Harris Corp., Tandem Get Federal Express Satellite 'ZapMail' Jobs

By a WALL STREET JOURNAL Staff Reporter

MELBOURNE, Fla.—Harris Corp. said it and Tandem Computers Inc. were chosen to build the earth stations and computer linkage system for Federal Express Corp.'s planned satellite-based data-communications network.

Neither Harris nor Federal Express would disclose the value of the contracts, but an industry source placed it at $10 million to $15 million.

The contracts are for jobs related to Federal Express's recently inaugurated ZapMail document-transmission service. Currently, ZapMail is sent over land lines. But Federal Express plans to convert to a satellite transmission service, first by using transponder space leased on satellites, and ultimately using its own satellites.

In a filing with the Federal Communications Commission about its plans, Federal Express said it might invest $1.2 billion in ZapMail over the next 10 years. A Federal Express spokesman said "it's hard to say" whether Harris and Tandem might receive additional contracts as Federal Express further develops its satellite-based service.

Harris, which makes communications and information-processing equipment, said it will provide earth stations that will receive and transmit data to the satellites, while Tandem will provide satellite communications equipment that will link the earth stations with a Tandem computer system supplied under a separate contract and already in place.

Sallie Mae Schedules $5 Billion Offering

By a WALL STREET JOURNAL Staff Reporter

WASHINGTON—The Student Loan Marketing Association, known as Sallie Mae, said it intends to offer about $5 billion face amount of 38-year zero-coupon global bonds.

Goldman, Sachs & Co. is underwriting the issue, which will be sold in the U.S. and abroad, and will be issued on the New York Stock Exchange.

A zero-coupon bond pays no interest, but is sold at a deep discount from face value. Goldman Sachs said $100 face amount of Sallie Mae bonds are to be offered at $2.734 each, for a yield of 9.94% annually. The bonds mature on Oct. 3, 2022, at which time investors receive the face amount.

Sallie Mae, the congressionally chartered agency that frees credit for student loans by providing a secondary market for them, said it will receive net proceeds from the issue of about $126 million, which will be used for general corporate purposes.

Litton Industries Inc. Gets Air Force Contract Totaling $30.8 Million

By a WALL STREET JOURNAL Staff Reporter

WASHINGTON—**Litton Industries Inc.** received a $30.8 million Air Force contract for electronics equipment.

Transamerica Airlines, a unit of **Transamerica Corp.**, received $29.6 million in Air Force contracts for air transportation.

Martin Marietta Corp. won a $27.4 million Air Force contract for space-missile support.

Cray Research Inc. received a $23 million Navy contract for computers.

General Electric Co. received $16.8 million in Air Force contracts for jet aircraft engines.

Avco Corp. won a $15.8 million Army contract for helicopter engines.

Goodyear Aerospace Corp., a unit of **Goodyear Tire & Rubber Co.**, won a $15.1 million Air Force contract for flight simulators.

Zantop International Airlines won a $13.3 million Air Force contract for air transportation.

General Dynamics Corp. won a $12 million Navy contract for missiles.

Westinghouse Electric Corp. received a $10.7 million Air Force contract for electronic equipment.

Teledyne Inc. won a $10.6 million Air Force contract for jet engines.

Southern Air Transport Inc. won a $10.1 million Air Force contract for air transportation.

Pennzoil to Eliminate 147 Jobs at Big Refinery

By a WALL STREET JOURNAL Staff Reporter

HOUSTON — Pennzoil Co. said it will eliminate about 147 jobs at its largest refinery because of the continuing slump in the oil industry.

Pennzoil said the 147 jobs represent nearly one-third of the 472 employees at its Shreveport, La., refinery. The natural resources concern said 100 jobs will be cut in the next several weeks and the remainder within a year. A Pennzoil spokesman said the refinery has posted losses of about $2 million to $3 million for the past two years. He said the move was necessary to return it back to profitability.

American Financial Enterprises

CINCINNATI—American Financial Enterprises Inc. said it will buy as many as one million shares of its common from time to time on the open market or in private transactions.

The investment company, which is controlled by financier Carl Lindner, has 13.9 million shares outstanding.

Morgan Stanley N Winners of New C

By a WALL STREET JOURNAL St

NEW YORK—Morgan St announced the first winners a program to give money to dergraduates who are inter securities industry.

Morgan Stanley said it grants of $8,000 each and a 000 to college juniors who first Management Informati grants program earlier this eligible for the grants, junio interested in the securities fi they can be studying other

Matthew Saal of Prince sity, a chemistry major who search paper on Latin Ame and the U.S. banking syste shad Zakaria, a Harvard math major who wrote an a call pricing models, each re 000. Milan Moore, an econom at Yale University, received his study of the biotechnolo try.

Along with the research pa cants had to show a record of academic achievement."

Canal-Randolph U Agrees to Sell Bui For Over $40 Mil

By a WALL STREET JOURNAL Staff

NEW YORK—Canal-Randolph its Canal-Randolph Associates Co ary entered into a contract to sell office building for more than $40 der its liquidation plan.

The buyer was identified as tional investor.

The subsidiary holds a 75% inte Illinois limited partnership that property, the One North Weste Building.

Canal-Randolph is a real es stockyard concern.

Raymond French, chairman a dent of the parent company, said be "at least two more distributions liquidating dividends.

Asher Edelman, vice chairma lated that the next one may be distr January because it would be more vantageous for shareholders."

Two dividends have been distri shareholders, $22 a share in June a share in July. The amount of the n dend hasn't been determined y French said.

Five of the concern's seven offi ings have been sold. Contract dis are under way for the remaining Bank of America building in Anahe lif., and the Broadway Bank buildin terson, N.J.

LEVEL 1 - 2 OF 2 STORIES

September, 1984

SECTION: INVESTMENTS; Pg. 80

LENGTH: 378 words

HEADLINE: CAE group holds steady

BODY:
While the general malaise of the stock market wreaked havoc with most groups in the High Technology Stock Index, the computer-aided engineering (CAE) workstation category has managed to maintain a near constant performance level. In the first seven months of '84, the category declined less than 4%, while the overall Index fell more than 21%.

Unlike the computer-aided design (CAD) systems used for mechanical-design applications, CAE devices are used within the electronics industry to design, verify, and test semiconductor and circuit-board layouts. Although CAE sales are already increasing 50% annually, growth is expected to accelerate through the decade as more system vendors integrate custom and semicustom chips into their products. The market is expected to top $500 million by '87, according to Dataquest (San Jose, Cal.). The three top suppliers -- Daisy Systems, Valid Logic, and Mentor Graphics -- have all gone public within the past year. Other recent issues include Sylvar Lisco and Zycad.

Speculation that interest rates have peaked and begun to decline rekindled the High Technology Index in June. The index edged up 3.6%, from 1017.9 to 1055.2. The Dow Jones Industrials rose 2.2%; the S&P 500, 1.7%.

The best-performing groups during the month included CAE workstations (+18.4%), computer turnkey systems (+12%), telecommunications equipment (+11.8), and laser and infrared equipment (+10.2%). The worst performers were mobile radio/paging (-6.2%), home computers/personal computer software (-3.2%), and pacemaker implants (-2.5%).

Companies posting the largest gains included CAD/CAM supplier Intergraph (34 3/4 to 42 1/2), CAE workstation supplier Daisy Systems (18 to 23 3/4), medical imaging equipment supplier Matrix Corp. (18 to 24), pharmaceutical supplier Mylan Labs (19 3/4 to 26 7/8), minicomputer supplier Tandem Computers (18 to 23), telecommunications supplier Tel Labs (19 to 23 1/2), and computer software supplier Cullinet (30 3/4 to 37 3/4).

The High Technology Stock Index was developed by Bud Anderson, editor and publisher of High Technology Growth Stocks, a monthly investment newsletter (402 Border Rd., Concord, MA 01742). A list of the companies in the index is available on request from the same address.

GRAPHIC: Graph, HIGH TECHNOLOGY STOCK INDEX; Chart, High Technology Index, MAY/JUNE CHANGE %

300 defense plants during the past eight years, a Pentagon spokesman said Wednesday.

The list of recipients was delivered to the Defense Logistics Agency late Tuesday and the agency's attorneys were studying it before its public release, spokesman John Goldsmith said.

Pentagon spokesmen have said the Defense Department is considering whether to bring criminal or civil charges against Texas Instruments because of improper testing of 4,700 different kinds of silicon chips that make up the thumbnail-sized electronic circuits.

Fifteen million semiconductors manufactured and tested by a Texas Instruments plant in Taiw Midland, Texas, faci defense contractors years, the DLA said.

Meanwhile, TI sto secutive sharp turnb Stock Exchange, dro at the close of tradin

Financial Digest

Kaypro investigates missing parts

Kaypro Corp. said Wednesday that it is investigating the possibility that millions of dollars in computer parts are missing from a circus tent and big trucks where Kaypro stored them.

Kaypro, based in Solana Beach, is the manufacturer of the Kaypro II — a $1,295 portable personal computer that last year was one of the nation's top-selling machines. The Kaypro II has been so successful, in fact, that Kaypro was forced to stockpile parts for it and other models in trucks, in bags strewn on its lawn and under a circus tent.

But security and accounting for the parts has been lax, people close to Kaypro say. Now, according to an analyst interviewed yesterday who asked not to be named, a preliminary review of inventory by Kaypro's auditors, Peat Marwick, is indicating huge shortfalls of chips, screens, disk drives, circuit boards and other components for Kaypro computers.

Although the accountants' work is not finished, reports circulating in the computer industry suggested that Kaypro's loss could approach $6 million. As of June 30, Kaypro's inventory totaled about $60 million, according to the company.

Tandem, ZapMail hook up

Tandem Computers Inc. of Cupertino and Harris Corp. have been picked to build a satellite communications network to support Federal Express' ZapMail, its new electronic mail service.

The first phase of the Federal Express system is due to be in operation next summer, replacing land-line service now in place between 16 cities. Financial details of the ZapMail project were not immediately available.

The system will link Harris satellite dishes with Tandem's Nonstop computers and networking equipment.

"This network will provide integrity of document transmission from source to destination," said James D. Lakin, a spokesman for Harris, based in Melbourne, Fla.

Apple cuts price of IIc

Apple Computer Inc. of Cupertino cut the price of its new portable only five months after its introduction.

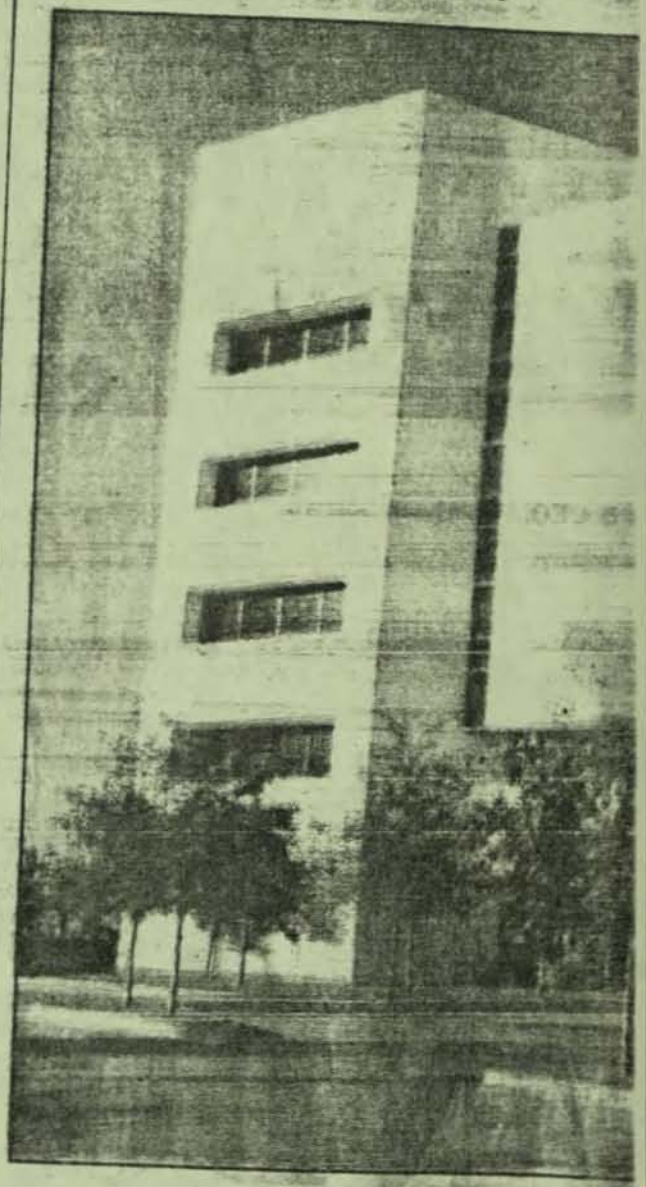
The price of the Apple IIc was reduced by $100 to $1,195.

In its release, the company didn't comment on sales of its portable.

While Apple had expected the IIc to cut into sales of the desktop IIe, this hasn't happened, according to

Commercial Real Estate

Playin



Developers of this office building at 20

Delays for

By Chris K
Business Writer

Executives slow burn th weather.

The compa permit for rel its new San J that disrupte nienced 300 e

Developer Builders, Inc

things, vendors have extended the speed of the SMD interface from about 10 mb/s to the 24-mb/s rates at which today's fastest drives transfer data. But as disk-drive technology advances, even faster transfer rates will necessitate a parallel interface like IPI, which provides for a 16-bit-wide cable.

"It'll be a year or two before PDI is even implemented in high volume," says James W. Patton, Control Data's product requirement manager for magnetic disks. "But IPI-2 is the tool that allows us to break through the serial roadblock."

Frank Casserino, director of peripheral product planning at Honeywell Information Systems, in Waltham, Mass., applauds the far-sightedness of the IPI standards-making committee. He also lauds the cooperative approach being taken by the four drive vendors, which he sees as an example of a "new culture" of increased cooperation in U.S. electronics industry.

"The one unique thing about this is that there will be chips to drive the interface from the beginning," Casserino says. **–Wesley R. Iversen**

Doing as the Japanese do

Among U.S. firms doing business in Japan, Hewlett-Packard Co., Palo Alto, Calif., "is light-years ahead of the rest" in dealing with the historical and cultural gap, according to consultant Hal G. Nielsen. The firm understands that any relationships will be long-term, he says—an approach borne out by the successes of Alan Bickell, vice president and managing director of intercontinental operations.

HP's joint venture, Yokogawa Hewlett-Packard Ltd., dates back to 1965, and its all-Japanese management has been continuous. "We've grown up with each other," notes Bickell, who has worked with them for 18 years. Even so, "It's not always perfect every time; we have to think about the culture gap continually," he says. Taking great pains to ensure communication, often summing up all talks in writing, is the key. Also, Bickell is now in Japan, on his fifth trip this year.

Firms with shorter records have also come up with ways to bridge the gap. Tandem Computers Inc., Cupertino, Calif., has added a new post in the last year at its four-year-old subsidiary, says Gerald L. Peterson, vice president for international marketing. "The post has to be filled by a U.S.-born person who speaks Japanese and is steeped in Japanese history and culture," he says. The title will be "adviser," more prestigious in Japan than in the U.S. "He facilitates communication at all levels," says Peterson. **–L.W.**

BUSINESS

U.S. firms seek harmony in Japan

San Francisco—Looking at U.S.-Japanese business from a distance, the casual observer might think the culture and trade methods of the two lands are pretty much the same. But that just isn't so, say many insiders here who are responsible for the success of these trans-Pacific business and technology interchanges. In fact, one informed judgment holds that the status of the touchiest part of U.S.-Japanese connections—the preliminary negotiating process leading to a deal—is more confusing than ever.

The major source of miscommunication comes from small U.S. companies crowding into the Japanese market without knowing how the cultural differences will affect them, says Hal G. Nielsen, a veteran Japanese hand with some 19 years' experience there. Nielsen argues that even some major firms have forgotten lessons that they learned in earlier negotiations, largely because key executives move on.

To bridge the gap, Nielsen now runs the San Francisco-based Entry Group International, which counsels U.S. firms on Japanese markets. He has also conducted nearly a dozen American Electronics Association seminars on the subject.

According to Nielsen, a basic pitfall awaiting a U.S. firm is the totally different Japanese view of negotiations and any subsequent deal the two parties may strike. For the Japanese, "negotiations are an end in themselves, leading to a flexible lasting relationship, not necessarily culminating in a formal legal document," he says.

Disillusionment. Conflict is inevitable when a U.S. delegation arrives in Tokyo and hopes to quickly negotiate a contract that specifically defines rights and duties of both parties. "It's no wonder so many go home with nothing to show other than an expensive business deduction," Nielsen says.

He says that two factors most often trip up U.S. firms, even those that have something attractive for the Japanese market. For one, the Japanese simply do not apply the time-is-money concept; they take as much time as they need. A Japanese firm has its own pace that cannot be hurried and usually spends a great deal more time on nonbusiness "getting-to-know-you" sessions than Americans do.

Another is the Japanese insistence on preparation. U.S. businesspeople, by contrast, usually do not have enough information in their heads to satisfy the meticulous Japanese approach to any subject that requires voluminous data; they keep telexing back home for more. "I have one negotiation that has gone on for five months," notes Nielsen.

A better-known Japanese attribute is distaste for confrontation and an aversion to using lawyers. "If disputes arise, the Japanese tend to compromise, not litigate. They turn to the law very reluctantly," he says.

