing five employers in the past fifteen years, has marked him as a "Silicon Valley rolling stone" and as such, is not competitive with his more stable eastern counterparts.

Hirt, who has an unblemished employment history with virtually all of his prior employers and is not a member of any protected class, is not sure of what he can do to improve his opportunities.

What do you think he should do to overcome the stigma of having been a "Silicon Valley rolling stone?"

To respond, use the postage-paid reader response card in the back of this issue, or FAX your response to (415) 941-6263. Responses received before April 1st will be considered for inclusion in the next issue. ▲

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

MEETING THE CHALLENGES OF THE 1990'S – WHAT ENGINEERS CAN DO TO HELP

by Ed Zschau

The 1990 census is nearly underway here in California. Experts are predicting that nearly 30 million people will be counted in this state. That means that there are six and a half million more Californians today than there were when the last census was taken a decade ago. And the state is still growing at a rate of about two-thirds of a million people annually.

California's enormous size and rapid growth rate, plus its vast resources and entrepreneurial spirit, create many opportunities for the future. With a \$600 billion economy, the sixth largest in the world (behind the U.S., the USSR, Japan, Germany, and France), California is well-positioned to be a key player in international markets. It is the gateway to the fast growing Pacific Rim, with strong personal and cultural ties to Asia. In fact, nine percent of California's population is Asian-American, and it's expected to grow to 13 percent over the next 20 years.

Similarly, California has proximity and close ties to Mexico, our third largest international trading partner (behind Canada and Japan) which will strengthen as California's Hispanic population grows from 21 percent of the state's total to 30 percent over the next 20 years. With our leadership in agriculture and technology, our strong system of higher education, and our wealth of natural resources, we Californians are well-positioned for great success as we approach the 21st century.

Unfortunately, describing California's potential for success doesn't tell the whole story. Its large size, rapid growth, and industrial achievements have also led to major problems that must be addressed squarely and with a sense of urgency. If not, the quality of life for Californians is in jeopardy. For example:

Housing prices are sky-high, and there's a shortage of housing which is expected to get worse. Today the median price for a

home in California is five times the median income. As a result, only 25 percent of Californians can afford to purchase a home compared to the national average of 49 percent.

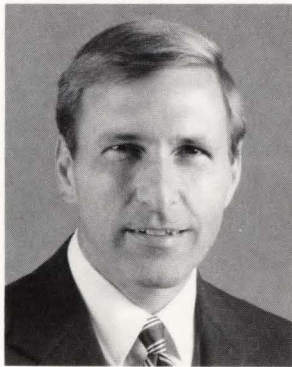
California's transportation system is inadequate, and too little is being done. Our highways have become overburdened with commuters who have moved in order to find housing they can afford. Over this decade, the number of vehicle miles traveled per year will grow at a rate four times the population growth rate, and five times the rate of increase in highway lane miles.

The transportation and housing problems have led to environmental threats and excessive use of energy.

California consumes more gasoline than any country in the world except the U.S. as a whole and the Soviet Union. Automobiles, together with industry and agriculture, produce five million metric tons of hazardous waste per year, and only 10 percent of that is disposed of without adverse effects. The indirect costs from toxic wastes in California – such as health care expenses – are about \$4 billion per year.

Innovative Solutions

These and many of the other challenges facing California can be addressed in large part by applying new technology and systems approaches that recognize and exploit the important interrelationships between problem areas. For example, transportation is the major cause of air pollution – a public health hazard – and creates enormous energy requirements. More extensive use of telecommunications and teleconferencing could reduce traffic, cut energy costs, and permit employees to live in areas where housing prices are lower. Moreover, technology can be brought to bear on problems of waste disposal (perhaps converting waste



"We need innovative, forward thinking programs," says Ed Zschau.

to energy), protection and conservation of natural resources and low cost housing. In short, engineers and technologists – you and your colleagues – have the tools to address California's challenges and, more than any other group, you understand how they can be brought to bear to improve our quality of life.

