Computer Systems News
260 Week of April 21, 1986 THE OEM

Treybig's Low-Key Style Lifts Tandem To New Heights

By Susan Kerr

CUPERTINO, CALIF. — James Treybig is a runner. Anyone who's seen him during his lunchtime jogs knows that. But for the 45-year-old president and chief executive of Tandem Computers Inc., how the race is run is just as important as the actual outcome.

EXECUTIVE spotlight

Since founding Tandem in 1974, Treybig has guided the company into the Fortune 500, and in fiscal 1985 Tandem achieved revenue of more than $624 million. But while some colleagues suggest the race to $1 billion is his next logical challenge, Treybig's concerns lie elsewhere.

"What's a billion vs. $800 million?" he said. "The more important goal is to keep Tandem an outstanding company, have it be successful and a good place for people to work."

Treybig has had to adapt as the company continues to grow.

Those goals are more difficult to attain as the company matures. But they are integral to Treybig's personality and are key reasons for Tandem's bright prospects in its second decade.

"I always felt my happiness comes from excitement or learning every day," Treybig said in a recent interview at Tandem headquarters here. "If I wake up in the morning and I'm going to be involved in something new, then that's a good day."

Treybig's low-key, personable management style is considered by observ-

(Continued on Page 71)

Treybig's Low-Key Style Is Uplifting To Tandem

(Continued from Page 1)

ers to be one factor behind the company's success, even though Treybig admits he's had to change his style somewhat as the company grows up.

Despite some recent stumbles on Tandem's road to financial success, Treybig continues to receive much of the credit for what Tandem has achieved. Extremely bright and quick-witted, Treybig has the ability to see into the heart of a problem, according to his present and former associates. Above all, he has an absolute commitment to Tandem and its employees, they said.

Although he puts in long hours, Treybig has time for other pursuits. He runs at lunch time—he has been training for the London Marathon—and enjoys ham radio "on remote uninhabited islands."

Appearances don't concern him much. In fact, a photographer present at the interview had to ask him to comb his hair. "I'm pretty well known for cruddy clothes and needing to buy shoes," he said.

Pronunciation of his name—"Try Big"—is consistent with his Texas background and with his intent to grow Tandem even larger. Although he likes trying out new ideas, he said he has no interest in ever starting another company.

"Start-ups wouldn't be a challenge again," he said. "The challenge is to build a terrific $10 billion company. That's more interesting to me. I've done one start-up. I don't need to do another."

But even if Treybig says he doesn't want to go back to the start-up days, colleagues note he still tries to retain some of the start-up spirit at Tandem.

"Here, people are the first thing that is thought of, while at most companies they're the last," said one Tandem employee. "Jimmy stays close to his troops," said another.

To provide a more "people-oriented" company, Treybig has utilized some of the newest technology, as well as some of the oldest. Among the tools are electronic mail, a Tandem television link-up to talk with employees, and, probably most famous, the Friday afternoon beer bust.

"We put this emphasis on communication and managers caring about people. I think we do have a reputation for managers with people thought," Treybig said. "If the presidents and vice-presidents want that type of manager, you tend to have them."

With that reputation, he pointed out, a company also can attract top talent in the industry and have a low turnover rate.

But it's not just high-level personnel a company needs to care about, Treybig said. A few days after the interview, for example, he was scheduled to have lunch with Tandem's original seven assembly workers, all of whom are still with the company.

"In fact, if you took our first 30 or 40 employees, most everyone's still here," he said. "I think that's pretty amazing."

Unlike many other executives, Treybig attempts to make himself accessible to employees, co-workers said, and even shows up at most of the Friday companywide gatherings.

"Every company has beer on

Friday," Treybig said. "People work and go out in a group to a bar. Having a social event creates networking. So a social thing at Tandem lets everyone participate in the network. In some ways it might be better for it not to be beer, but I think beer is better than coffee or tea."

"Actually, at the beginning the beer was really on Saturday," said Samuel Wiegand, now president of GRiD Systems, who joined Tandem in 1975 as employee number 20. "We'd all be working, and at lunch Jimmy would run out and get some six-packs. But as we grew, it was switched to Friday."

As the company has grown, Treybig has been forced to grow with it.

When Tandem was small, he said, "I'd sell anything, anybody. Then, when you get bigger, you have to move to a different mode. Or at least a company has to define what they've always done. I had to move [from being more of a cheerleader] to more of a critiquer. You have to learn that a company isn't perfect.