Because the business potential for both sides keeps growing, Nielsen is experiencing a brisk demand for his services of advising clients how to deal with the cultural and historical differences between the two countries. Besides the $2.19 billion of goods sold to them in 1983, Japan is taking steps to make it easier for U.S. firms to export, after pressure from the American government. For example, U.S. telecommunication firms are bidding on contracts—estimated at $3.2 billion—to be awarded by Nippon Telegraph & Telephone Public Corp. **–Larry Waller**

ADWEEK

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Tandem Raises Agency Review Flag

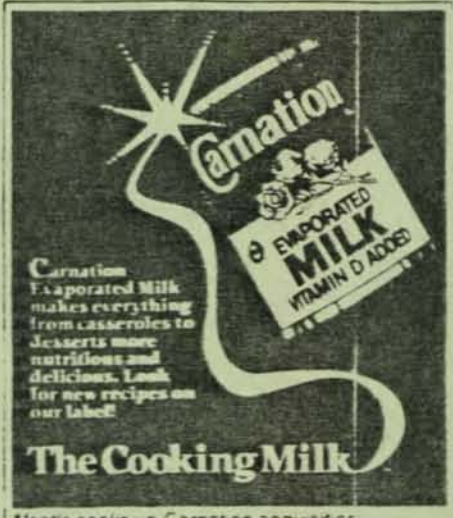
Company Restless Despite Record Year

By Paul Farhi

CUPERTINO—Tandem Computers Inc., one of the Silicon Valley's original computer success stories, last week began hunting for a new ad agency, despite the fact that the company appears headed for a record year.

The large system manufacturer placed calls to 10 shops in northern and southern California and alerted incumbent Wylie Wilson & Munn of San Francisco that it would be invited to defend the business. WWM has handled Tandem for eight years.

Sources pegged the ad budget at about $6 million, but ad manager Claudia Hudson indicated it was substantially less, without providing a specific figure. Tandem advertises in *(Continued on page 83)*



Nestle cooks up Carnation acquisition

Tune Up in Torrance: DFS Restructures

By Bob Peischel

TORRANCE—Dancer Fitzgerald Sample is gunning to become a force to be reckoned with in southern California. As a first step, the shop last week unveiled plans to reorganize its top brass, effective Oct. 1.

The change replaces DFS Southern California president Norm Lauchner with Toyota account chief Jim Lindsey and director of client services Nelson "Skip" Riddle.

•Moving upstairs is Lauchner, who officially becomes assistant to DFS Holdings chairman Stuart B. Upson in New York. Lauchner will continue to work out of the local office.

•Lindsey, *(Continued on page 6)*

INSIDE ADWEEK

Voters Ducking Dirt

Before the political pundits even begin target practice, the message from voters is "We're sick of mudslinging." A national ADWEEK survey, conducted by Video Storyboard Tests/Campaign Monitor, looks at the issue. *(See page 29)*

High-Tech Gold Dries Up

The Silicon Valley is registering a sizable quake these days with more high-tech firms folding, leaving agencies holding the bill. *(See page 37)*

INDEX CONTINUES ON PAGE 2

Dollar Parks Billings In CL&O's Driveway

By Jack Feuer

LOS ANGELES—Dollar-Rent-A-Car doesn't have Ford or J. Walter Thompson in its future anymore. After signing a fleet pact with General Motors last week, the nation's fifth-largest car rental company drove its $3 million-plus account into Carlson, *(Continued on page 2)*

Nestle To Make Move on Milk

By Tom Delaney and Bob Peischel

LOS ANGELES—The handful of agencies servicing Carnation accounts can expect to see a hefty increase in billings once the $3 billion acquisition offer made last week by Nestle S.A. is finalized, sources told ADWEEK.

"Carnation's ad budget will go up immediately...about 25 percent," an agency source said. Food industry analyst William Maguire was a bit more conservative. He predicted the budget increase at "15 to 20 percent...at least."

Carnation, one of the west's oldest clients signed up with Erwin Wasey (predecessor to SSC&B L.A. which recently merged with Dailey & Associates) in 1913. The company currently allocates $50 million to *(Continued on page 2)*

Ten California Agencies Tangling in Tandem's Review

(Continued from page 1)

business magazines and in computer and other trade publications and does not use broadcast advertising.

Formed by a trio of entrepreneurs a decade ago, Tandem markets a line of "fault tolerant" computer systems used to run automatic teller networks, telecommunications networks and other large commercial projects. Its name derives from the dual computers built into each system that back each other up in the event one fails.

The company's three systems are sold under the NonStop trademark with price tags in the $70,000 and up range.

The review seems strange in light of Tandem's balance sheet, which shows record revenues of $379.5 million for the nine months ended June 30, up from $300.4 million in the same period last year. In 1983, total revenues passed $418 million—a level Tandem will easily eclipse when fiscal 1984 closes at the end of this month.

Hudson said the review was unrelated to profitability concerns or dissatisfaction with the incumbent's work. "We're reviewing all our communications efforts," she said. "After eight years (with WWM), we want to see what other agencies have to offer."

Tandem's preliminary list of invitees includes Keye/Donna/Pearlstein, DYR, Dailey & Associates, Della Femina, Travisano & Partners and Matsumoto/Herzog, all of L.A.; Ogilvy & Mather, Ketchum, San Francisco; Battenberg, Fillhardt & Wright San Jose; and Commart Adv., Santa Clara.

The invitation-only review may also include Chiat/Day's San Francisco office, which had not been contacted late last week. At the same time, Ogilvy & Mather had not decided whether to participate due to a conflict with the AT&T Information Systems account housed in its New York office.

The list will be pared to finalists following capabilities presentations this week.

FROM WALL ST. TO MADISON AVE.

First Boston, Shearson Say ABC Ripe for Buyout

ABC has been grist for the merger rumor mills of Wall Street for some time, but the mills ground more finely last week. Market participants not only bid up the target firm's price and volume at a record clip but also singled out Capital Cities Communications, Gulf + Western and Coca-Cola in trading as potential buyers.

While Capital Cities and G + W denied takeover intentions, conditions with ABC are ripe for a buyout. Technically, ABC is attractive for anyone, according to Shearson Lehman/American Express, which projects eps of $6.60 for '84 and $8 for '85, with P/Es of 9.5 and 7.8 respectively. The biggest operational pluses Shearson sees are the Olympics, upfront selling and ABC's profitable non-network units, such as publishing (a big draw in a leveraged buyout). Other factors, like the foreseen breakeven of ESPN in 1986 and changes in the FCC Rule of 7, would brighten the picture more.

Capital Cities has been known to be looking for a good buy among media companies that are already doing well, and ABC might just fit that qualification.

Meanwhile on the other side, some analysts have less kind words for ABC's management. In a strongly worded report that gave rumors a big boost last week, First Boston Corp.'s Richard MacDonald says, "ABC's stock price does not reflect the inherent value of the broadcast and publishing groups, the real estate, or the potential of ESPN. It is not because investors do not understand the values, simply that management has yet to realize them. . . . Any major price appreciation, however, must await evidence of dramatic long-term operating improvement or a major move by an outsider in the relatively near term. . . ." First Boston's earnings prognosis for ABC is only a bit lower than Shearson's.

All this could make for interesting trading for some time. With ABC now priced around $75 per share, it has a way to go before reaching what some consider its "breakup" value of $100-150, low enough to make a buyout worthwhile. (Rumor had Capital Cities offering $106 per share and other offers around $100.)—*Claire Mencke*

Agency Stock Watch

ADWEEK's 10 and the Dow both had a short and fairly slow week, broken only by some acquisitions activity. For both, the big event was Nestle's planned buyout of Carnation, although Interpublic, the ad company most affected by the move, finished the market week unchanged. Ally gained in the account area and led in trading, closing up ⅝.

ADWEEK'S 10 AGENCIES 1,594.47 LAST WEEK 1,588.15 DOW JONES 30 INDUSTRIALS 1,207.37 LAST WEEK 1,224.37

	change	WEEK'S close	WEEK'S high	WEEK'S low	P/E	YEAR'S high	YEAR'S low	EPS¹	dividend²	yield
BBDO	—	44	44	43	13.54	45	32¾	3.25	2.00	4.5
DDB	+⅛	15⅝	15⅝	15	15.29	24	13⅝	1.03	0.88	5.6
FCB	+⅛	51	51	50⅛	10.43	54⅛	43⅜	4.85	2.20	4.3
Grey	—	125	125	125	9.31	125	106	13.42	2.70	2.2
Interpublic	—	33¾	33¾	33¾	12.41	34	25¾	2.72	1.00	3.0
JWT Group	+⅛	33⅛	33⅛	33⅛	9.88	43	30	3.43	1.44	4.3
Mickelberry	+⅛	5⅛	5⅛	5⅛	11.46	8	4⅛	0.48	0.06	1.1
Ogilvy	+⅛	32⅛	32⅛	31⅛	15.63	32⅛	22⅛	2.08	0.86	2.6
Saatchi	+⅛	27⅛	28⅛	27⅛	19.41	31⅛	21	1.43	0.71	2.6

ADWEEK's agency composite sometimes parrots the Dow as of 1973-81. Price data courtesy of L.F. Rothschild Unterberg Towbin. ¹four quarters trailing ²most recent annualized

First Effort Breaking For First Professional

By Bob Peischel

LOS ANGELES—First Professional Bank will be touting its particular brand of financial services to professionals with a lot of income but little time in a fall ad campaign, slated to break in November.

The $500,000 campaign will be the first created for the two-year-old bank by its agency of eight months, Santa Monica-based Louis & Saul.

"First Professional Bank, like the professionals we serve, stands ready to help" is the theme of the six-month campaign, which is built around a quartet of four-color print ads explaining FPB's house-call style of service.

The schedule, already planned, will include regional editions of *Time*, *Newsweek*, *U.S. News & World Report* and *Sports Illustrated*.

Backing the print flight will be a direct mail advertising effort.

Three of the ads will be directed at specific professions—doctors (estimated to be two-thirds of the bank's clientele), lawyers and accountants—while the fourth will be aimed at professionals in general.

FPB has about $60 million in assets and has been profitable for over a year, according to FPB chairman Dr. Joel Kovner, who says 90 percent of FPB's business is off-site.

Providing special services for professionals is a new but growing arena for financial institutions, according to Robert Mellem, vice president of research at the investment firm of Piper, Jaffray & Hopwood in Seattle.

"What we're seeing mostly is some of the larger banks trying to expand and get into that area," he said. □

Peninsula Times Tribune 9/11/84 PD1

20 local stocks gain 13 percent in monthly report

Times Tribune staff

After hitting rock bottom in July, stocks of 20 Peninsula companies surged ahead by 13 percent in August, registering the biggest monthly increase since May 1983.

Applied Materials Inc. in Santa Clara, a semiconductor equipment manufacturer, led the surge with an eight-point gain, climbing to $35 a share at the end of August from $27 a share at the end of July. Applied had registered a $4 drop during July, when the stock price fell to $27 from $31 in June.

Another big gainer was Varian Associates Inc. in Palo Alto, which rose $7 a share to $43 over July.

Leland Levy, vice president of Prudential-Bache Securities Inc. in Palo Alto, said the recovery of Peninsula stocks reflected a general boom in the stock market last month. Levy compiles the Peninsula Stock Index.

Levy said Peninsula stocks during August outperformed the New York Stock Exchange, which posted a 9 percent increase. However, the NYSE has a better overall record for the year. NYSE stocks have remained unchanged since the beginning of 1984, while local stocks are down 12 percent, Levy said.

The stock of Dysan Corp. in Santa Clara dropped $2 a share to $6 from $8 last month. The company reported a $14.5 million loss for the third quarter that ended Aug. 4.

Peninsula Stock Index August 1984

	July 31	Aug. 31	Change
Amdahl	10	12	+2
Apple	25	26	+1
Applied Biosys	26	27	+1
Applied Materials	27	35	+8
Avantek	21	22	+1
Dysan	8	6	-2
Hewlett-Packard	36	39	+3
Intel	31	33	+2
Measurex	15	20	+5
National Semi	12	16	+4
Raychem	54	60	+6
Rolm	39	45	+6
Siliconix	15	18	+3
Spectra Physics	23	26	+3
Syntex	44	45	+1
Tab Products	14	17	+3
Tandem	13	15	+2
Triad	10	11	+1
Varian	36	43	+7
Watkins-Johnson	23	23	+0

BUSINESS SYSTEMS

Upstarts sell Unix-based systems as no-fault insurance

New Unix and microprocessor-based systems readying to ship are said to bring greater programming ease to fault-tolerant computers, smooth modular growth, new competition for Tandem, and the first fault-tolerant supermicros positioned well below Tandem.

Only two vendors have shipped fault-tolerant computers in any serious volume—Tandem and Stratus—yet fault tolerance is already becoming a buzzword, approaching the stale and hackneyed status of user friendly. Is it a cliche already to say that by 1990 system-level or circuit-level fault tolerance will be in every computer on the market?

Steve Feldman

Regardless, what spares fault tolerance from tedium is truly fresh, exciting industry developments for continuous-processing systems, and eye-opening figures showing enormous potential demand for these machines within online transaction processing and other markets. A high-risk, high-adventure story is now being played out by a pack of new upstarts, existing vendors of true fault-tolerant systems, and computer giants claiming some degree of fault proofing (i.e. Digital's Vax clusters and IBM's Series 1 network). The computer giants in years to come are also expected to show systems with fault-tolerant architectures on silicon chips. Digital Equipment, with a stake in semiconductor-maker Trilogy Ltd., and IBM both have an interest in circuit-level, fault-tolerant machines.

Aimed at a growing number of applications where uptime and data integrity is critical, fault-tolerant systems use hardware- or software-based approaches to, in essence, duplicate systems within a single machine, synchronizing program execution through checkpointing. Should one element of a system fail, the corresponding device or alternate data path takes over, recovering—ideally—from the point of failure.

The potential demand for fault-tolerant systems is enormous. Omri Serlin, head of research and consulting firm ITOM International (Los Gatos, Calif.) sees a $32 billion market for online transaction processing (OLTP) by 1986 which fault-tolerant vendors can attack. "In no way do I imply that any significant portion will be taken by fault-tolerant suppliers, Serlin clarifies.

In 1983, the $230 million spent on fault-tolerant machines—a very small percentage of the OLTP market—was split between

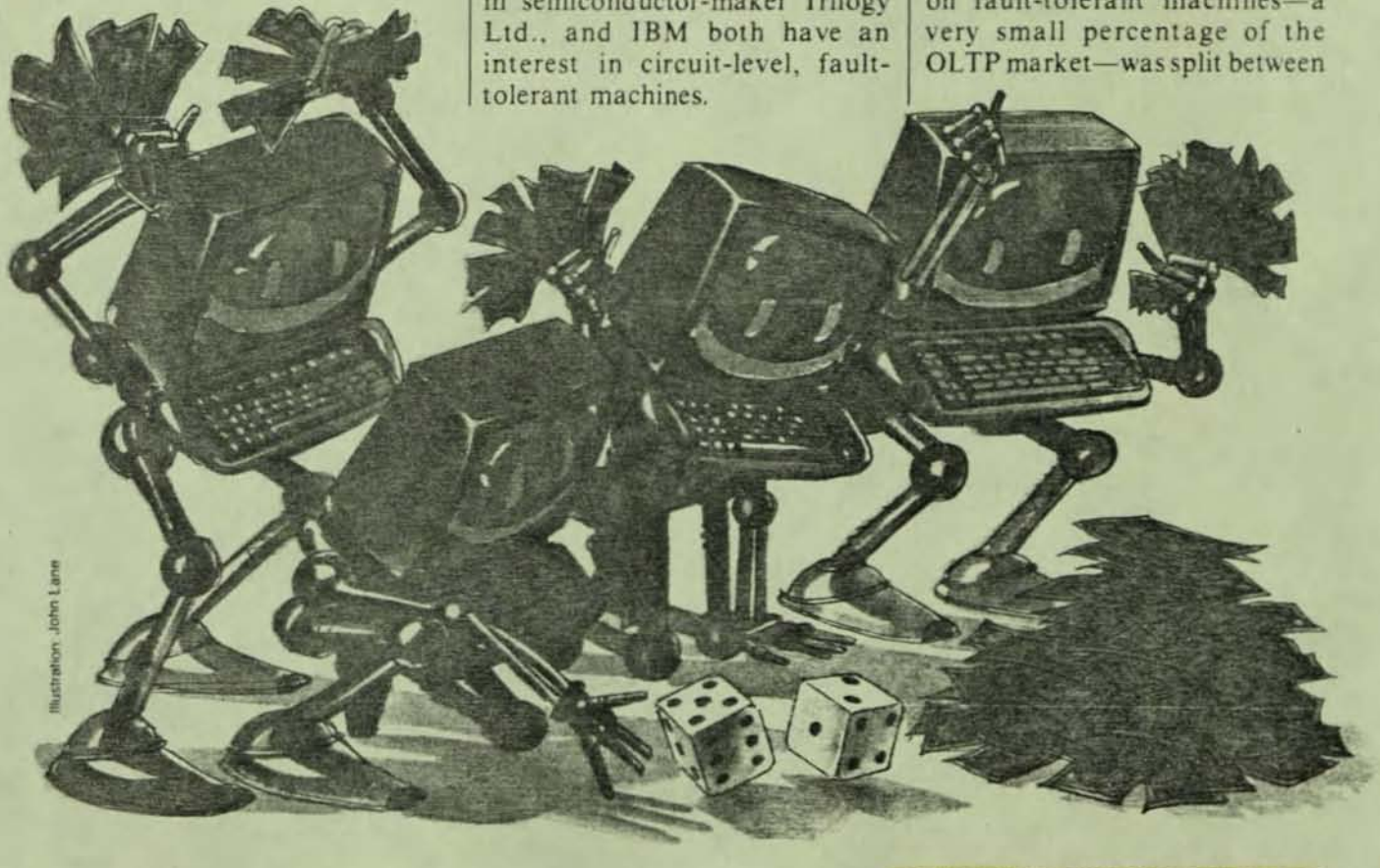


Illustration: John Lane

Stratus ($21 million) and Tandem ($209 million assuming that half of Tandem's sales were for actual fault-tolerant implementations), according to the Yankee Group (Boston), a market research firm. Fault-tolerant sales will grow to $650 million in 1985. "For some applications, (fault-tolerant) vendors will be biting into each other, but they'll also be biting into OLTP in general against traditional vendors," says Yankee senior analyst, Peter Lowber.