We need innovative, forward thinking public-private programs that complement the free enterprise system and that make use of our strong suit, technology. Government can be a catalyst and can provide incentives for action, but you – the engineers in the private sector – are in the best position to provide the leadership and initiative we need.

One of the most disturbing trends which will make the job more difficult is the growing scarcity of trained engineers and the diminishing percentage of young people who are opting for study and careers in science and technology. Unfortunately, our schools don't have the resources to reverse this trend. They're not equipped to provide young people of all backgrounds with the education and inspiration to become engineers, but you can. It's critical that you do, not only for the continued growth and success of your companies but also to address the challenges facing California over the next decade.

Identify ways in which your creativity and engineering skills can help, and bring those new ideas to those who can get them implemented.

Get involved with organizations, such as the Technology Center of Silicon Valley, that are creating programs and resources to help teachers in our local schools provide their students with better training in science and math and a sense of the excitement that comes from applying technology to making a real difference in people's lives.

Engineers have much to contribute to their communities as well as their companies.

Look around, get involved, and make a difference! ▲

This is an excerpt from the speech Ed Zschau gave at the Engineers' Week Banquet in February. Zschau is CEO of Censtor Corporation, Chairman of the Board of the Technology Center and a director of several technology and business councils.

FROM ENGINEER TO ENTREPRENEUR

*What drives engineers to start their own companies?
That's the question we posed to executives at
three Silicon Valley startups.*

by Thomas M. Woolf

Why would anybody want to start a business? The hours are incredibly long. There are sleepless nights over money. And then there's family stress.

But consider the rewards! Part of the American dream is being your own master and creating your own success story. Everyone wants a chance to realize his dreams.

Even though the ultimate rewards are great, getting started can be quite trying. It is never easy to launch a successful company, but you can learn from those who have gone before. We surveyed the entrepreneurs responsible for starting three Silicon Valley companies to find out what they encountered on the road to success.

PHOTONICS INC.:

In Search of a Solution

It has taken Dick Allen, President and Chief Operating Officer of Photonics Inc., a long time to realize his dream. Even during his days as vice president and general manager of Memorex's Communications Group, and later as general manager for NCR's Micrographics Division, Allen had an eye toward creating his own business.

When he launched his Campbell-based



Dick Allen – "Many fail because there is no market for the product."

company, Allen was seeking a systematic way to solve a market problem. "As general manager for both Memorex and NCR, I was faced with computer installation problems," he says. "Once you had the installation set, you had to move things around and start all over again. That means people remain idle while new cable is pulled. There had to be a better way."

So Allen developed Photolink, a substitute for computer cable that uses infrared light to transmit computer data from point to multipoint using the ceiling as a passive reflector. The first Photolink began shipping last fall and connects Apple computers. It hooks up to a Macintosh's RS-232 port and aims at a central point on the ceiling. Information is then exchanged by rapid infrared pulses. The concept is the same as flashing Morse Code.

"I didn't set out to create a wireless infrared local area network," he exclaims, "but to find a way to eliminate cabling problems. I looked at a lot of technologies, including radio. I settled on infrared by process of elimination." In fact, Allen confesses, he knew virtually nothing about infrared technology when he started.

"It took all of my savings to keep things going while I came up with the appropriate technology," he admits. "The next step was to build demonstration units and write a business plan to get venture capital." Unfortunately, capital was harder to find than anticipated. "I started looking for venture capital in the fall of 1986. We actually closed our first venture funding in January 1988. I started running out of money and started living on credit cards, something I never dreamed that I would be doing."

"Part of the reason it took so long was that in my first business plan, I didn't posi-

tion the product properly. It sounded as if I were trying to start another local area network company. I recut the business plan, repositioned the product as a cable replacement and went back to the venture capitalists." The result was funding from Crosspoint Venture Partners (which had initially turned the project down), Alpha Partners and Apple Computer's venture capital group.

Although customers show the same skepticism about the technology, there are more and more believers seeking new ways to expand their Macintosh computer networks. The next step, says Allen, is to get another round of seed money bringing the total to \$6.25 million, and then to develop Ethernet and token ring products to support IBM PC workstations.