"I probably see a customer a day. In the older days, I saw four a day. But still most of my day is critiquing, trying to bring excellence. I used to sell everything. I just believed everything was good and I sold it. Today I have to make sure it's good."

An emphasis on product quality is one key factor to competing with IBM, he said. Although Tandem has always faced IBM in one way or another in Fortune 500 sales calls, Big Blue is now remarketing a fault-tolerant system manufactured by Tandem competitor Stratus Computer Inc.

"In some ways it's easier today [competing with IBM] since we're a lot bigger and companies don't question our survival. But on the other hand, IBM notices us and they fight harder. But there's no doubt that IBM is a tougher competitor today for everybody because of the change in the antitrust laws," Treybig said.

Treybig also has been an instrumental force behind Tandem's big push in new-product development, some observers said. Dennis McEvoy, Tandem vice-president of software, said, "Jimmy still is an entrepreneur. He has lots and lots of creative ideas. He's never going to be a complete numbers guy, but we've got plenty of those in the company."

Treybig is an engineer. He received his electrical engineering degree from Rice University and served a stint with Texas Instruments Inc. He then came out to California to get an MBA from Stanford University. While in nearby Palo Alto, Treybig met up with Thomas Perkins, then head of Hewlett-Packard Co.'s computer division.

Perkins hired Treybig for a summer job at HP and later moved him in as a marketing manager.

In the early 1970s, Treybig followed Perkins to his new venture capital firm, known today as Kleiner Perkins Caufield & Byers. Two years later, backed by $1 million in financing and a business plan calling for the company to reach $100 million in five years, Treybig went out and formed Tandem. He fulfilled the five-year plan.

Tandem has had the reputation as a venture capitalist's dream company mainly because of its tremendous growth. But with that growth, there was little formal financial control.

"It's a lot more fun when you don't have to do all that stuff like cost controls," Wiegand said. "There really has been a trauma as they've had to control the spending rate. In the early days I don't ever remember going over an operating statement or budget. Now they have to do that carefully. That was hard for Jimmy to learn. He liked operating on the basis of doing what you like to do."

But that's impossible to do when a company gets into the multi-hundred-million-dollar range. Starting with fiscal 1982—when Tandem was forced to revise its revenue downward by nearly $24 million due partly to a more conservative accounting approach—Tandem has been trying to get its earnings growth to match its revenue growth.

To achieve that, it has put a cap on hiring and improved manufacturing techniques, Treybig said.

While keeping an eye on spending naturally should be one responsibility of a chief executive, Treybig for years said it just didn't seem that vital.

Until recently, "We were so focused on what we were doing and we believed we were right, that maybe we didn't have enough self-examination. We were growing very fast. So to say we should have done this or that—that's easier to say now looking back.

"But if you were in the framework of that time growing a hundred-and-something percent, fighting to find people and so on . . . we're just all human. And there are only so many hours. But we were still too confident. It would have been good to have been a little less so. But really it's the role of a president. A good president would have forced that. I could have done a better job."

Treybig favors an informal management style that doesn't always work when a company gets larger. In the five years he worked with Tandem, Wiegand said the only official staff meeting he could remember was when they once were called together to plan the company picnic.

"We just met when we had to," Wiegand said. "Jimmy's not what you'd call a management-by-objective type. As long as you didn't say you had a problem, he left you alone."

"A person really has to change, though," Treybig said. "I like it if people know just what to do without my having to tell them, I mean just by hint. When you're small that works real well, but when you're big it doesn't work at all. So then you have to change and be willing to be abrupt."

One event seemed to help Treybig learn his new role. In 1984, Tandem missed out on a customer satisfaction award that it had won five previous times. "That represented losing quality in our software and some of our products. We kind of lost some of our systems and product strategies, but we came back, started finding ourselves again and won that award again," he said.

That customer award episode was an important message to Treybig because it hit his pride, said Perkins. "On day one, I recall Jim saying that we won't have any unhappy customers. That was a way of saying we'd have to have not just high-quality hardware, but be a high-quality company."

LEVEL 1 - 1 OF 8 STORIES

April 30, 1986, Wednesday

DISTRIBUTION: Business Editors

LENGTH: 266 words

HEADLINE: ALTOS-COMPUTER; (ALTO) Announces strategic agreement with Tandem Computers Inc.

DATELINE: SAN JOSE, Calif.