Markets for fault-tolerant systems include banking, brokerage, manufacturing, telecommunications, federal government, and point of sale.

While newcomers such as Sequioa, Tolerant, and Auragen role the dice with the established players, they might also keep an eye on Encore Computer (Wellesley, Mass.), the new and curious holding company with bucks, marketing savvy and management lured from Digital Equipment, Prime and Data General.

Adding to the excitement, particularly for readers of this magazine, are the new Unix- and microprocessor-based, modular architectures said to offer unheralded ease in programming fault-tolerant systems. These systems will forge new opportunities for software developers and systems integrators. As important, the new modular architectures permit systems to expand gradually and easily and allow end users and third-party houses to obtain fault-tolerant computers at lower entry price points. Upgrading for greater online transaction processing throughput can be achieved incrementally without purchasing an entire new mainframe-type system.

With more processing power available for less money, fault-tolerant vendors are making software smarter and more appealing to applications developers. The new Unix-based systems may be attractive to third-party developers, who view Unix as the emerging standard that will run their software on a range of systems.

Upstarts readying to ship microprocessor-based systems will position themselves below Tandem or directly challenge Tandem, which for several years had been without fault-tolerant competition in the online transaction processing (OLTP) market. Relative fault-tolerant veteran Stratus will also challenge Tandem with recently introduced machines reaching the power of Tandem's acclaimed TXP machine.

According to Mathew Meehan, an analyst with Salomon Brothers, the new microprocessor-based machines offer advantages unavailable to Tandem systems at the time of their inception: self-checking designs have become affordable and reduce software overhead; and tightly coupled designs allow flexible user-controlled growth and controlled load balancing. "By using off-the-shelf components," Meehan says, "standard software manufacturers are attempting to end-run Tandem's years of hardware and software development."

Although fault tolerance has been and will continue to be a feature of mainframe-level systems for OLTP, the industry is getting a glimpse at supermicro-level fault-tolerant systems. For example, NoHalt Computers (Farmingdale, N.Y.) says that its modular 8086- and Z80-based fault-tolerant system carries the industry's lowest entry price for a continuous processing machine: about $25,000 for an 8086 applications processor, dual-power supplies, dual 20-Mbyte drives, dual Z80 file processors and dual busses. The system can pack as many as 16, 16-bit processor boards to run up to 16 processes concurrently for roughly $70,000. "This type of power in a fault-tolerant machine is unheard of at that price," insists Anthony Cantasano, executive vice president.

The NoHalt computer will not compete with Tandem and Stratus, but is being targeted as a distributed system that will actually place fault tolerance not at a central location, but at local sites. Applications would include word processing and other office functions, claims processing point of sale, MRP, inventory control, and hotel and airline reservations. For many applications, the system will actually supplement larger centralized fault-tolerant systems and IBM host mainframes. "We're putting fault tolerance as close to the user as possible," Cantasano says. For example, a local branch of a bank can perform credit checks on its customers locally, offloading the central host and lowering communications costs. NoHalt is targeting its system at OEMs and turnkey systems integrators. The system runs CP/M and MP/M programs and a range of languages, and will eventually support Unix.

There may be some question whether the NoHalt system earns true fault-tolerant status. While

"With more processing power available for less money, fault-tolerant vendors are making software smarter and more appealing to applications developers."

offering a dual system in most respects, it has only a single-application processor running a user's application; if that processor fails, the user of that processor would be down. However, NoHalt says its system, whenever needed, easily supports dual-application processors to run a single process in tandem with recovery capabilities.

A new Unix- and Multibus-based system offering supermicro performance and low pricing is being marketed to OEMs for resale into operational departments requiring continuous processing. Offered by Parallel Computers (Santa Cruz, Calif.), the Parallel 300 fault-management system is attractive to OEMs who might ordinarily be averse or unable to support a system nationwide, according to Parallel President Charles W. Ryle. The system was designed so it could be maintained and repaired by a non-technical end user. Diagnostics point users to faults. Without tools, a user can replace all parts including power supplies. Systems recoveries after a repair are automatic, Wyle says. Users can call Parallel to receive replacement parts within 24 hours.

Applications written for the Parallel 300 could serve small banks, brokerage houses, and medical labs, and be used for supervisory control systems within factory automation systems, communications, freight handling and shipping. "The niche that Parallel is going after could be sizable, although I'm reluctant to put a number on it," says Peter Lowber. "But it certainly is large enough to enable Parallel to get on the gravy train quickly, since they're about the only vendor with that particular solution."

Parallel 300 is not expandable. It runs Berkeley 4.2 Unix. Since fault tolerance is implemented transparently within the operating system, users see the standard Unix interface. Applications can be transported from any Unix system to Parallel 300 without modifications for fault tolerance, Wyle reports.

According to Omri Serlin, Parallel, by offering a completely replicated system with fault-recovery software for $75,000, "comes well below the price of Tolerant and Auragen, which had been the low price leaders."

Sporting a redundant architecture of MC68010 processors, disk drives and disk controllers, the Parallel 300 executes tasks simultaneously on both processors. If one processor fails, the breakdown is detected by the system's synchronization logic. The faulty processor is immediately configured out of the system and the other processor takes over.

Unix is the muscle behind the newer fault-tolerant systems. Sequioa Systems Inc. (Marlborough, Mass.), Auragen Systems Corp. (Fort Lee, N.J.), Tolerant Transaction Systems (San Jose, Calif.) and Computer Consoles (Rochester, N.Y.) have Unix systems which are beginning or about to ship. While leading the drive toward open systems, Unix, vendors hope, will help counteract a perceived problem with their systems: their incompatibility with IBM and DEC equipment.

Since Unix lacks strong commercial and multi-processing features, vendors "are spending enormous amounts of energy fixing Unix and developing new kernels for multi-processing environments and for implementing their fault-tolerant recovery techniques," Serlin says. The Unix user interface is also dressed up with new shells and menu-driven interfaces.

The new fault-tolerant vendors hold at least one advantage over the major mainframe and super-mini vendors. Companies, such as IBM and DEC, are shackled to existing architectures and software used by their installed bases, precluding them perhaps from offering fault-tolerant architectures that match the elegance of Tandom, Stratus, or Sequoia systems. Established vendors with architectures that cannot easily adopt for fault-tolerant operation are more interested in developing circuit-level fault tolerance than redesigning operating systems tied to installed bases of applications software. "As a consequence, you can expect over the next few years halfway solutions best illustrated by DEC's Vax cluster," Serlin explains, "where you take a bunch of existing computers with practially zero modifications, add a little bit of new software and some new interconnect switching mechanisms, and offer it as a solution for increased availability."

AT&T has a fault-tolerant machine based on an older architecture, but AT&T is not tied to a sizable OLTP installed base and thus may be able to introduce a new machine. For its current fault-tolerant system—the 3B20D—AT&T lacks general-purpose OLTP applications software and marketing savvy at this point, analysts point out. Its pricing may be too high to attract significant third-party software development. Serlin notes that the system is not expandable beyond a two-CPU configuration. "It's highly unlikely that AT&T will become a serious competitor to Tandem and Stratus. Their strategy will likely be aimed at military and aerospace, where defense contractors develop their own software."

Startup fault-tolerant manufacturers, seeing that their systems have architectural advantages over offerings from major vendors, foam at the mouth over a $16.6

billion market for online transaction processing in 1984 from which to draw. Sixty-five to 70% of that market is IBM-based, according to the Yankee Group. While startups will still have difficulty wrestling business from the major vendors, the OLTP market requiring fault tolerance is broad, growing, and wide open.

Remember there is no such thing as a fault-tolerant market. Rather, fault tolerance is becoming an emerging requirement for OLTP in general. Continuous processing is merely one of several basic criteria for online transaction processing, according to a Yankee Group study. Others include transaction-processing throughput, data integrity, linear expandability, and networking.

The fault-tolerant startups, Lowber notes, will likely do an admirable jobs in all areas, but networking. Herein lies the Catch 22. Tremendous opportunities exist for fault-tolerant startups, particularly in light of the difficulty major mainframe and minicomputer vendors have in introducing fault tolerance without disrupting their installed bases. Yet, it will be difficult for a startup to support at the outset a large systems market requiring sophisticated communications systems. Developing full SNA implementations to reach compatibility with IBM's System Network Architecture took DEC and Data General, for example, years to develop. Although startups claim they have communications support through third-party packages, this merely provides the physical link, Lowber says. Vendors must still build the high-level functions into their own operating systems—not a trivial task.

Designing fault-tolerant architectures is not trivial either. Many vendors have run into problems causing shipment delays. Auragen and Tolerant, two cases in point, say they are now readying for deliveries. Tolerant is now shipping non-fault-tolerant configurations to OEMs and software houses and says it will ship fault-tolerant computers by the first quarter of 1985. Auragen has shipped about 20 System 4000 clusters to Nixdorf Computer, its European distributor, and is beginning to ship clusters to U.S. software houses. Auragen has signed a $25 million contract with Japanese vendor Sord Computer and claims to have OEM contracts totalling a $60 million backlog excluding Nixdorf.

Modular growth, Unix-based machine-independent software, and ease in programming are features written on the calling cards of fault-tolerant upstarts. For example, Sequoia, to formally introduce its highly modular, hardware-based, fault-tolerant product in September, has designed its tightly coupled, multiprocessor system to behave like a single computer to the applications programmer. Its enhanced Unix operating system performs automatic load balancing, sparing the applications programmer for the complicated chore of splitting the workload among designated processor modules.

Sequoia's tightly coupled architecture gives every self-checking MC 68010 processor, memory, and I/O element direct access to every other element through a high-speed bus. As a benefit of tight coupling, one copy of the operating system runs throughout the entire system for efficient memory storage and sharing.

Yet as processors are added to tightly coupled systems, they can run into contention problems that loosley coupled systems avoid. "The heart of our system design has been directed at the contention issue," says Sequoia president Warren Tyler. He claims that Sequoia avoids contention through its high-speed, 80-Mbytes/s dual bus and through a large (128 kbytes) and fast (40-ns static RAM) cache memory on each processor, serving to ease data traffic. Thirdly, a segmented bus allows for transfers between I/O devices and memory without tying up the system bus, as long as the devices and memory modules share the same bus segment. Sequoia's system interfaces to the Ingres relational database system for accessing large shared databases form terminals or programs. Development tools are also provided.

Similarly, Synapse Computer (Milpitas, Calif.), at the very high end, features the N+1 architecture which has modular expansion and a tightly coupled, shared memory system able to load balance across the system. A proprietary operation system integrates a relational database, transaction-processing manager, and dictionary, reducing development time and cost.

Checkpointing, a fault-tolerant feature that programmer's once had to concern themselves with, is now transparent. Tandem had to introduce software tools to virtually eliminate checkpointing by the programmer. Newcomers, such as Auragen and Tolerant, having the benefit of observing Tandem's experience, claim that their implementations achieve checkpointing transparency at a lower cost and consume less systems resourses during regular operation.

Says Tolerant marketing director Shirley Henry: "We've taken the transaction control mechanism that Tandem uses in TMF (Transaction Monitoring Facility) and the load-balancing capability that they use in PUMathway and collapsed all of that down into the lowest levels of our operating system." By embedding a begin-end transaction processing model

into the lowest levels of the OS, then only the transaction must be protected, not every process within that transaction. "Tandem checkpoints or synchronizes primary and backup programs before every non-repeatable operation—such as updating a disk record," Henry explains. "We synchronize once per transaction; subsequently we have a good deal less overhead.'

Tolerant also claims that development tools it provides make it easier, faster, and less expensive to develop online applications than it is to develop typical batch programs under IBM environments. Tolerant's system allows programmers to move between programs, forms, and database inquiries without writing any control code.

Stratus, which hooks its system to IBM PCs on its local network; Computer Consoles, with its Unix-based OfficePower system; and Nestar Systems, with its high-reliability LAN, are going after office automation markets that view fault tolerance as a critical requirement.

Keeping ahead of newcomers. Stratus, which intends to add Unix support, says it will keep ahead of the newcomers through intensive R&D and marketing. Stratus, says president William Foster, significantly strengthened itself with the recent introduction of two high-end processors "which had to be a setback for the (startups) who have been working on their designs—some for as long as we have—and haven't gotten their original products out the door in any volume at all.

Tandem Computers Inc. (Cupertino, Calif.) has Non Stop TXP systems that grow modularly from two to 16 processors. Beyond that, systems network through a high-speed, fiber-optic, fault-tolerant interface. Recognized as having extensive communications offerings, Tandem is expected to hold its lead in the fault-tolerant marketplace.

With $418 million dollars in 1983 revenues, Tandem says while new firms are gearing up it continues to make enhancements to its products based on actual customer requirements. "The product we ship today is quite a bit different from the one we shipped in 1976," says marketing director Barry Ariko. Tandem says its position is analogous to DEC, which was followed by a herd of minicomputer vendors, but remains the dominant supplier." Today fault-tolerant is the right idea, just like the minicomputer was at one time."

IN DEPTH

The coming day of fault tolerance

By Wilbur H. Highleyman

A little more than four years ago, my In Depth series, "Survivable Systems" [CW, Feb. 4-Feb. 25, 1980], appeared in *Computerworld*. At that time, Tandem Computers, Inc. offered the only commercially available fault-tolerant system, the Nonstop. Now that there are about two dozen offerings from domestic and foreign manufacturers, it is clear that fault tolerance has been accepted as a concept with a future.

As with memory and languages and operating systems, fault tolerance will become a subconscious requirement. We just wouldn't think of building a system without it.

It is my guess that within the next 10 years fault tolerance will be as common as higher level languages, multiuser operating systems and megabyte memories.

I first became involved in fault-tolerant systems in the mid-1960s, when my company at that time, Data Trends, Inc., built a triplexed totalizator system for the New York Racing Association. The system was designed for the Aqueduct, Belmont and Saratoga racetracks and used Honeywell, Inc. H200s. Remember them? They were 6-bit machines designed for commercial data processing.

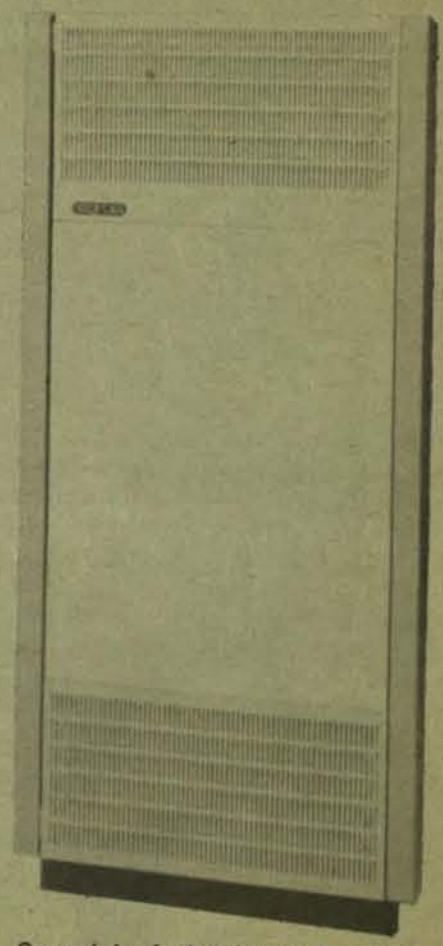
The system was quickly followed by a network of duplexed Digital Equipment Corp. PDP-15s acting as the telex switches still used by ITT World Communications, Inc. The floor of the Chicago Board of Trade was first automated with triplexed DEC PDP-8s.

The Sombers Group was later involved with other systems. One included telex switches for the British Post Office using General Automation, Inc.'s SPC-16. Another, the data base manager for the (New York) *Daily News* editorial system, used duplexed Prime Computer, Inc. 200s.