Would Allen do it again? "Oh, yeah. Having been through a number of startups, I think I understand the reasons they fail. Many failed because there wasn't any market for the product. Some of them failed because there was insufficient cash. One of the truisms of venture capital seems to be you will almost always need more money than you think you'll need."

VIEWPOINT SYSTEMS INC.:

Interface with Success

When they decided to launch Viewpoint Systems, a software development firm based in San Mateo, Marti Johnson, Director of Product Design, and Barbara Booth, Director of Research and Development, weren't exactly sure what they were getting in to. They just knew that it was time to make a fresh start.

Ken Gardner, President and Chief Operating Office for Viewpoint, led the effort to break away from Tesseract Corporation, the San Francisco human resource software vendor where the three worked together.

"We got together and decided to take a risk," Booth says. "We thought we could make it on our own, consulting. We got a contract for a PC system; Marti and Ken put together the specs and I programmed it. After that, the money started getting short, so we decided it was time to go after venture capital. It was then we started to formulate what we really wanted to do."

The result is Viewpoint Systems, which provides a family of graphical products so Fortune 500 companies can easily create cooperative processing applications that

comply with IBM's Systems Application Architecture. Their first product is I/F Builder, which lets users create customized interfaces for mainframe workstations. It is already being used by three corporations and one software developer. Two additional products, Q/Builder to query mainframe databases and VP/Builder for full cooperative processing, will be introduced later this year.

In seeking capital, Johnson developed a demonstration program using Windows. "I know these programs really well and I can pop open windows and make it look real," she says. In October 1988 they approached Alpha Partners of Menlo Park. They received funding in November, and, armed with a letter of intent for funding, hired their first programmer in January 1989.

What drove Johnson and Booth to form their own company? "I had been with Tesseract for almost five years and I felt that I had tapped out on what I could do for them," Johnson explains. "I loved working with Ken and Barbara, so when they decided to go, I went with them."

For Booth, the environment was an important motivator. "The opportunity to build a work environment to our specifications drove me more than anything. I think that there is a very human side to this company and the most important part of my job is making sure that my people are all right and that the environment is right."

And what does the Viewpoint team attribute to their success? "I think one of the biggest things in our favor is that we had no expectations," Johnson says. "We set the bar at a certain level, and as soon as we get over the bar we set it higher. You keep going forward, looking back only long enough to learn from what you did."

POWER INTEGRATIONS INC.:

Building to Market Specs

Klas Eklund, Vice President of Engineering and co-founder of Power Integrations in Mountain View, identified the enormous market opportunity for an integrated circuit

that combines low-voltage analog and digital control with high-power output. The technology has been available for some time, but the problem has been making it economical to produce.

"I realized that if you are going to have an impact, the approach would have to be simple and straightforward," Eklund says. "You couldn't use exotic material or technology. The cleverness would be in the chip architecture. What I did was come back with a new architecture for high-voltage devices that could be easily combined with any CMOS technology."

How did Eklund perfect and launch his vision? The story begins in 1984 when

Eklund came to the United States from his native Scandinavia on a two-year sabbatical. At that time, he was an executive with AB Rifa, the semiconductor arm of the Swedish telecommunications giant L.M. Ericsson. AMD was working on a joint project with Ericsson, and Eklund was given a desk and time to learn and think.

"This was really a fantastic opportunity," Eklund recalls. "I really had a chance to look around at what was happening, read technical articles and go chat with people." One of AMD's projects was to develop high-voltage chips to replace telephone relays. "I did a lot of work with that and was able to sell my ideas to AMD management. I put a small team together and we were starting to realize those ideas."

In 1985, one of the AMD executives who left to head Data General's semiconductor group called Eklund with a proposal. So Eklund went to work for Data General to develop his technology, with the understanding that he would eventually launch his own company. Power Integrations followed in May 1988.

"When I started to put the business plan together, I realized I would need some help

with the marketing and product plan," Eklund says. "I saw in the paper that Art Fury had left Micro-Linear, and I knew that he was a very well-known marketer. So I looked him up in the telephone directory." Fury is now Vice President of Marketing for Power Integrations.