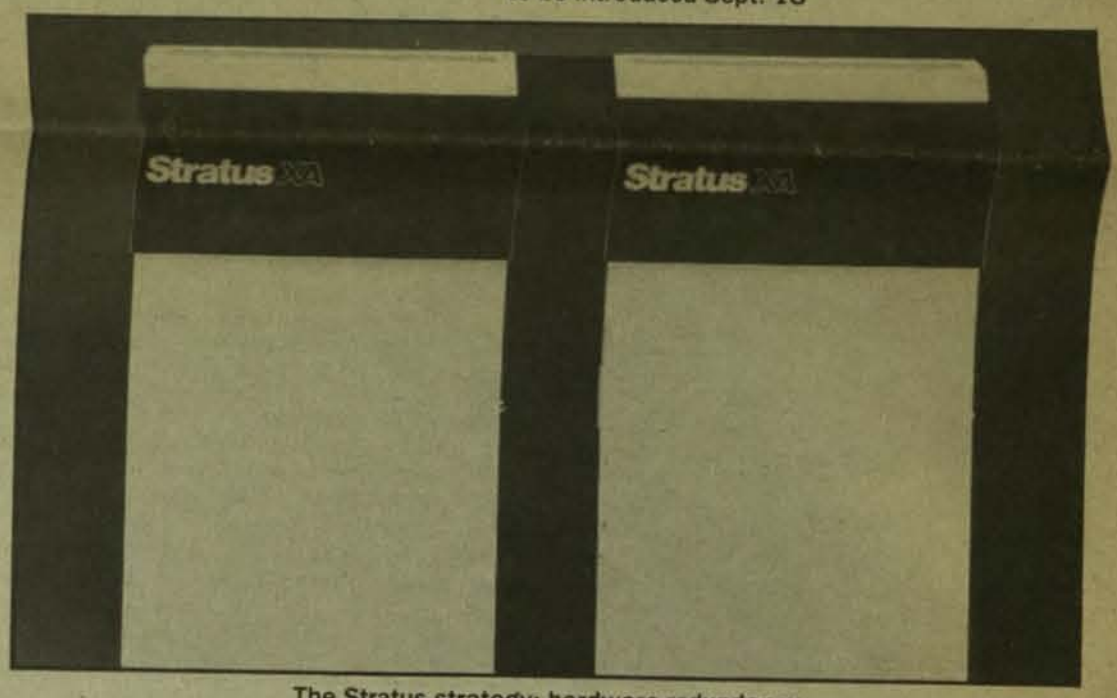
All of these fault-tolerant systems were pre-1976, and all had the following characteristics:

- Each used a homegrown operating system supporting a fault-tolerant strategy that was quite specific to the application.
- Each ran as a single processor with a shadow standby that could take over without losing a transaction (or a call in progress). Triplexed systems simply provided a third cold standby.
- Memory sizes were small by today's standards (16K bytes to 64K bytes).
- All programming was done in assembly language.

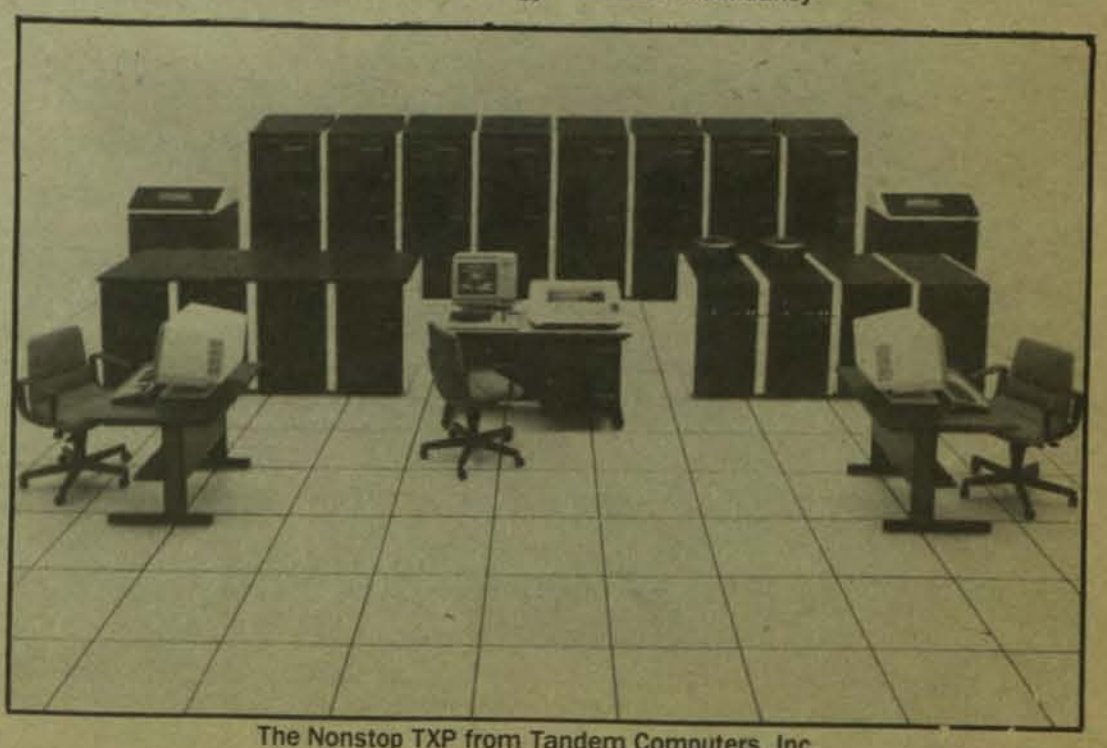
In those days, we built the systems from scratch and squeezed the last bit of performance



Sequoia's fault-tolerant machine, to be introduced Sept. 18



The Stratus strategy: hardware redundancy



The Nonstop TXP from Tandem Computers, Inc.

Federal DPers will meet on fault tolerance

Wilbur H. Highleyman will speak on state-of-the-art fault tolerance at the Federal Computer Conference, to be held Sept. 18-20 at the Washington, D.C. Convention Center.

This seventh annual event will include sessions, workshops and professional enhancement seminars.

More information is available from the Federal Computer Conference, 286 Boston Post Road, Wayland, Mass. 01778.

out of the hardware. After all, hardware was expensive, and software was cheap (at least, that was management's perception).

Then came 1976 and Tandem, and our little world of custom fault-tolerant systems turned upside down. Tandem had the daring to introduce a generic fault-tolerant product — one that was applicable to almost any application. Just learn to checkpoint, Tandem said, and you can build any application to run fault tolerant.

Tandem was right. The custom fault-tolerant business of The Sombers Group vanished almost instantly, to be replaced with experience on dozens of new Tandem-based systems. Of course, checkpointing did not turn out to be the trivial exercise touted by Tandem. And there were failure windows not even anticipated. But with ever-increasing experience and continuing improvements in Tandem products, the building of these systems has become more straightforward.

Today, these systems can be found in almost any application, except those which require ultra-fast response time or are products aimed at very low-cost markets (these are still candidates for custom operating systems).

The most amazing part of the Tandem story is that the company held this market captive for six or seven years — unheard of in today's technology. It was not until 1982 that Stratus Computer, Inc. became a serious competitor. Synapse Computer Corp. emerged next, followed by dozens of others. Now, within just two short years, the field is full with fledgling hopefuls. Each brings a new idea to the fault-tolerant marketplace — a new piece to the puzzle — begging the question of where is all this going.

What is fault tolerance?

As a general statement, a fault-tolerant system is one in which any failure is transparent to the user. However, this general statement is unusually demanding. For one thing, it implies that any sequence of failures will be user-transparent. The reliability of today's hardware is such that tolerance of any single failure is sufficient, given sufficiently rapid repair time.

The statement also makes no allowance for reduced performance in the (presumably) rare event of a failure. This is often tolerable, as long as all functions are still available to the user community. We will therefore use a relaxed definition for purposes of the following discussion: A fault-tolerant system is one in which any single failure is functionally transparent to the user.

In order to be fault tolerant, a system must have the following characteristics:

Redundancy. Each critical component must be replicated so that it can be replaced upon failure.

Fault detection. The system must be able to identify automatically a component that has failed.

Isolation. The failed component must be isolated, electrically and logically, from the rest of the system.

Reconfiguration. The system must reconfigure itself to continue uninterrupted operation in the presence of this fault.

Repair. The faulty component must be repairable without affecting normal ongoing system operation.

Recovery. Once repaired, the failed component must be reintroduced into the system.

Data base integrity. No failure mode shall be allowed to contaminate the data base.

What's happening now?

Tandem, located in Cupertino, Calif., is the granddaddy of generic fault-tolerant systems. Tandem introduced a multicomputer system in which up to 16 independent computers were interconnected by a dual high-speed bus. Within this structure, fault tolerance was implemented via software. Each operating program (or process) running in one computer could have a back-up process running in another computer.

Via software-implemented checkpoints at critical points in the process, the back-up process is informed of the primary process' exact state. Thus, if the primary process should fail (due to a processor failure, for example) the back-up process could take over very quickly (within seconds) from the last known state. Done properly, the user is unaware of the failure.

Given that Tandem's approach reflected the technology of the mid-1970s, it was a very advanced concept and obviously is holding its own today. (Tandem continues to command the bulk of the market for fault-tolerant systems.) However, this "software" approach has certain drawbacks. Checkpointing imposes a nontrivial system overhead, and the understanding and generation of solid checkpointing strategies is a little-understood art.

Using the microprocessor technology of the '80s, Stratus Computer of

Natick, Mass., introduced a totally new idea — fault tolerance strictly through hardware redundancy. Taking the Stratus processor as an example, it is really four microprocessors (Stratus uses the Motorola, Inc. 68000) arranged as two pairs of duplexed processors. All four microprocessors are run in lock step at the system clock frequency. The outputs of each microprocessor within a duplexed pair are continually checked for consistency.

As long as all outputs are the same, both pairs operate in parallel. If one duplex pair should find an inconsistency, it immediately disconnects itself from the system bus, but the other duplex pair continues operations.

Along with its equally secure memory, disk and communications units, a Stratus "processing module" will continue uninterrupted processing in the event of any single failure. Stratus allows up to 32 processing modules to be connected via a high-speed bus, although this capability is used solely for expansion and not recoverability as in Tandem's case. (Note: To be more accurate, each Stratus processor really is made up of a multiple of four microprocessors, since there is one set for executive work and one or more sets — depending on the model — for application work. Each set is quadraplexed and runs in lockstep.)

Hardware approach

Stratus solved the overhead problems of Tandem's software approach through its "hardware" approach of quadraplexing. On the surface, this appears to be a more expensive, though higher performance, solution. However, it is not clear from actual field experience that either is true: Both systems appear to be price/performance competitive.

Then enter Synapse Computer Corp. of Milpitas, Calif. Synapse argues that the multicomputer approach of both Tandem and Stratus is inefficient for two reasons. One is that many applications require several cooperating processes, especially in transaction processing. Terminal requestors communicate with transaction servers, which communicate with a data base manager.

In loosely coupled systems such as these, the interprocess communications mechanism is lengthy (typically a few milliseconds) and represents a significant portion of the system load. Secondly, though the load of the system can be shared among the computers, it cannot be easily dynamically balanced, since processes must be preassigned to a particular computer. It is not uncommon for one computer to be running at 90% to 100% load while others are running at 10% to 50% load.

Synapse introduced a closely coupled multiprocessor system (as opposed to a multicomputer system) in which up to 28 general-purpose or I/O processors (again, the Motorola 68000) use one common memory. This improves efficiency in two ways. Interprocess communications is now via direct memory and is measured in microseconds rather than milliseconds.

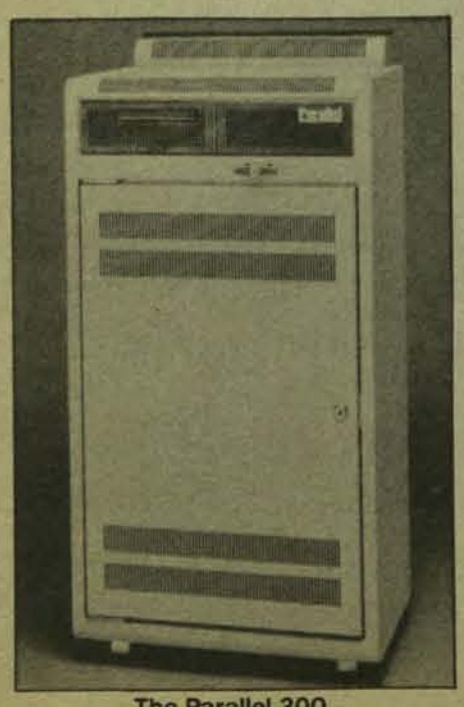
Furthermore, all general-purpose processors can work off a common task queue, thus keeping all equally busy. A process is no longer assigned to a single processor; on each dispatch it is assigned to the next free processor.

Contaminate memory

Of course, a closely coupled architecture has a horrible fault-mode because any sick processor, through certain hardware failures, can contaminate main common memory. And the failure of a main memory module also represents a catastrophic system failure. Synapse, therefore, addresses fault tolerance with a somewhat different philosophy. The company submits that, in many applications, it is perfectly reasonable to require users to reenter their current transaction in the event of a failure — provided that failures are infrequent and that the integrity of the data base is maintained.

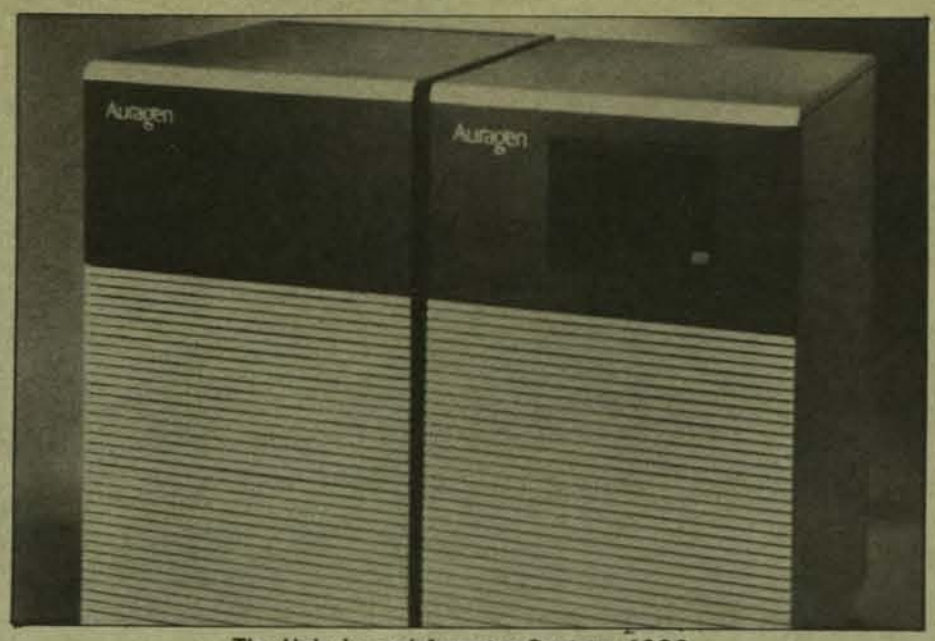
To this end, Synapse maintains sophisticated logs of all disk activity. In the event of a failure of any kind, the system is brought down, automatically reconfigured, and any transactions in progress are rolled back. It may take a few moments a few times a year, but Synapse argues that the resulting price/performance of its "transaction" approach to fault tolerance far outweighs this inconvenience.

A common thread of all of these systems is expandability and transparency. Applications can be written and systems installed without worrying about outgrowing the size of the box. If volumes increase, functions proliferate, or (heaven forbid) the application was underestimated, simply add modules — more processors, more disks, more terminals, whatever is needed. And if you fill up a system or need to distribute it,



The Parallel 300

Of course, a closely coupled architecture has a horrible fault-mode because any sick processor, through certain hardware failures, can contaminate main common memory.



The Unix-based Auragen System 4000

interconnect multiple systems with anything from local-area networks to satellite links.

The beauty of this expandability is its transparency to the applications programs. The operating system knows the name and whereabouts of every processor, file and peripheral in the system. As these are moved around in an expanding system, the applications programs need know nothing of this configuration change and, therefore, require no modification. A few minutes of modifying the system generation parameters does it all.

Service is another area of innovation. Tolerance of a single failure is only of value if that fault can be rapidly repaired. Led by Stratus Computer and followed by some of the newer entries, a failed system will automatically place a call to a centralized service facility. The fault can be diagnosed over the dialed data link, and a replacement component is sent by courier overnight to the customer for replacement. Often, the customer will receive the replacement component before he has even noticed the system alarm designating a failure. I suppose all that is left is training the courier service to also replace the part.

Three philosophies

We now have three distinct fault-tolerant philosophies introduced by the first three entries (at least, domestically) into the generic fault-tolerant field. There is the software approach by Tandem, the hardware approach by Stratus and the transaction approach by Synapse.

Each approach has its pluses and minuses, perhaps most easily expressed by the minuses. The software approach imposes system overhead, the hardware approach imposes hardware overhead, and the transaction approach imposes recovery time overhead. It is interesting that the newcomers to the field following Tandem, Stratus and Synapse use one or a combination of these techniques.

Auragen Systems Corp. of Fort Lee, N.J., offers a multiple computer system in which up to 32 processor clusters can be interconnected via dual high-speed buses. Each processor cluster is an independent computer system which is itself a closely coupled configuration of three microprocessors (one executive and two application processors) communicating with its own common memory, files and peripherals.

Auragen's fault-tolerance approach is similar in many ways to Tandem's software approach, except that checkpointing is done automatically at the operating system level. Therefore, it requires no application awareness and is more efficient during normal operation, but with longer recovery times. Auragen's fault-tolerant system is a Unix-based system. The company claims that any Unix program will run fault tolerant with no changes.

Tolerant Systems Corp. of San Jose, Calif., has announced a system in which multiple System Building Blocks can be configured in a variety of ways. Each System Building Block contains two National Semiconductor Corp. 32032 microprocessors (one for real-time executive work and one for application tasks), memory and I/O interfaces.

In a typical configuration, System Building Blocks are configured in

Some boards of directors don't want to hear anything but Big Blue, and Big Blue doesn't have a fault-tolerant system. But even this argument is dissipating as granddaddy Tandem rapidly approaches becoming a billion-dollar company.

pairs for handling specific system functions. For instance, one pair of building blocks would act as communication servers, one pair as application servers and one pair as file servers. Normally, both System Building Blocks in a pair would share the load.

However, if one fails, all traffic is passed through the surviving building block. Tolerant's system recovers from a fault via a transaction recovery similar to Synapse. Incomplete transactions are backed out of the data base, and the user reenters those once recovery is complete.