Apparently, capitalization was not a problem. "The first capitalist we talked to wanted to get the deal off the street immediately," Eklund says. Eventually, William Davidow of Mohr-Davidow Ventures was the first to offer capital.

Since then, development and production has been moving according to schedule. The company has already received 10,000 inquiries from the ad campaign launched in September.

Eklund notes that marketing these high-voltage chips has taken some missionary work. A new primary market, for example, is the electromechanical industry since these products can be used to control power sources, relays and other devices. "The market opportunity is just enormous," he says. "We have the opportunity to build a company as big as Intel or National Semiconductor."

Eklund credits the company's initial success to a number of factors. "You have to check for market opportunity, and we have a breakthrough technology to tap that opportunity. We also have the best venture capital companies backing us — experienced people who understand semiconductors. And you can't do it alone;

you have to attract talented people."

After years in a large corporate organization, Eklund likes his new role as entrepreneur. "Here I can be a hunter," he exclaims. "Small companies are like the hunting people who can move far and fast whereas the big companies are like the farming people who have to stay in one place. The real challenge is to keep that environment in the future."▲



Barbara Booth (standing) and Marti Johnson — "We had no limiting expectations."



Klas Eklund — "You have to check for market opportunity."

Thomas M. Woolf is a freelance writer and editor with Silicon Valley ENGINEER.

SEEING SILICON VALLEY ON TWO WHEELS

By K. C. Chan

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Consider bicycling. Engineers may do it for exercise, or for conservation, but they all consider it fun. Cycling has been growing in popularity among Silicon Valley engineers and around the nation. I talked with three cycling enthusiasts to find out why they started cycling, what motivates them to ride now and what are some of their favorite routes.

Conservation With A View

Laura Mappin, a software testing engineer at Ungermann-Bass, got hooked on cycling during a camping tour in Washington state. She became so enthralled with the sport that she started a cycling club when she lived in Eugene, Oregon, a few years back.



"Commuting is more comfortable on a recumbent bike," explains Laura Mappin of Ungermann-Bass.

Now, she lives in Sunnyvale and is active in the Western Wheelers Bicycle Club.

Her enthusiasm for biking goes beyond recreation. In fact, many of her rides are for shopping and commuting. So, if you see a person in a contraption that looks like a pedal-powered chair on wheels (known as a recumbent bicycle) wearing a matching bright orange and pink outfit, it may be Mappin on the nine-mile commute to and from her office in Santa Clara.

Mappin explains that she prefers the recumbent bike. "It's so comfortable, so easy to cruise and provides a sweeping view."

She rides to minimize the need to drive her car, noting, "We cannot continue using our cars the way we have. This is my own way of preserving our precious oil." She believes the popularity of cycling is mostly due to the rising level of health and ecological consciousness. "People are feeling responsible for our environment," she asserts. "Each one of us can and is making a difference."

Her favorite routes? Mappin enjoys the scenic ones around Woodside and along Skyline Drive.

Riding for Exercise

Another cycling commuter, Mike Hardin, rides from Menlo Park to his office in Hayward at least twice a week. For Mike, an electrical engineer at RPC Industry's R&D group, the one and a quarter hour trip is a way to exercise.

Hardin started riding in the mid-seventies when the gas crisis hit, commuting by bicycle from Menlo Park to San Carlos. Hardin rides a great deal for fun with the Western Wheeler Bicycle Club. Thus, during the week, Mike rides to save gas and to exercise. On the weekend, he says, "Cycling is my hobby. I ride for recreation, for mental relaxation and for the social activities that a cycling club provides."

For fun, Hardin also likes riding Skyline or along the coast for four to six hours. "One of my favorite routes is along Highway 9 toward Saratoga Gap," he declares. "But Kings Mountain Road to Skyline is also very pretty — it has redwoods, the canyon and a great downhill stretch on Highway 84!"

Reliving Her Childhood

"I hope to be riding with my baby using a bicycle trailer soon," shares Christine Sawcett, a software engineer at Mentor

Graphics. Christine rode a bike for the first time when she was in college. "It was like reliving my childhood! I discovered some of the fun that I missed out on while growing up in London." So she is determined that her child will learn to cycle earlier. Sawcett bikes to be outdoors, to feel refreshed and just to relax and take in the scenery. The Santa Cruz mountains, Mount Hamilton in San Jose and Portola Valley are just some of the areas she has enjoyed riding with her cycling club.

Whether you want to do some recreation cycling and touring, or some serious training, check out a few of the clubs listed below. Some clubs have weekly rides and help members discover beautiful routes all over the Bay Area and beyond. Some trips attract four to six riders, while the more popular ones will have dozens. For current biking events and news, pick up a copy of California Cyclist, available free in most bike shops, or refer to other recreational publications like City Sports.

Happy Cycling!

Bay Area Cycling Clubs

Almaden Cycle Touring Club, P.O. Box 7286, San Jose, CA 95150, (408) 338-2663. Recreation cycling and touring.

Coastside Cyclist, c/o Richard Leavitt 852 Buena Vista, Moss Beach, CA 94038, (415) 728-5848. Recreation on-road/off road rides.

Golden Gate Cyclists, c/o Gregor Clark, 425 Divisadero, Suite 306, San Francisco, CA 94117, (415) 863-9939. Recreation cycling, all ages and abilities. Weekend rides in Bay Area. Helmets required.

Meno Park Velo Club, 441 El Camino Real, Menlo Park, CA 94025, (415) 327-5137. Racing and training for performance-oriented cyclist. Weekly training rides.

Single Cyclists, P.O. Box 684 Kentfield, CA 94965 (SASE). Recreational and social cycling. Monthly newcomers' parties.

Western Wheelers Bicycle Club, Inc., P.O. Box 518, Palo Alto, CA 94302. Recreation touring club. All levels. Time trials and camping trips. ▲

K. C. Chan is a principal of the Geneva Consulting Group, a San Francisco-based marketing and business development consulting company. Previously, she was a Marketing Manager at Sun Microsystems.

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THE BIRTH OF A PRODUCT

Carefully planned prototypes help assure that your product ideas become a profitable reality.

by Suzanne M. Matick

Many concepts and products with marketable advantages emerge from Silicon Valley. Developing prototypes that attract investors and even customers is a crucial part of seeing those ideas become reality.

Although they had developed a timely product with a solid design, the founders and principals of Polar Spring Corporation of Menlo Park all agree that it was their prototypes for IceHaus, a counter-top water purification system, that positioned the company for success.

The Inspiration

Polar Spring was founded as a partnership to make clean drinking water readily available to all. Dr. C. N. Chang, scientist/inventor, was motivated to find a clean drinking water solution when his parents, who were visiting from Taiwan, were appalled to see their grandchildren drinking tap water (unheard of in Taiwan and many parts of the world). The inspiration for creating a natural water purification process came to Dr. Chang when he saw a picture in National Geographic of an Inuit hunter enjoying a chilling draft from one of Greenland's melting icebergs.

In January 1987, Dr. Chang and Judith Schwartz, Polar Spring's president, began working with the concept, attempting to

determine how best to develop refrigerated water purification into a product or products. When Don Hendricks joined the team in the spring of '87, he constructed the model to prove Dr. Chang's theory using a small refrigerator with a Lawn Genie for a controller to make pure ice that would melt into pure water.

Zeroing In

In the summer of 1987, Dr. William Conlon and John Weist joined the partnership. Conlon, renowned for creating products from concepts, worked with Hendricks to refine the design. From these refinements, engineering models were constructed to clarify optimization issues. Weist, the market research specialist, then investigated the market. Each engineer at Polar Spring participated in the telephone survey, which gave them a perspective on public concerns and desires. The result was a targeted, well-documented product.