Sequoia Systems in Marlboro, Mass., combines the hardware and transaction approaches. Its product, to be introduced Sept. 18 at the Federal Computer Conference in Washington, D.C., is a closely coupled system like that of Synapse. Up to 64 general-purpose processors and 96 I/O processors communicate with common memory over a pair of high-speed buses.

Unlike Synapse, each general-purpose processor is composed of a pair of Motorola 68000 microprocessors operating in Stratus-like lockstep. Thus, each is completely self-checking. Memory elements and I/O processors are also self-checking. Like the Synapse system, if there is an error, incomplete transactions are backed out and restarted following recovery.

Modified stance

Nohalt Computers, Inc. of Farmingdale, N.Y., takes a modified stance on fault tolerance. In its Failsafe system, up to 16 application processors communicate with a mirrored, redundant data base manager. Each application processor provides a single user environment, supporting a user terminal and up to three other peripherals associated with its application, such as a printer or a communications line. If there is a failure in the data base manager, system operation continues. A failure in an application processor will take that user out of service.

Parallel Computers of Santa Cruz, Calif., provides a system in which up to five parallel processing units can communicate over a single simplexed bus to disk controllers and communications controllers. Each parallel processing unit is actually two processors, each Motorola 68000-based. Each half of a parallel processing unit is independently processing the same transactions as the other half. The unit halves checkpoint to each other to keep each one in sync with the other's progress. If one fails, the other carries on.

The above systems represent many of the current domestic entries in the generic, expandable fault-tolerant system market (though the Parallel system is aimed more specifically at supervisory control and data acquisition applications). Other systems worth noting that are less generic and not expandable are from August Systems, Inc. and Syntrex, Inc.

August Systems, of Salem, Ore., markets a triplexed voting system to the process

control and supervisory control and data acquisition marketplaces. All inputs are processed by each of three independent Intel Corp. 8086-based processors, and the results, whether digital or analog, are voted on. If there is a disagreement, two out of three determine the result. The repeated failure of one processor to agree with the other two takes it out of service.

Syntrex, Inc., of Eatontown, N.J., markets its fault-tolerant Gemini system to the word processing market. Similar in architecture to the Nohalt system, Gemini is composed of an 8086-based redundant data base manager and up to 14 8086-based intelligent Aquarius terminals. A failure in the data base manager is transparent to the user, whereas an Aquarius failure puts that user out of service.

Of noticeable absence in the above discussion are the major computer manufacturers established prior to Tandem. Not one has announced a generic, expandable fault-tolerant system, though there are some entries in one form or another. Both Perkin-Elmer Corp., with its Resilient system, and AT&T, with its 3B20D, market a dual-processor fault-tolerant system. But once the user grows out of this "box," he *is faced with difficult decisions* on how to expand. With Perkin-Elmer, the user at least can climb the 3200 product line, from the small 3205 to the powerful 3200 MPS.

And then there is DEC, the perennial hopeful for a major entry in the field. After one false announcement and rapid withdrawal, DEC finally announced VAX cluster, which can support up to 16 nodes interconnected by a high-speed dual bus. Each node can be a VAX (780 or 750) or a disk control unit (hierarchical storage controller). DEC has delivered VAX cluster hardware, but software is still forthcoming, even for such elemental operations as file sharing, not to mention file mirroring and fault recovery. And it appears that fault recovery will be implemented by checkpointing process context to disk — a backward step from software checkpointing?

Shaping the future

Some interesting common paths are beginning to take shape that may set a precedence for future offerings. One is the embracing of the software, hardware and transaction-recovery techniques introduced by Tandem, Stratus and Synapse. So far, there do not appear to be any new philosophies beyond these introduced.

Another common path is the inherent expandability of these systems. I would not expect to see any new ventures introducing systems limited to dual processors. And still another is the wealth of software tools that have come to be expected, from the normal complement of higher level languages to networking, data base management and transaction processing tools.

Development efforts appear to be focusing (and appropriately so) on the use of existing technology to reduce development effort. To wit, with respect to the newcomers:

Processor — All but Tandem use microprocessor technology. Five use Motorola 68000 (Stratus, Synapse, Auragen, Parallel and Sequoia).

Operating system — Many of these systems are Unix-based, including Auragen, Tolerant, Sequoia, Nohalt and Parallel.

System language — All use a high-level language for a system language. C is predominant and parallels the use of Unix.

Data base manager — More and more, an existing data base management system is being ported. Stratus is using Oracle Corp.'s Oracle, and Tolerant is using IBM's SQL. I have heard of others, as yet unconfirmed.

All of this flurry of activity is not without its problems. Several of the new start-ups have been delayed in getting their product to the marketplace. And DEC still has not delivered its promised VAX cluster software. But the march goes on, and the breadth of available fault-tolerant computing systems grows with the months.

When to consider

When does it make sense for you, the user, to consider going to a fault-tolerant system?

The answer is simple. Compare the cost of failures of your current system to the cost increment of going to a

And then there is DEC, the perennial hopeful for a major entry in the field. After one false announcement and rapid withdrawal, DEC finally announced VAX cluster, which can support up to 16 nodes interconnected by a high-speed dual bus.

fault-tolerant system. The cost of a failure is the cost of lost business, idle workers and perhaps contingent liabilities incurred while the system is down. The downtime of a system is that time it takes to repair the hardware plus the time it takes to repair a corrupted data base, which could be many times the hardware repair time.

For new systems in which conversion is not a problem, the incremental cost of fault tolerance is rapidly approaching zero. After all, if a multiprocessor system is sharing a load across all its processors and if the overhead imposed by fault-tolerant considerations is minimal, a fault-tolerant system should be just as price/performance efficient as any other system. A look at today's offerings will verify that. And you get invaluable expandability as a freebie.

About the only reason not to go to fault tolerance for new systems today is because of management's concern for vendor stability. Some boards of directors don't want to hear anything but Big Blue, and Big Blue doesn't have a fault-tolerant system. But even this argument is dissipating as granddaddy Tandem rapidly approaches becoming a billion-dollar company.

Why haven't the major manufacturers entered this market? Good question with hazy answers. First, the perceived size of the marketplace may not yet be attractive. IBM certainly has proven that the personal computer market is a hotter trail to follow, at least for itself. Second, there is always the nagging problem of competition with existing product lines. And third, I am sure that the major manufacturers recognize the significance of the technological pitfalls in such a product development.

All that notwithstanding, I look at the development of fault tolerance in light of other breakthroughs that were major in their time, but are commonplace today. In the field of minicomputers, for example, 8K bytes was a lot of memory 15 years ago. Now, megabyte memory capabilities are taken for granted. Ten years ago, Fortran was about the only high-level language available for minicomputers, and multiuser operating systems were still unavailable. Would you even consider buying a mini today if it did not support many languages in a multiuser interactive environment? Of course not.

And so it goes with fault tolerance. As fault tolerance becomes more available as a near-zero cost option from major manufacturers, with unlimited expansion as an added plus, more and more new systems will be built as fault tolerant. As with memory and languages and operating systems, fault tolerance will become a subconscious requirement. We just wouldn't think about building a system without it.

How long? Anybody's guess. But based on past experience, it's got to be less than 10 years.

About the author

Wilbur H. Highleyman is chairman of The Sombers Group, Inc., Mountain Lakes, N.J., which specializes in turnkey software packages for on-line systems. Highleyman has nearly 30 years of experience in the development of real-time, on-line data processing systems, with particular emphasis on multiprocessor fault-tolerant systems and large communications-oriented systems. Highleyman is also founder and chairman of Minidata Services, Inc. and president of the Northeast Region Tandem User's Group.

NEWS

Californians buy gasoline with ATM bank cards at Mobil stations

SAN FRANCISCO — Two San Francisco banks and Mobil Oil Corp. have joined in a point-of-sale (POS) project through which bank customers can use their automated teller machine (ATM) cards to buy gasoline.

Mobil POS project manager John Rowerdink reported that more than 300 San Francisco-area and Sacramento, Calif.-area gas stations have been linked to the banks through an existing Mobil network that ties 2,500 stations nationwide to Mobil's Kansas City, Mo., data center.

Crocker Bank and First Interstate Bank ATM cardholders will be able to use those cards at 750 Mobil stations in California when the project is completed later this month, according to Rowerdink.

He reported that the debit card option is an addition to Mobil's existing POS system, installed at the 750 California Mobil stations, and is being installed in Washington, Oregon, Florida, the District of Columbia, Pennsylvania and New Jersey. He said the debit card system was field-tested at 60 Washington, D.C., stations. At present, the POS stations in the remaining states accept charge cards, not debit cards.

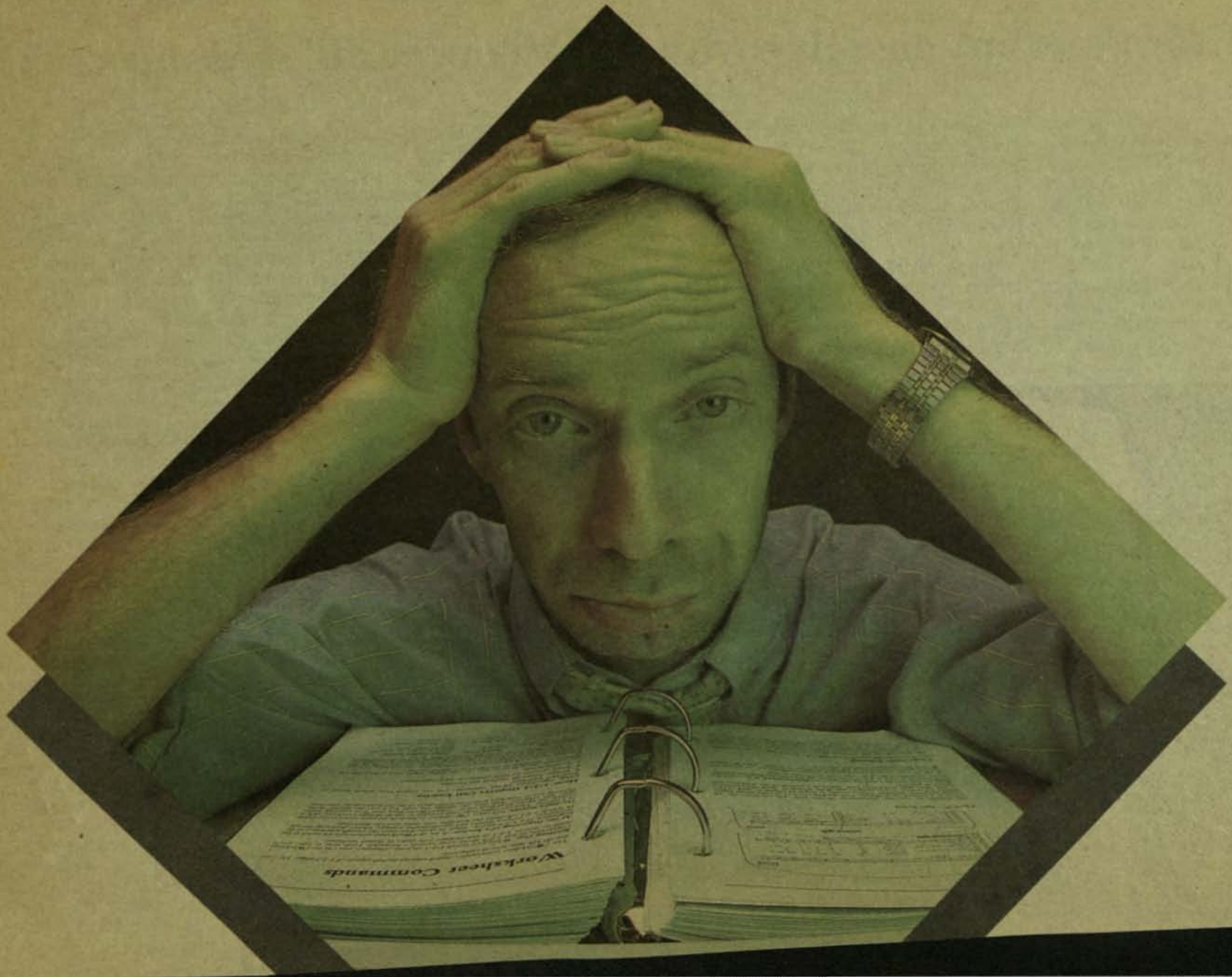
Bank officials reported that the system involves using dedicated data lines to link the banks to Mobil's Kansas City facility for payment authorization and reporting.

With the system, motorists give their ATM cards to gas station attendants or cashiers, who run the cards through a cardreader and key in details of the gasoline sale. The motorists, using either a keypad attached to a Datatrol, Inc. FT 3205 terminal or a portable keypad that the attendant brings to the car, then punch in their personal identification numbers.

The transaction details are transmitted from the POS terminals to Mobil's Tandem Computers, Inc. Nonstop II and TXP processors in Kansas City and relayed to the bank computers for verification of the identification numbers. Approval or authorization is then relayed back to the terminal via Kansas City and the transaction logged, with the sale amount deducted from the customer's bank account.

According to Loretta Masters, Crocker Bank's associate product manager for POS services, all of the communications should take between five and 10 seconds.

She noted that the Mobil project is independent of Crocker's involvement in Interlink, a POS project being developed by five major California banks.


Workshop Commands

LEVEL 1 - 3 OF 3 STORIES

September 10, 1984

SECTION: NEWS; Pg. 38

LENGTH: 385 words

HEADLINE: Californians buy gasoline with ATM bank cards at Mobil stations

DATELINE: SAN FRANCISCO

BODY:

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Belt-tightening at Tandem

In the face of rising expenses and some sales problems, Tandem Computers president James Treybig says that the Cupertino computer maker has swung into a "belt-tightening" program. Begun last month, the effort coincides with price cuts up to 32% for Tandem's NonStop 1+ and NonStop 2 mainframe computers, as well as some computer accessories. Among other things, the company has imposed new restrictions on hiring, wages and employee travel. Treybig says that the moves are designed to combat higher expenses incurred earlier this year by the hiring of more than 600 people—many of whom are busy developing new products.

The price cuts may hurt Tandem's profits in the fourth-quarter, which ended Sept. 30. Analysts say that the TPX, Tandem's new top-of-the-line mainframe, is taking longer to sell than expected; NonStop 2 sales have dried up; and sales for the NonStop 1 are being affected by start-up competitors such as Stratus.

Star Wars

The Army, which this summer succeeded in knocking a dummy nuclear warhead out of the sky with a heat-seeking missile, is honing its strategic sharpshooting skills even further with innovative infrared sensors. The R&D project, known as the Airborne Optical Adjunct, will be worth $290 million over five years to Boeing Aerospace and its electronic subcontractors.

Aerojet Electro Systems and Hughes Aircraft each are being asked to design optical sensors capable of discerning the heat of a human body at a distance of 1,000 miles against the cold background of space. The sensors would ride on a modified Boeing 707, which also would carry powerful Honeywell computers specially programmed to track ballistic missiles as they reenter the atmosphere. Data links would pass the information to ground-based radars that would steer defensive weapons.

Filevision: The next 1-2-3?

If Apple Computer has its way, Telos Software Products of Santa Monica, Calif., could become the next big name in software, à la Lotus Development Corp. Apple's software evangelist Guy Kawasaki, who heads up the company's third-party software programs for the Macintosh and Lisa, is touting the pictorial database called Filevision, which Telos is shipping for the Mac, as "the next 1-2-3" (Lotus's integrated spreadsheet). Filevision is one of 70 packages Apple was shipping for the Mac this month.

financial information to its clients, including UBC, and a related private multitenant network operated by Olympia & York, a large real estate developer, and United Telecommunications. UBC was formed by United Tel after OlympiaNet was put together to expand the offering to other real estate developers ... Equatorial Communications (Mtn. View, CA) has purchased an option on one more satellite transponder, bringing the total number to five. Equatorial offers one-way broadcast satellite services for customers such as newswires ... Cableshare (London, Ontario) has sold a private packet network system to CNCP Telecommunications (Toronto, Ontario) for $2.2 million. The packet network, which consists of hardware from Compania Telefonica Nacional De Espana and Cableshare software, will be used to expand the Infoswitch packet network in Canada ... The LAN industry is wasting no time in making connections to the IBM PC AT. Nestar Systems (Palo Alto, CA) and Fox Research (New York, NY) have already integrated the AT into their respective LANs, Plan and 10-Net and will support IBM's PC Network Program when it is available in 1985. By announcing its own LAN, however, IBM has put a big cloud over the LAN industry. Has IBM "legitimized" the market or will it take an enormous market share, squeezing out all but the strongest few? Only time will tell ... The Source (McLean, VA) has finally taken the hint that its $100 subscription fee was too high when CompuServe (Columbus, OH) was charging $39 and has lowered its sign-on fee to $49.95. In addition, it has instituted some interesting new services, including a member directory that allows people with similar professions to search for each other ... Intelligent Technologies (Palo Alto, CA) has introduced two Bisync Exchange packages that allow PCs to be connected into the IBM mainframe environment, with features such as file transfer from the PC to the mainframe. One package supports 3274/6 terminals, while the other emulates the 3780. In addition, the firm released a 3278 emulation board that allows a PC to be connected to a 3274/6 controller via a coaxial cable ... When Federal Express' ZapMail electronic mail service was announced, one particularly interesting feature was its use of special high-resolution facsimile equipment (from Nippon Electric). This equipment provides a resolution of 400 dots-per-inch, which means that the dot-matrix structure of the image is almost imperceptible. (Old-style Group 1 fax used 96 dots per inch in its high-speed mode, and Group 3 fax uses about 200.) The amount of transmission capacity (bandwidth or time) needed to carry an uncompressed 400-dot-per-inch image is four times the capacity required for a 200-dot-per-inch image. (Compression would typically narrow the difference somewhat.) An EMMS reader told us last week that he had gone to the trouble of putting a ZapMail message under a microscope and had counted the dot resolution; he reckons that it's not 400 dots-per-inch, and is probably Group 3. We'd be interested to hear from other readers about their Zapmessages. Is Federal Express going to wait for its new satellite earth stations before switching to high-resolution mode? Are some Zapmessages going via

Group 3 mode, while others are going high-res? Microscopes at the ready! Further indirect evidence of ZapMail's success was Federal's announcement last week of contracts with Harris (for earth stations) and Tandem (for computer switches). Total capital spending on ZapMail over the next ten years may be in the range of $1.2 billion, according to Federal's FCC filings.