With marketing specs, engineering documentation and a proof-of-concept model, Polar Spring Corporation was ready for an infusion of capital. Originally overlooked by venture capital groups, Polar Spring continued to emphasize partnership and team effort to attract \$325,000 in capital from friends and private investors.

The Prototype Team

The same preparedness contributed to the effective partnership with the prototyping company. The group agrees that all the elements necessary to achieve a great product—a strong team, a working technology, impressive documentation and superior industrial design—came together in the working prototype. As Hendricks says, "The prototype captured the attention of investors, retailers and corporate partners."

Determining the right prototyping partner included many considerations. "We wanted a company that shared our partnership philosophy—a company that understood start-ups and working from a concept to a product," Hendricks explains. "We also needed a company that thoroughly knew materials and could make good recommendations. Finally, we needed a prototype company that could work quickly from our drawings and documentation. Our choice, Target Prototypes of Scotts Valley, was both technically capable and willing to sit down and really work with us."

To Market, To Market

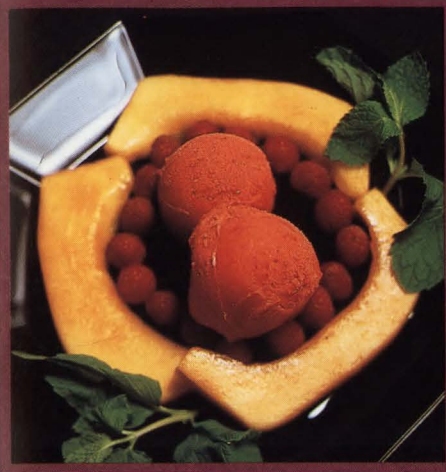
Since the IceHaus model had to be functional, Target Prototypes recommended using food-quality plastics and dyes for the prototype. The plastics suitable for manufacturing the product will be blow-molded for mass production and are inappropriate for the one-time production of a single model or prototype. The challenge was to determine and obtain plastics for the prototypes that were not only of food-grade quality but also did not impart any taste.

The careful selection process and partnership with Target Prototypes have brought Polar Spring closer to realizing its goals. One specialty houseware retailer thinks the Polar Spring product is the equivalent of the next "food processor," and has contracted for its own prototype to illustrate some aesthetic modifications. Another prototype was developed for a major U.S. appliance manufacturer and that prototype was featured in a series of focus groups across the country.

Target completed all of these prototypes at the end of September '89. If all goes well, consumers will be able to buy an IceHaus some time this year. Refreshing news! ▲

Suzanne Matick is a writer and public relations specialist on assignment with Ad Infinitum of Los Gatos.

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SILICON SLICES

Engineers in the news... The new chancellor at U.C. Berkeley is an engineer. **Chang-Lin Tien**, a mechanical engineer, replaces **Ira Michael Heyman**, who is retiring June 30th. Tien spent seven years as the chairman of Cal's mechanical engineering department.

Will West Beat East? **John Doerr**, engineer-inventor turned venture



Lawrence Tesler, Apple VP and trivia whiz, competes in 1990 Computer Bowl.

capitalist says "yes." He is the Captain of the West Coast team in the Second Annual Computer Bowl to be held April 27. **Lawrence Tesler** from Apple Computer and **Charles House**, of Hewlett-Packard will represent the West in answering such computer trivia questions as "What computer co-starred with Redford in *Three Days of the Condor*?" **William "Bill" Joy** from Sun Microsystems who competed last year will be judging. You can see the live video performance at Techmart. Call **Linda Lawrence** at (408) 974-4643 for more info.

"If we don't increase our knowledge by 20 percent a year, we'll fall behind," says sales & marketing chief **Bob Oakley** of Microscience. "And if you are away from any part of the industry for 2-3 years, you only know half of what is going on." Minnesota born and raised,

Oakley is now escouced at disc drive maker Microscience's new offices overlooking the mustard fields in north San Jose. Here's another engineer who has made the transition from engineering to marketing. Waxing philosophical he says, "The disc drive maker's task is simple: everyone wants more capacity, higher performance, better quality, less power, less heat and longer life." Easy to say, hard to do!

Hardware as Art? March is Design month at Techmart. Award-winning contemporary designs will be exhibited, including industrial product designs from 15 Bay area manufacturing companies including Tandem Computers and Hewlett-Packard. Stop by and take a look—you may find yourself looking at the products you use from a whole different perspective!

Clever innovation gets results. Consider Sysorex International, the Mountain View computer systems integration outfit. In an era when profits elude computer resellers, Sysorex—led by the remarkable **Salam Qureishi**—does final systems configuration at its principal vendors' sites. Result: lower costs, fewer DOA systems installed. Everybody wins—vendor, end user



Microscience Director of Sales and Marketing Bob Oakley enjoys new offices in San Jose.

and Sysorex. The government believes. They've pelted Sysorex with business—several hundred million dollars worth, despite competition from reselling's biggies.

Visually impaired engineers and scientists face an additional hurdle when trying to keep abreast of the newest technology. **William Tuel** at IBM and **John Wilkes** at HP have found a way to help. With the support of

their employers, William and John spend two hours a week reading technical books out loud—a real test of their knowledge of the lingo! Want to join them? Call **Joanne Sweet** at the Palo Alto office of Recording for the Blind (415) 493-3717.

"A Silicon Valley fab engineer is only as good as the equipment he buys," claims Sales Engineer **Tom Pomposo** of **Lasertec**. "That's why I progressed from pure engineering to sales and marketing functions. I found I really like the people contact and introducing new technologies."



Tom Pomposo, sales engineer, Lasertec, likes introducing new technologies.

Tom got his EE from SJSU when Silicon Valley was just "Fairchild on one side of 101 and Lockheed on the other." He worked as a final test engineer with two companies, and then with Nanometrics for seven years in sales and marketing, helping to pioneer the use of scanning electron microscopes for in process inspection of wafers.

With Lasertec he is finding new applications for confocal laser scanning microscopes—a technology developed 20 years ago but not commercially available in color until three years ago. What does a sales engineer really do? "Make friends with other engineers and help them solve their problems."

Winners. Everybody loves them. Today one of the Valley's oldest established semiconductor outfits is booming. It's Teledyne Components. The semi operation was founded in 1963 by ex-Fairchild founders **Jay Last** and **Jean Horni** as Amelco and made its reputation in MOS FETs. Now it's that rarity, a specialist in analog devices from discrete to hybrids, and a growing "power" house with BiCMOS devices that replace bipolar with dramatic improvements. Who is managing this resurgence? **Mitch Goozé**, an old hand in the

Valley semi biz is CEO, and an even older hand, **Roger Murray**, one of the 1958 arrivals at Fairchild, is manufacturing honcho. Of its ability to solve problems with analog ICs, Goozé calls Teledyne Components an "applications specific company." Clever.

A 42-year old startup? That's how some have described Fremont based Elcon, best known for making pluggable connectors for the military. According to **Lyn Morris**, President, Elcon served the defense and aerospace industry almost exclusively since the 1940's. But today Elcon is booming in the commercial electronic industry as well, thanks to the

growing demand for connectors with higher density, higher current and lower losses, and the trend towards pluggable components with blind mate connectors. Welsh-born Morris, who got his technical training in England, but has lived in Los Altos for 13 years, concludes "We



Lyn Morris, President of Elcon: "Almost every airplane manufactured in the western world uses our connectors."

have the technology, but without the right people, the best technology is meaningless. We are fortunate at Elcon, we have the right people."