LEVEL 1 - 1 OF 1 STORY

PR Newswire

September 17, 1984, Monday

DISTRIBUTION: TO BUSINESS NEWS

LENGTH: 562 words

DATELINE: STURBRIDGE, Mass., Sept. 17

KEYWORD: SPECTRAN OPENS NEW FACILITIES

BODY:

STURBRIDGE, Mass., Sept. 17 /PRN/ -- SpecTran Corporation (NASDAQ:SPTR), a developer and manufacturer of optical communications fiber, announced today the startup of operations at a new 27,000-square-foot manufacturing and office facility adjoining its original plant here.

The $1.2 million building, financed in part with a $1 million industrial revenue bond issued by the Massachusetts Industrial Finance Agency, triples the company's plant space and will enable SpecTran to more than double manufacturing capacity in the months ahead, according to Raymond E. Jaeger, president. To date, the company has spent a total of approximately $4 million to equip its total plant and other facilities.

Included in the new SpecTran facility is space for offices, laboratories, drawing towers, quality assurance, finished goods inventory, raw materials, shipping and receiving and a model shop.

At ceremonies marking the opening, Jaeger said that growth of the fiber optics industry has consistently outpaced SpecTran's ability to meet demand for the specialty datacommunications fibers it began producing here in 1982. "Our new line of single and multimode long-distance telecommunications fiber, introduced in July of this year, has added substantially to this prospective volume," he noted. Fiber optics products and technology are expected to become a $1.5 billion industry before the end of this decade, according to independent marketing analysts.

Product segments that have traditionally constituted the core of SpecTran's business are large diameter fiber with superior light coupling efficiency for use over short distances in data communication applications, fibers that transmit information in the presence of radiation and fibers for transmitting ultraviolet light. Also important to the company's product mix are fused silica capillaries.

Single-mode fiber for long-distance telecommunications systems is a new field for SpecTran. Until now, this market has been served exclusively by one or two major suppliers. Single mode is capable of greater information-carrying capacity over longer distances, with fewer repeaters than multimode.

In August, SpecTran reached agreements to supply two major cable manufacturers with fiber valued at a total of $2 million. One of the orders, for approximately $1.8 million in telecommunications fiber, will be used by a supplier to the Bell operating companies. The other order for data communications fiber is from Siecor Optical Cable Corp. Together, these orders total more than the company's

total 1983 volume of $1.8 million.

SpecTran was founded in June 1981 and started production in 1982. In 1983, SpecTran fibers were qualified for use by the military in its Cruise Missile Program and AEGIS class ships and by Tandem Computers for its Fiber-Optic Extension link. Work continued under research contracts from the U.S. Air Force and patent licenses were received from Gulf & Western for diamond-like carbon coatings. The G&W license is the third license received from major corporations, following earlier assignments by Corning and Western Electric. SpecTran is one of only a few companies to hold all these licenses.

CONTACT -- L. B. Stauffer of Porter, LeVay & Rose at 212-564-4700 for SpecTran

Tandem Computers Cuts Prices On Its Low-End NonStop Systems

By Sue Barnard

CUPERTINO, CALIF. — Tandem Computers Inc. has revealed substantial price reductions for its low-end NonStop fault-tolerant transaction processing systems.

The company said systems have been reconfigured and prices have been lowered to make the line more competitive at the low end. Tandem's systems family ranges from the NonStop 1+ and NonStop II at the low end to the NonStop TXP at the high end.

International marketing vice-president Gerald Peterson stressed that the price reductions do not signal a change in strategy but are a continuation of a strategy that began last fall when the NonStop TXP was introduced and the other NonStop prices were lowered. "This just makes us more mean and lean down at the lower end," he said.

Two NonStop 1+ systems packages are offered. The first, which previously would have been listed for $101,150, has been reduced to $89,000, a 12 percent reduction. The OEM volume price has been reduced to $55,000.

Peterson: Continuation of a pricing strategy that began last fall.

The basic NonStop 1+, rated at 1.4 MIPS and expandable to 11.2 MIPs, includes two proprietary Tandem processors, 2.2 Mbytes of main memory, a 128-Mbyte disk drive, a 45-ips tape drive, a hard-copy console, support for up to 17 asynchronous terminals, and Tandem's Guardian operating system and Encompass data base management system.

The enhanced NonStop 1+ system includes four processors and 4.4 Mbytes of memory. It is rated at 2.8 MIPs and also is expandable to 11.2 MIPS. It is priced at $105,000, a 32 percent reduction from the original $153,350. Discounts of up to 33 percent are offered for volume purchases, lowering the price to $70,000.

The NonStop II system package is priced at $129,000, a 24 percent reduction from the previous price for a similar configuration at $170,150. The NonStop II package adds support for SNA and software support for 32-bit addressing capability and includes two processors, 4 Mbytes of main memory, a 128-Mbyte disk drive, a 45-ips tape drive, an operations and service processor, a Guardian operating system, an Encompass data base management system and COBOL programming language.

Peterson said of the price reductions, "We weren't as price-competitive as we felt that we could have been."

Peterson said Tandem hopes to round out its offerings for those building a NonStop network. In a prepared statement, Tandem president James Treybig said, "The pricing structure will help large accounts that require geographically distributed networks because it provides a cost-effective solution for NonStop TXP users who want to extend their applications to remote operations such as branch offices where the power of a NonStop TXP is not required."

In addition to making the systems more competitive for direct sales customers, Tandem is working to emphasize its commitment to third-party marketing, Peterson said. Accounts are looking for solutions with complete packages. The price reductions make the NonStop systems more attractive not only because they are less expensive but because they in turn can lower their prices to customers and reach parts of the market they could not reach before.

In conjunction with the price reductions, Tandem also is offering a new upgrade program that allows NonStop 1+ and NonStop II customers to trade in existing processors and memory for credit toward

(Continued on Page 59)

Tandem Cuts Price Tags On NonStop Systems

(Continued from Page 58)

NonStop TXP systems. Credits range from 60 percent to 80 percent of Tandem's current list price for NonStop 1+ and NonStop II processors and memory.

Peterson said the company hopes customers will realize that using the NonStop 1+ on the low end does not preclude growing up to the NonStop TXP, which uses the same software.

The price reductions increase the difference between the low end of the line and the NonStop TXP, for which the basic price is $283,775.

The NonStop TXP, introduced in October, has been so successful at the high end that Tandem can afford to reduce its prices at the lower end, Peterson said.

The company's major competitor is IBM, he said, claiming that IBM's products cover Tandem's price range, but they use three or four different operating systems and architectures, making upgrades more difficult.

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re packages running under Unix
OS. At present, sources said, files

Sperry Transportables Bow

By Clare P. Fleig

Sperry Corp., which first entered the personal computer (PC) marketplace last November, added three transportable computer models to its PC product line last week.

All three models are compatible with IBM and Sperry PCs and are based on Corona Data System Inc.'s transportable systems. The units use an Intel Corp. 8088 microprocessor, 256K bytes of internal memory, a nine-inch CRT screen, a standard-size keyboard and a 5.25-floppy disk drive with 360K bytes of storage, a Sperry spokeswoman in Blue Bell, Pa., said.

Each 38-pound transportable unit also includes the MS-DOS operating system, GW-Basic and an RS232C serial port, she added.

Sperry's low-end model, SP1, features four expansion slots and sells for \$2,685. The second unit, SP2, offers two 5.25-inch floppy disk drives for \$3,110.

The company's high-end unit, the SPX, is priced at \$4,985 and includes one 5.25-inch disk drive, one 10-Mbyte hard disk and three expansion slots, she said.

"We are introducing the portables to round out our PC product line," the spokeswoman said. "We brought out our desktop PC when our customers indicated they had a need for it and we have found the same thing true of the portable market."

Although Sperry's desktop was manufactured for the company by Mitsubishi Electric Co., Tokyo (see *ISN*, Nov. 28, 1983), Sperry chose Corona Data Systems, Thousand Oaks, Calif., as the vendor for its transportable line because "Corona offered the best product for us," the spokeswoman said.

Sperry and Corona have signed a \$45.9 million OEM contract that calls for Corona to supply the enhanced, private-label portable units over an 18 month period beginning later this month, a spokesman for Corona said.

Analysts, for the most part, see the Sperry's move as a "me-too" effort to stay with, rather than lead, the PC pack.

"It is a good move for Sperry to have this product available to their installed based but it certainly isn't a leap forward technically, nor is the pricing aggressive," said Jan Lewis, senior analyst with InfoCorp, San Jose, Calif.

Lewis added that the transportables' weight could be a competitive disadvantage in a market that has many similiar products.

The Sperry spokeswoman defended the products' weight, however, saying that it was necessary to provide the full functionality that customers were demanding from the product.

The portables, like the new Sperry PC, will be marketed exclusively to business end users through Sperry's national direct sales force, the spokeswoman said.

"In particular, we see this product as important to our customers in the government and in the manufacturing areas," she said. "It is rugged enough to take home, use on the factory floor or be put away in a closet when not needed."

While the new portables will round out the Sperry PC line, the spokeswoman indicated that Sperry will be adding other portable products, possibly a briefcase-size model, to the line.

Harris, Tandem To Construct Federal Express' Data Network

Harris Corp., Melbourne, Fla., and Tandem Computers Inc., Cupertino, Calif., said last week that they will build a customized satellite-based data communications network for Federal Express Corp.

The network will support Federal's recently announced Zapmail service. The network is designed to integrate satellite technology with large-scale data processing operations, a Harris spokesman said.

Under terms of the contract, Harris was named the prime contractor for the project, with Tandem being the subcontractor. Harris will supply the earth station equipment, including its KU-band satellite communications technology and its proprietary Delta Gain 6-meter antennas, the spokesman said.

Currently, Federal is using Tandem's TXP minicomputers for processing documents over a terrestrial network, a Tandem spokeswoman said. The contract specifies that Tandem will be responsible for supplying the interface between the Harris equipment and the TXPs, she said.

In addition, Tandem will also provide control and monitoring equipment for the system. Tandem had signed the original contract with Federal in mid-1983, the spokeswoman said. Then, earlier this year, Federal contracted with both Harris and Tandem after deciding to utilize a satellite-based system, she added. The system is targeted for completion in July 1985. Dollar amounts of the contract were not released, but an industry source placed the value at between \$10 and \$15 million.

Amdahl To Sell Fujitsu Super CPUs

By Paul E. Schindler Jr.

Amdahl Corp. has apparently won the permission it long sought to market Fujitsu Ltd. VP100 and VP200 supercomputers in the United States, according to industry sources who expect an announcement of the products next week.

An Amdahl spokeswoman would neither confirm nor deny the report, repeating only the Sunnyvale, Calif., firm's previous statements that it is negotiating with the Tokyo

asked not to be named, said that estimate was high. He said it was more likely the actual performance of the Fujitsu machine, when doing vector processing—as opposed to the scalar processing typically performed by most mainframe computers—would be about 250 mflops, or roughly the same as a single-processor Cray Research Inc. X/MP supercomputer.

One computer industry analyst said Amdahl officials claim to have 10 letters of intent for purchase of the Fujitsu supercomputers. The

Sept 17, 1984 p27

Number of stock market's 'movers' sl

(Sept. 12, 1984)

The current ratio of bullish to bearish stocks as determined by our proprietary analytical procedure has improved from 2.6 to 3.2, which is bullish. There is however a significant shrinkage in the absolute number of "movers," i.e., those stocks that are expected to move significantly up or down. In other words, the number of stocks that are in the neutral zone have increased. More testing of the lows below Dow Jones Industrial Average 1,200 is expected before any sustained broad rally takes place.

Using proprietary analytical procedures and tools, Marketscope regularly analyzes, from both the fundamental and technical perspective, over 2,000 stocks that

MARKETSCOPE

Stock Symbol and Company Name	Price Purchased	Target Area
AMN: Ameron Corp.	28 1/4	31
ANT: Anthony Industries	15	18
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BEV: Beverly Enterprises	28 5/8	32
CF: Collins Food	24 3/8	27
CKN: Crocker Bank	23 5/8	27
CLN: Coleman Systems	32 1/4	34
CSC: Computer Science	14 3/8	17

Federal Express names Tandem

Tandem Computers Inc. of Cupertino and Harris Corp. of Melborne, Fla., have been selected to build the first phase of a satellite-based data communications network for Federal Express Corp., a Memphis-based express mail company.

Federal Express will use the network to support its ZapMail service, a nationwide document transmission and electronic mail service.

The first phase of the satellite network is scheduled to be operational by July 1985 and will replace ground traffic between 16 U.S. cities, the company reported.

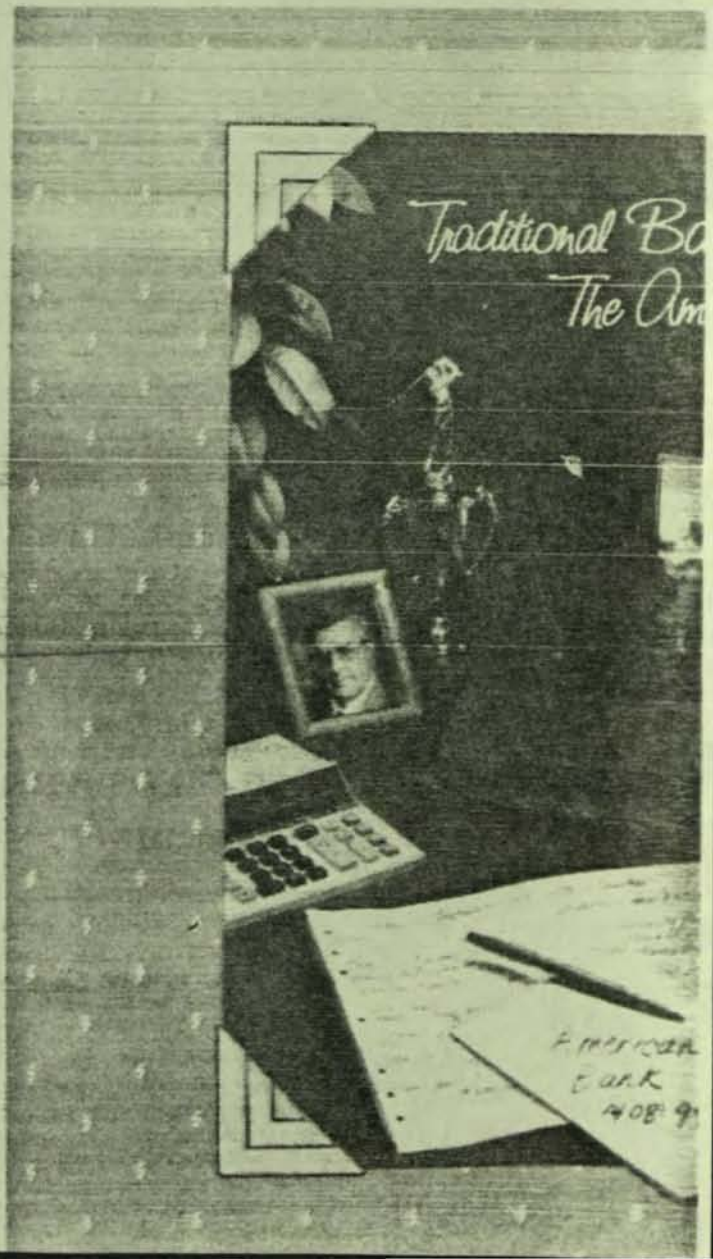
The network, designed to integrate satellite technology with large-scale data processing, will comprise Harris satellite ground equipment, Tandem network interface products and Tandem NonStop TXP computer systems.

Tandem's computers, under another contract, are the principal computer system used to switch ZapMail documents around the country.

Ad agency lands big contracts

Imahara & Keep, a Sunnyvale advertising and public relations agency, has added $5.9 million in new accounts to the firm, increasing its annual billing by about a third, an agency spokesman said.

The three new full-service account clients are Candela Electronics, a Sunnyvale manufacturer of telephone equipment and systems; Hyundai Electronics



LEVEL 1 - 2 OF 2 STORIES

September 17, 1984, Monday

DISTRIBUTION: Business Editors

LENGTH: 416 words

HEADLINE: GRID-SYSTEMS; Adds Mite, Tandem 6530 emulation software to their Compass portable computer line

DATELINE: MOUNTAIN VIEW, Calif.

BODY:

GRiD Systems Corp. Monday announced it has added two new communications software packages, Mite and MicroGate 6530, to the extensive communications software already available on the company's Compass portable computer line. Today's software introductions bring to seven the number of communication packages now available from GRiD including IBM 3101 and DEC Vt100 terminal emulators. These new software packages are part of an ongoing program to provide users of GRiD's Compass with a family of productivity-enhancing software tools. GRiD plans to introduce additional software packages during the fall. The Mite data communications package permits Compass users to access almost any computer system that uses the MS/DOS operating system, including the IBM Personal Computer. The MicroGate 6530 package lets the Compass emulate Tandem Computers Inc.'s, model 6530 multipage terminal. Tandem's 6530 also depends upon MS/DOS as its operating system. With Mite, compass users can have access to computerized informational services, such as The Source, Dow Jones, CompuServe, and corporate and university data centers, through asynchronous communications. Mite also supports GRiD-to-GRiD computer interactive communications and file transfer, and permits users to transfer files between the GRiD and other microcomputers. Mite is published by Mycroft Labs, Tallahassee, Fla. MicroGate 6530 enables users of the Compass to communicate with a Tandem host mainframe by using the GRiD internal modem or serial communications channel. Primary applications for the MicroGate software on the Compass are in government agencies, financial institutions, and manufacturing companies. MicroGate was written by Gateway Microsystems, Austin, Texas. The Mite software for the GRiD Systems Compass portable computer is available now at U.S. $195. GRiD will offer service support for Mite via a telephone assistance line. The MicroGate Tandem 6530 terminal emulation software is available now from GRiD at U.S. $595. GRiD Systems Corp., with headquarters in Mountain View, offers an extensive range of high-performance portable computer, peripheral and networking systems for mobile professionals who need the most advanced decision support tools.

CONTACT: GRiD Systems Corp., Mountain View
Debra Staff, 415/961-4800
by Strayton Corp., Santa Clara
Catherine A. Monaco, 408/727-1188

Management Information Systems Week 9/19/84 p4

THE NETWORK

Texas Instruments, under fire for improperly testing certain microcircuits used in U.S. military weaponry, said none of those microcircuits is used in commercial computer products. "These are special military discrete and IC (integrated circuit) devices," a TI spokeswoman said. The **Pentagon** last week announced it would not accept certain microcircuits, made at TI's Midland, Tex., plant, because they were inadequately tested. But government officials have said that so far, the testing methods have not resulted in any equipment failures. Although TI spokesmen have said the potentially affected devices represent less than 5 percent of TI's semiconductor billings, the company's stock fell 13 1/4 points in the two days after news of the matter broke. Gerald Fleming, an industry analyst with **Bear, Stearns & Co.**, predicted the long-term resulting impact on TI's financial condition would be "negligible," although he said he was surprised at the big drop in the company's stock price.

Bank of America is a "flagship account" for **Metaphor Systems** according to Kevin Randolph, vice president and director of marketing information for the San Francisco-based bank. By flagship, Randolph means that the bank is one step beyond being a beta-test sight for Metaphor's information retrieval and analysis system (see Sept. 12 MIS Week, page 1). The bank is evaluating six of Metaphor's terminals and will take eight more in October, with an eye toward purchasing the units. The bank uses it to show accounts and outstanding balances.

Tandem Computers Inc. will work with **Harris Corp.** of Melbourne, Fla., to build the first phase of a satellite-based network for **Federal Express Corp.** The communications network will be used by Federal Express for its ZapMail electronic mail and document transmission service. The first part of the network is expected to be up and running next July. It will replace terrestrial traffic between 18 U.S. cities. Tandem will supply its network interface products and Tandem NonStop TXP systems for the network. Harris brings its satellite ground equipment to the party. Earth stations using Harris' Ku-band satellite communications technology and **Delta Gain** six-meter antennas will be used in the system.

Apple Computer Inc. can be expected to introduce a network for its personal computers that will be priced lower than networks from other manufacturers, including **IBM**. Apple chairman Steven P. Jobs told investors in San Francisco that the network will be "easier to install than a stereo." Mike Murray, Apple's marketing director, told attendees at a Future Computing seminar, also in San Francisco last week, that "The Macintosh is the beachhead. But, in the future we've got to be able to hook those products up together." Apple has been giving out strong hints about its network since the National Computer Conference in July. Jobs also said that the backlog of Apple IIe orders currently exceeds 120,000. Production of the IIe has been strained because of the large demand for the product. A laser printer is also in the works at Apple, as previously reported in MIS Week. It could be introduced before the year is out. Apple also plans to introduce a hard disk for the Macintosh, possibly in 18 months. Meanwhile, Apple last week appointed William V. Campbell to executive vice president for U.S. sales, a newly formed post covering the sales, service, marketing and distribution. Campbell's predecessor in some of his responsibilities was E. Floyd Kvamme, who resigned in March to join **Kleiner, Perkins, Caufield & Byers**, a San Francisco-based venture capital firm.

Acorn Computer Corp., of Woburn, Mass., which had announced that it was "going to take a healthy bite out of the **Apple**-dominated educational market" on Sept. 19, will continue to allow the Apple to ripen another week. The statement is now expected Oct. 4. Acorn said the delay was due to "Logistic difficulties:" they simply couldn't arrange to get everyone involved to Boston on the original date. The announcement will relate to marketing, which will be national in scope.

BOCs: Access Fees W

By MARK FRANKEL

WASHINGTON—In its first major report, Bell Communications Research (Bellcore) last week told federal regulators that charging a $4 monthly access fee to residential and single-line end-users will ease pressure on local service rates and keep more than a half-million subscribers on the network.

"End-user charges . . . will help preserve universal service" and ultimately benefit consumers through lower long distance and local telephone bills, with total savings of $3.58 per month, than if telcos continue to use present methods to recover costs in the future, according to the study presented to the Federal Communications Commission.

The study by Bellcore, the common analysis and legislative arm of the 22 divested Bell operating companies (BOCs), supports the FCC's own findings that access charges are needed upon residential customers as well as multi-line businesses.

The FCC had hoped to impose a $2 monthly charge upon residential lines earlier this year, but after encountering stiff Congressional oppositionit was forced to postpone its imp tation until sometime ne Some observers say C will act to block any po unpopular access char home lines should th mission try again.

The Bellcore study, "I pact of Access Char Bypass and Universal Te Service," supports the contention that a full sy access charges will incr efficiency of the local l lower the vulnerability regulated exchange co to bypass systems.

Without the fees, long rates will remain unrea above the actual cost of ing inter-exchange providing business users incentives to construct th networks, the study sai

Presently, without a dential access charge, lo revenue vulnerable t bypass, tariff shopping is estimated at $10.20 per month for non-traff tive (NTS) revenue and $ month for associated sensitive (TS) revenues, port found.

Putting the fees into p reduce the telcos' "reve

On-Line Buys 'Secure/CIC

FORT LEE, N.J.—On-Line Software International Inc. announced here it will acquire ownership of "Secure/CICS" from Boole & Babbage Inc., Sunnyvale, Calif., effective Oct. 1.

Secure/CICS, an on-line security package for International Business Machines Corp. mainframe systems and compatibles, is currently installed in 150 domestic and overseas installations.

On-Line Software also announced that Secure/CICS users may upgrade to the firm's own CICS security package, "Guardian," at no charge. Acceptance of the upgrade offer must be confirmed by the user by Jan. 1.

Guardian, priced at $28,875 for OS environments and $21,000 for DOS, sells for approximately 50 percent more than Secure/CICS, an On-Line spokesman said.

Users who choose not to upgrade to the On-Line product will be entitled to the New Jersey-based company's "best efforts" to support Secure/CICS, said the On-Line representative.

Boole & Babbage president Jack Van Kinsbergen said in the joint announcement, "If technical problems arise after Oct. 1, however, we'll certainly offer our engineering expertise to help iron them out."

The addition of Secu users to the over-200 Guardian gives On-Line est user base of any CIC ity software vendor, the representative said.

Informatic

WOODLAND HILLS Informatics General C nounced last week the f of a new company as joint venture with Axelr

Apple Bundles For Yuletide S

CUPERTINO, Cali ple Computer has put her an Apple IIc p computer package t cludes the IIc, the Mon and a monitor sta $1,295.

The special bundlin pected to sell well in and holiday seasons.

Apple has also redu suggested retail price IIc alone to $1,195, $1,295. The price Monitor IIc remains and the Monitor IIc s $39.

Harris, Tandem Win Pacts On Fed. Express Sat. Net

MIAMI — Harris, Melbourne, Fla., and Tandem Computer, Cupertino, Calif., said they have been selected to build the first phase of a satellite-based data communcations network for Federal Express. Contract values were undisclosed.

Federal Express will use the network to support its Zapmail Service, a new nationwide document transmission and electronic mail service.

The first phase of the satellite network is scheduled to be operational by July, 1985, and will replace terrestrial traffic between 16 U.S. cities.

The network, designed to integrate satellite technology with large-scale data processing, will comprise Harris Ku-band and Delta Gain earth station equipment, Tandem network interface products and Tandem Nonstop TXP computers. The tandem computers, supplied under a separate contract and already in operation, form the backbone computing system for switching Zapmail document traffic.

Electronic News 9/24/84 p52

LEVEL 1 - 6 OF 11 STORIES

September 24, 1984

SECTION: NEWS; International Report; Pg. 43

LENGTH: 48 words

HEADLINE: NORWAY

BYLINE: CW International News Network

DATELINE: OSLO

BODY:

Cap Gemini Sogeti, a French software company, and Tandem Computers, Inc., a U.S. computer manufacturer, have been awarded a $12 million contract to design and install a public videotex system in Norway.

The contract was awarded by the Norwegian Postal, Telephone and Telegraph Agency.

9/24/1984

NEWS AVAILABLE FOR TNDM 9:29am

/TNDM EUROP /EDP AIR/
09/24 TANDEM JOINS WITH THREE FIRMS (DJ) IN DEVELOPMENT-MARKETING
PA CUPERTINO CALIF -DJ-
TANDEM COMPUTERS INC. ANNOUNCED THREE JOINT VENTURES TO DEVELOP AN AIRLINE RESERVATIONS SYSTEM AND TO MARKET 22 OTHER APPLICATION SOFTWARE PACKAGES RELATED TO THE AIRLINE INDUSTRY. TANDEM'S PARTNERS IN THE NEW JOINT VENTURES ARE TWO SUBSIDIARIES OF THE SCANDINAVIAN AIRLINES SYSTEMS GROUP - LINJEFLYG AB AND SCANATOR AB A STOCKHOLM SWEDEN-BASED COMPUTER SOFTWARE MARKETING AND MANAGEMENT CONSULTING FIRM THAT IS JOINTLY OWNED BY SCANDINAVIAN AIRLINES SYSTEMS GROUP AND ENATOR AB AN INTERNATIONAL MANAGEMENT AND EDP CONSULTING COMPANY.

TANDEM'S THIRD JOINT VENTURE PARTNER IS BEDFORD ASSOCIATES INC. OF NORWALK CONN. A COMPUTER SOFTWARE COMPANY.
THE INITIAL DESIGN OF THE AIRLINE RESERVATION SYSTEM HAS BEEN COMPLETED BY LINJEFLYG AND WILL BE OPERATIONAL IN DECEMBER 1985. THE INSTALLATION WILL BE A JOINT EFFORT BY TANDEM LINJEFLYG AND BEDFORD ASSOCIATES. BEDFORD ASSOCIATES WILL DEVELOP A STANDARD VERSION OF THE SYSTEM TO BE MARKETED TO OTHER AIR CARRIERS.

THE SYSTEM WILL BE JOINTLY MARKETED AND SUPPORTED IN NORTH AND SOUTH AMERICA BY TANDEM AND BEDFORD ASSOCIATES AND IN THE REST OF THE WORLD BY TANDEM AND SCANATOR.

THE OTHER PACKAGES INCLUDE SEVEN TRAFFIC AND OPERATIONS MODULES FOUR AIRCRAFT MAINTENANCE MODULES ADMINISTRATIVE AND MANAGEMENT SYSTEMS THREE TOUR OPERATIONS SYSTEMS AND A SOFTWARE DEVELOPMENT TOOL - ALL CURRENTLY OPERATIONAL WITHIN THE SCANDINAVIAN AIRLINES SYSTEMS GROUP OF COMPANIES. THE OFFERINGS WILL ALSO INCLUDE A CARGO SYSTEM THAT IS BEING DEVELOPED BY SCANDINAVIAN AIRLINES. THESE PACKAGES WILL BE JOINTLY MARKETED AND SUPPORTED WORLDWIDE BY TANDEM BEDFORD ASSOCIATES AND SCANATOR.
9 29 AM

LEVEL 1 - 2 OF 9 STORIES

September 25, 1984, Tuesday, Late City Final Edition

SECTION: Section D; Page 2, Column 4; Financial Desk

LENGTH: 63 words

HEADLINE: Tandem Ventures

BYLINE: Reuters

DATELINE: CUPERTINO, Calif., Sept. 24

BODY:

Tandem Computers Inc. said it had formed ventures with units of Scandinavian Airlines System Group and with Bedford Associates Inc. to develop an airline reservations system called Spar and to market 22 other software packages with airline- related applications. One of the two S.A.S. units is owned with Enator A.B. Tandem said Spar would be installed in December 1985.

SUBJECT: Terms not available

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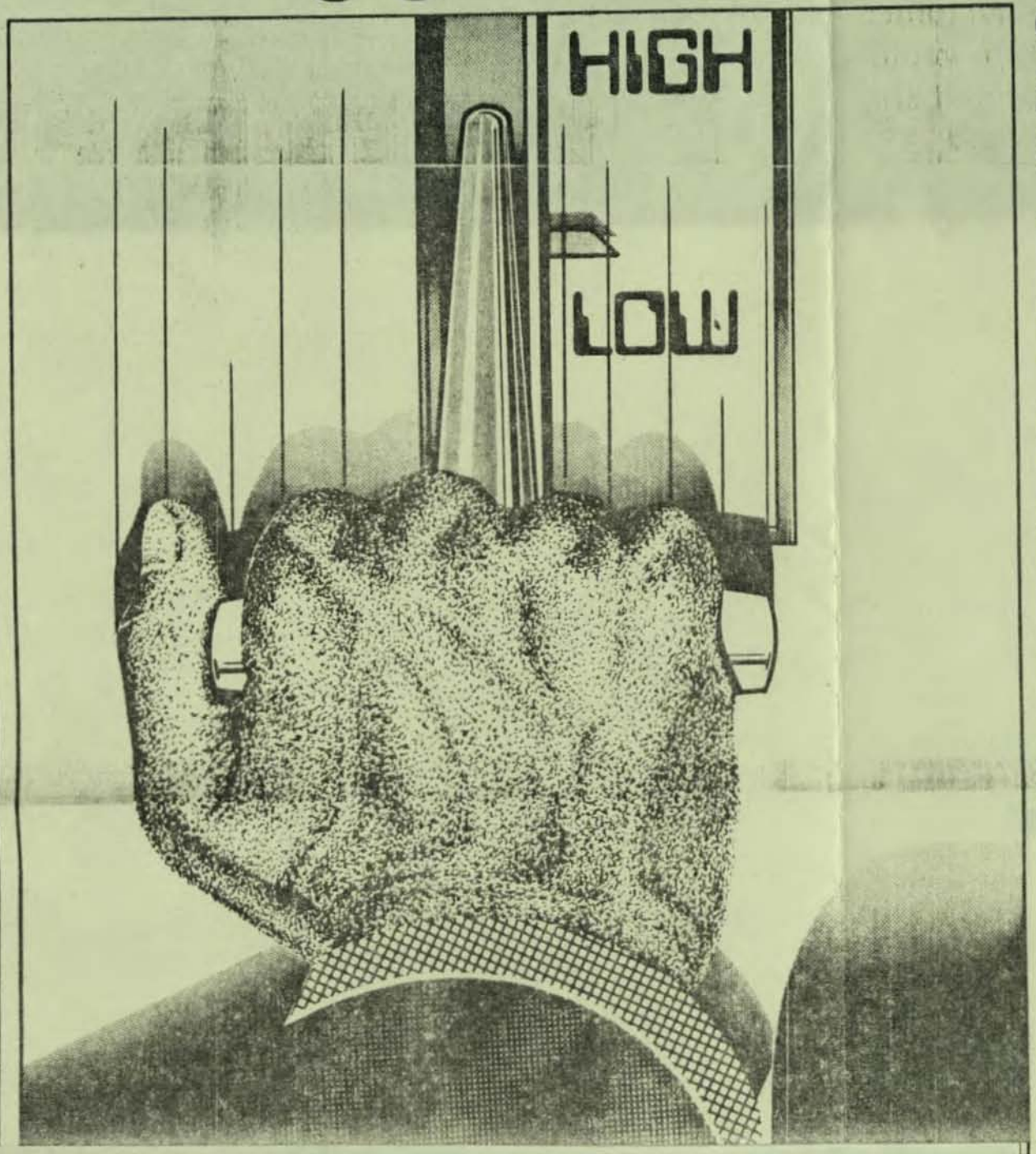
San Jose Mercury News 9/26/84 p1C

Shifting growth into a lower gear



Companies prepare for slower times

By Dedra Hauser
Business Writer

Caution is becoming a watchword in Silicon Valley management circles.

As the national economic recovery that began in 1983 starts to lose some of its steam, many high-tech executives are preparing to downshift into a lower gear. Others have already begun cutting spending to accommodate slower growth.

"Companies are starting to guard their bottom line a bit more," says Steve Sweeney, president of Associated Circuits Inc. of San Carlos. "That disastrous 1982 was such a short time ago, and you keep hearing that the economy is going to come in for a rapid slowdown after the election . . . Executives are saying to themselves, 'We won't bottom out like in 1982, but if we do have a little dip, we want to be prepared this time.' "

Tapering off

For some of the youngest local high-tech companies, the tapering off in national economic growth makes little difference. "Our business doubled this year, and I expect it to double again next year," says Ralph Ungermann, president of Ungermann-Bass Inc. of Santa Clara, a maker of local networks. "We're in a new emerging market where the (overall) economy has a small impact on our business."