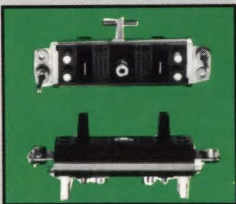
Engineering ethics must be a hot topic! **Joseph H. Wujek** is giving a workshop on the topic at an IEEE PACE meeting in May. He will also be featured on a radio call in show on April 25th at 6 pm on KCSM. ▲

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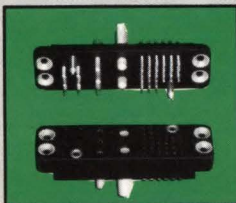


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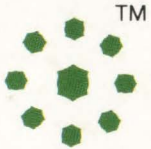
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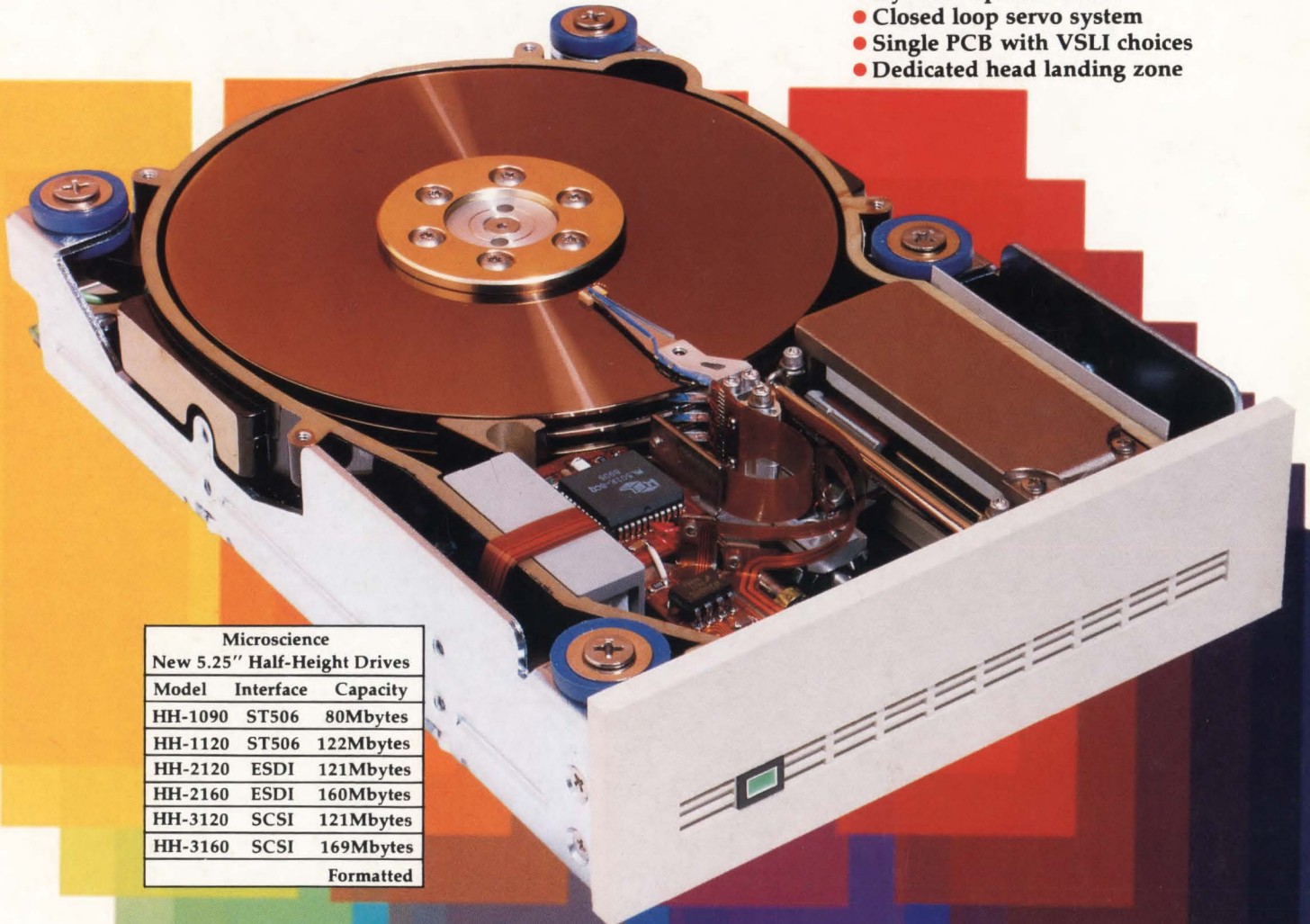
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