And the expected slowdown from 1984's torrid pace of expansion will still leave most local high-tech companies with growth rates that are the envy of most of corporate America. Nonetheless, the best-managed companies are keeping a vigilant eye on the economy and their own expenses so they can avoid getting overextended.

"We're in the stage of the economic cycle where the leading economic indicators are turning down," says David Sanders, director of corporate development at Hewlett-Packard Co. of Palo Alto. "We're carefully watching our incoming order rates to make sure we pick up any early signals of changes in the economy."

Predicting economy

Predicting the twists and turns of the economy is never easy, and it's particularly tricky for the electronics industry, says Richard O'Brien, H-P's corporate economist. "Our industry is a leading economic indicator, so it's sometimes very difficult to catch the turning point (in the business cycle)."

But that doesn't stop O'Brien from trying.

One of the few in-house corporate economists in Silicon Valley, O'Brien has developed a macroeconomic model that uses national economic

Continued on Page 7C

San Jose Mercury N

Local firms are tightening their belts

Continued from Page 1C

trends and H-P statistics to predict the company's growth levels. His forecast: "1985 will be a good year but not a spectacular year, with about a 4 percent (national) growth rate."

O'Brien admits that he's a little more bullish than many forecasters. "It could be because I'm sitting here in Silicon Valley and not in the Northeast." In addition, he says he differs from many economists who are expecting a "blowout in interest rates after the election."

H-P doesn't rely solely on O'Brien's forecast for planning purposes. "We get the bottom-up forecasts of the divisions and compare them to ours . . . Management usually splits the difference," O'Brien says.

Because forecasting is not an exact science, H-P's division and group managers are expected to keep close tabs on their order levels so they can fine-tune expenditures to match growth levels. Management in Palo Alto monitors corporatewide trends to identify any deviations from expectations.

H-P has developed order-processing systems that keep track of worldwide orders on a daily basis. "The information systems we have are one of the key underlying elements of our success as a company," says corporate development manager Sanders.

Although few local companies can command the planning resources of an H-P, high-tech industry has become more attuned to the importance of preparing for fluctuations in growth. "Most companies have become much more sensitive to the cyclical nature of the industry," says Ronald Deutsch, a spokesman for Signetics Corp. of Sunnyvale. "Even in boom times we start to look ahead and try to keep our employment and expenses under control."

But business cycles are only one of many variables in predicting growth, and no company has a foolproof method for predicting the future. High-tech executives are also learning how to manage the cutbacks that result when their growth doesn't meet expectations.

> 'Executives are saying to themselves, 'We won't bottom out like in 1982, but if we do have a little dip, we want to be prepared this time.'
>
> — *Steve Sweeney, Associated Circuits*

Since spring, Tandem Computers Inc. of Cupertino has been engaged in a cost-cutting program triggered by lower-than-expected growth in revenues and earnings. "What we've done this time is to make cuts a bit differently than (the cuts made) in 1982," says Gerald Peterson, vice president of international marketing at Tandem.

When Tandem decided to cut costs in 1982, the company implemented a companywide salary freeze and asked all employees to work a couple of days without pay. "This wasn't very popular," Peterson says. This time, Tandem is focusing on cutting its business travel costs, postponing some capital expenditures and keeping its employment level flat to bring costs back in line with revenues.

Tandem has shaved millions of dollars off its travel budget over the past six months by carefully scrutinizing travel plans to eliminate unnecessary trips.

All hiring requests are being sent to Peterson and his counterparts at the company for approval. "Top management is paying attention on a weekly basis to employment levels. Any request for a new hire comes to us personally and we evaluate it, which doesn't happen normally," Peterson says.

Because Tandem is continuing to grow at a healthy rate, the company has been careful to make cuts that don't affect that growth, Peterson says. "It's real easy if you don't manage that (cost-cutting) process to go into a downward spiral."

The recent spate of local layoffs suggests that quite a few local companies haven't met their growth expectations lately. But H-P's O'Brien says he doesn't expect to see any major cutbacks in Silicon Valley over the next year. He doesn't foresee a downturn in the economy until 1986, and he considers the slowing growth rates in 1985 as a healthy return to more sustainable growth levels.

"Some high-tech companies may suffer from a bit of overenthusiasm and get a little bit ahead of their plans, but for most companies it should be a fairly nice, easy transition back towards normal growth," he says.

But even though most forecasters expect the recovery to continue next year, many companies are already starting to rein in costs.

Associated Circuits has experienced a small but noticeable decrease in its orders for custom-printed circuit boards over the past month, says president Sweeney. This partly reflects a normal late-summer slowdown, but Sweeney says companies also seem to be guarding their dollars more closely. "Typically a company will have us redo a half dozen printed circuit boards if their R&D people make any changes. But now if they're only minor changes they don't bother."

Video game sales were very slow this summer, Levy said, but he sees encouraging signs for fall and the Christmas season. "I'm getting a much more positive feeling from my customer base than I would have expected six months ago," he said. The source of those newfound feelings, he said, was the fact that the video game market seems to have settled down, meaning there are likely to be fewer surprises for retailers than in the past couple of years.

□

Moving right along. While its former parent, Pizza Time Theatre Inc., is still mired in bankruptcy proceedings, work is progressing at coin-operated video game maker Bally Sente Inc. of Sunnyvale.

You may recall that the company got off to a big start last December under Nolan Bushnell, who was then Pizza Time's chairman and chief executive. It was going to market coin-operated machines that featured interchangeable software. When the kids got tired of one game, the

is now third in the personal computer market behind IBM and Apple Computer Inc. of Cupertino.

□

Tidbits: An Wang, founder of Wang Laboratories Inc. of Lowell, Mass., is the winner of the 1984 Medal of Achievement from the American Electronics Association. The medal, symbolizing significant contributions to the advancement of electronics, was given to Wang for his "contributions of both time and financial aid to education institutions, the community and the arts." Wang is an overseer of Harvard University and a trustee of Northeastern University and Boston's Museum of Science. He is also president and chairman of the Wang Institute of Graduate Studies, which he founded in 1979...

Tandem Computers Inc. of Cupertino announced three joint ventures in the airline industry to develop a reservations system and to market 22 other applications software packages. Frequent fliers will be glad to know that Tandem makes so-called "fail-safe" computers. In the airline industry, they'd better be . . .

Verbatim projects loss of up to $12 million

Verbatim Corp. of Sunnyvale said Tuesday it will post a $10 million to $12 million loss for its first quarter ending Sept. 28. The company, a leading maker of floppy disks, blamed continuing softness in that market and a slowdown in shipments to major customers.

The loss works out to between 43 cents and 53 cents a share. Verbatim earned $5.4 million, or 23 cents a share, during the same period last year.

It will be Verbatim's first quarterly loss since 1980.

Investors reacted by pushing down Verbatim's stock Tuesday. It was the most actively traded issue on the American exchange, closing at 7⅛, off ⅝.

Verbatim has been hit by several problems at once: falling prices, increased competition, reduced demand and production problems.

All disk makers have been suffering from constantly eroding prices, though analysts said Verbatim was hurt particularly because its manufacturing facilities were older and more costly to operate than competitors'.

Meanwhile, the company has faced a year-long problem with its biggest customer, presumed by outsiders to be International Business Machines Corp. Earlier this year, IBM returned a shipment of disks because the specifications had been changed without prior notice. The change had been made because Verbatim was trying to correct a problem it was having with "soft errors," which occur when there is dust on the disk.

Finally, Verbatim decided to change its manufacturing procedures to eliminate the errors. That change has taken place this quarter, partially contributing to the expected loss, according to treasurer Richard Brounstein.

San Jose Mercury News
9/26/84 p 2C
J Greer's Column

MANAGEMENT

Belt-tightening at Tandem

In the face of rising expenses and some sales problems, Tandem Computers president James Treybig says that the Cupertino computer maker has swung into a "belt-tightening" program. Begun last month, the effort coincides with price cuts up to 32% for Tandem's NonStop 1+ and NonStop 2 mainframe computers, as well as some computer accessories. Among other things, the company has imposed new restrictions on hiring, wages and employee travel. Treybig says that the moves are designed to combat higher expenses incurred earlier this year by the hiring of more than 600 people—many of whom are busy developing new products.

The price cuts may hurt Tandem's profits in the fourth-quarter, which ended Sept. 30. Analysts say that the TPX, Tandem's new top-of-the-line mainframe, is taking longer to sell than expected; NonStop 2 sales have dried up; and sales for the NonStop 1 are being affected by start-up competitors such as Stratus.

Star Wars

The Army, which this summer succeeded in knocking a dummy nuclear warhead out of the sky with a heat-seeking missile, is honing its strategic sharpshooting skills even further with innovative infrared sensors. The R&D project, known as the Airborne Optical Adjunct, will be worth $290 million over five years to Boeing Aerospace and its electronic subcontractors.

Aerojet Electro Systems and Hughes Aircraft each are being asked to design optical sensors capable of discerning the heat of a human body at a distance of 1,000 miles against the cold background of space. The sensors would ride on a modified Boeing 707, which also would carry powerful Honeywell computers specially programmed to track ballistic missiles as they reenter the atmosphere. Data links would pass the information to ground-based radars that would steer defensive weapons.

Filevision: The next 1-2-3?

If Apple Computer has its way, Telos Software Products of Santa Monica, Calif., could become the next big name in software, à la Lotus Development Corp. Apple's software evangelist Guy Kawasaki, who heads up the company's third-party software programs for the Macintosh and Lisa, is touting the pictorial database called Filevision, which Telos is shipping for the Mac, as "the next 1-2-3" (Lotus's integrated spreadsheet). Filevision is one of 70 packages Apple was shipping for the Mac this month.

TANDEM, GROWTH

LEVEL 1 - 2 OF 2 STORIES

September, 1984

SECTION: INVESTMENTS; Pg. 80

LENGTH: 378 words

HEADLINE: CAE group holds steady

BODY:

While the general malaise of the stock market wreaked havoc with most groups in the High Technology Stock Index, the computer-aided engineering (CAE) workstation category has managed to maintain a near constant performance level. In the first seven months of '84, the category declined less than 4%, while the overall Index fell more than 21%.

Unlike the computer-aided design (CAD) systems used for mechanical-design applications, CAE devices are used within the electronics industry to design, verify, and test semiconductor and circuit-board layouts. Although CAE sales are already increasing 50% annually, growth is expected to accelerate through the decade as more system vendors integrate custom and semicustom chips into their products. The market is expected to top $500 million by '87, according to Dataquest (San Jose, Cal.). The three top suppliers -- Daisy Systems, Valid Logic, and Mentor Graphics -- have all gone public within the past year. Other recent issues include Sylvar Lisco and Zycad.

Speculation that interest rates have peaked and begun to decline rekindled the High Technology Index in June. The index edged up 3.6%, from 1017.9 to 1055.2. The Dow Jones Industrials rose 2.2%; the S&P 500, 1.7%.

The best-performing groups during the month included CAE workstations (+18.4%), computer turnkey systems (+12%), telecommunications equipment (+11.8), and laser and infrared equipment (+10.2%). The worst performers were mobile radio/paging (-6.2%), home computers/personal computer software (-3.2%), and pacemaker implants (-2.5%).

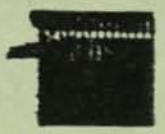
Companies posting the largest gains included CAD/CAM supplier Intergraph (34 3/4 to 42 1/2), CAE workstation supplier Daisy Systems (18 to 23 3/4), medical imaging equipment supplier Matrix Corp. (18 to 24), pharmaceutical supplier Mylan Labs (19 3/4 to 26 7/8), minicomputer supplier [redacted] (18 to 23), telecommunications supplier Tel Labs (19 to 23 1/2), and computer software supplier Cullinet (30 3/4 to 37 3/4).

The High Technology Stock Index was developed by Bud Anderson, editor and publisher of High Technology Growth Stocks, a monthly investment newsletter (402 Border Rd., Concord, MA 01742). A list of the companies in the index is available on request from the same address.

GRAPHIC: Graph, HIGH TECHNOLOGY STOCK INDEX; Chart, High Technology Index, MAY/JUNE CHANGE %

Goldman Sachs

Investment Research



For your files

Tandem Computer

B
10/18

John C. Levinson

September 28, 1984

During the past year, Tandem has established seven industry-oriented marketing groups -- airlines, distribution, federal government, financial, retail, telecommunications, and manufacturing. Each group has about six headquarters employees plus regional support personnel to better target specific accounts and markets. Further, better-quality and focused applications software is expected; Tandem now has more than 30 software houses writing applications programs for its NonStop systems, compared with less than 10 just 9 months ago. A transition to this type of marketing organization with more applications software is necessary to improve Tandem's batting average at large accounts, but takes time to bear fruit. Also, successful evolution into a better marketing organization should improve recent turnover trends.

3. Increasing IBM Competition. The more a company sells high-end products, particularly those with mainframe power, the more it comes into direct marketing competition with IBM. Tandem's TXP competes in many (if not most) cases with IBM's 308X line, IBM's most important product from revenue, profit, and customer control standpoints. Successful product competition against IBM is not impossible; Tandem's products are superior from a price/performance standpoint, and Tandem's on-line transaction processing system is tough to match, even for IBM. On the other hand, when it comes to marketing, we believe IBM outshines Tandem more often than not. By focusing on increasingly larger sales, Tandem has "backed into" a position where it is competing with IBM in the market the computer giant holds dearest, the market for large mainframe applications that are central to an account's data processing operation.

Increasing marketing competition from IBM is probably the most difficult hurdle Tandem has to negotiate to get back on the fast-growth track; it is also perhaps the most difficult for investors to evaluate. We believe there are two consequences of stiffer IBM competition: loss of sales bids and lengthened selling cycles when IBM throws its top marketing talent at a particular sales situation. Tandem claims to have lost only one major deal to IBM in the June quarter; on the other hand, while difficult to quantify, sales cycles are often longer when selling large TXP systems against IBM. To help with this transition, Tandem has recently hired a number of former IBM marketing and sales people. One of the most important is Lawrence McGraw, an 18-year IBM veteran who is now the vice president responsible for all of Tandem's marketing and field support. Mr. McGraw has been instrumental in forging a more marketing-oriented company, with vertical market groups supported by headquarters.

Revenue Outlook: New Product Flow will Aid Competitive Posture

Tandem's near-term revenue growth is somewhat uncertain because of the continuing marketing transition and recent price cuts. However, there are three major positives -- the strong economic environment, Tandem's good (and soon to be improved) product cycle, and the rapid underlying growth of the on-line transaction processing market (estimated at 30%). We have discussed our positive assessment of the economic environment at length in past reports (see our May Quarterly). In short, our Economic Research

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Tandem Computers Inc. (OTC:TNDM) Monday announced three joint ventures to develop an airline reservations system and to market 22 other application software packages related to the airline industry. The moved represents Tandem's first joint development and marketing efforts in the airline industry. Tandem's partners in the new joint ventures are two subsidiaries of the Scandinavian Airlines Systems Group (SAS): Linjeflyg AB and Scanator AB, a Stockholm, Sweden, based computer software marketing and management consulting firm, which is jointly owned by SAS and Enator AB, an international management and EDP consulting company. Tandem's third joint venture partner is Bedford Associates Inc. of Norwalk, Conn., a computer software company with extensive airline industry experience. The reservation system, called SPAR, is a total reservation system designed for airline operations in the dramatically changed environment of the 1980s. In addition to inventory control, flight availability, passenger handling, ticketing and check-in capabilities, SPAR provides superior schedule change, group booking control, schedule connections and other functional capabilities not available in most airline reservations systems today. The initial design of the SPAR system has been completed by Linjeflyg and will be operational in December 1985. The installation will be a joint effort by Tandem, Linjeflyg and Bedford Associates. BAI will develop a standard version of the SPAR system to be marketed to other air carriers. SPAR will be jointed marketed and supported in North and South America by Tandem and BAI and in the rest of the world by Tandem and Scanator. The other packages include seven traffic and operations modules, four aircraft maintenance modules, administrative and management systems, three tour operations systems and a software development tool, all currently operational within the SAS group of companies. The offerings will also include a cargo system (CARINA) that is being developed by SAS. These packages will be jointly marketed and supported worldwide by Tandem, BAI and Scanator. According to Larry McGraw, Tandem vice president of marketing and service support, ''The SPAR and CARINA systems, coupled with the other airline industry applications now operational on Tandem equipment, give us the most complete menu of offerings available from a single source today. '' Tandem's computers are designed for on-line transaction processing and airline executives have indicated a clear need for Tandem's participation in their data processing strategies. These offerings give us a tremendous advantage.'' The major market for the packaged offerings is expected to be medium-sized air carriers. In addition McGraw said he belives there is a significant opportunity for Tandem in the world's major air carriers. According to McGraw, ''The major airlines see a requirement to offload their existing systems, most of which were designed in the sixties. The linear growth capabilities of Tandem's architecture make us an ideal vendor to allow a smaller airline to start using these advanced software offerings and to grow. ''They also allow a major airline to achieve

much greater flexibility than their current operations allow.'' Bedford Associates Inc. is a software development company specializing in the specification, design and development of high volume transaction oriented, communication-based systems, with particular expertise in the transportation and financial industries. Tandem Computers Inc. manufactures computer systems and networks for the on-line transaction processing marketplace. Tandem recently was added to the Fortune 500 list of leading industrial companies.

CONTACT: Tandem Computers Inc., Cupertino
Pat Becker, 408/725-6035
Gina Burr, 408/725-7455