BODY:

Altos Computer Systems Wednesday announced a strategic agreement with Tandem Computers Inc. involving technology transfer and joint product development centered around the Motorola 68020-based Altos 3068 multi-user supermicro.

The value of the agreement was not disclosed.

Phil White, Altos senior vice-president of marketing and sales said, ''This agreement is another endorsement of our strategy to provide our customers with high performance, low cost systems that can be adapted to changing market requirements. Our product success in these markets is due to flexible design features that allow the 3068 to incorporate new technologies in microprocessors, storage devices, communications, and service efficiencies.''

Gerald D. Held, Tandem's director of new ventures, stated, ''The agreement with Altos is consistent with our strategy to complement our technology through relationships with leading industry suppliers.''

Altos designs, manufactures and markets 8-, 16- and 32-bit multi-user microcomputers for distribution to more than 60 countries. More than 70,000 Altos systems have been installed, worldwide. fiscal 1985 sales for the company surpassed $124 million.

CONTACT: Altos Computer Systems, San Jose
Bethany Hornthal, 408/946-6700, Ext. 4901
or
Tandem Computers Inc., Cupertino
Pat Becker, 408/725-6035
by
Regis McKenna Inc., Palo Alto
Abigail Johnson, 415/494-2030

LEVEL 1 - 1 OF 2 STORIES

Business Wire

April 29, 1986, Tuesday

DISTRIBUTION: Business Editors

LENGTH: 407 words

HEADLINE: TANDEM-COMPUTERS; (TNDM) Announces new ISV product; Menlo Macintosh software

DATELINE: CUPERTINO, Calif.

BODY:

Tandem Computers Inc. (OTC:TNDM) Tuesday announced that the MAC MENLO software from Menlo Business Systems Inc., Los Altos, Calif., has been certified by Tandem as an Independent Software Vendor (ISV) product.

MAC MENLO, as part of the Tandem Alliance ISV program, will be marketed and supported by Tandem as an extension of its product line. The MAC MENLO software allows an Apple Computer Macintosh work station to emulate a Tandem 653X terminal.

Tandem also announced an agreement with Menlo to jointly market three other Menlo products as part of the Tandem Alliance software house program. These include the FOUNDATION application development tool; MENLO MAIL, an electronic mail application; and MENLO PIMS, a product and inventory management system.

Under the terms of the agreement, Menlo Business Systems will market the FOUNDATION, MENLO MAIL and MENLO PIMS software products directly to NonStop system users under the sponsorship of Tandem Alliance, a program that encourages the development of software solutions for Tandem users.

Developed by Menlo Business Systems, the MAC MENLO and FOUNDATION family of products are designed to operate on the full range of Tandem NonStop computer systems.

Available from Tandem, MAC MENLO is priced at $395 per copy.

Available from Menlo Business Systems, the license fee for FOUNDATION is $26,000 plus 10 percent annual usage and service fee. The license fee for MENLO MAIL is $10,000 plus 10 percent annual usage and service fee. The license fee for MENLO PIMS is $78,000 plus 10 percent annual usage and service fee.

Menlo Business Systems was founded in 1982 to provide application development and end user productivity tools, business applications and professional services to Tandem users.

In addition to its software packages, the company offers consulting technical support to Tandem users. Menlo is headquarterd at 334 State St., Los Altos, Calif. 94022. Telephone is 415/948-7920.

Tandem Computers Inc. manufactures and markets computer systems and networks for the commercial on-line transaction processing market. Tandem is

located at 19333 Vallco Parkway, Cupertino, Calif. 95014. Telephone is 408/725-6000.

CONTACT: Tandem Computers Inc., Cupertino
Joyce Strand, 408/725-6516
or
Menlo Business Systems, Los Altos
Linda Strand, 415/948-7920

LEVEL 1 - 5 OF 6 STORIES

April 29, 1986, Tuesday, Final Edition

SECTION: Style; Style Plus; C5

LENGTH: 276 words

HEADLINE: Corporate Sabbaticals

KEYWORD: LEAVE01

BODY:

Let's say you'd like the best of all possible worlds: a healthy chunk of time off from your job and a paycheck. In academia, it's called a sabbatical, but, slowly the idea's making its way into the corporate tower.

Employes of Time-Life Books in Alexandria, for example, can take three or six months off at partial pay after 15 years with the company. Personnel director Tom Swiger says employes use the time to "work on their novels, travel or just to do total relaxation." When they come back, he says, "they have new ideas and a renewed interest in their jobs."

After only four years on the job at Tandem Computers Inc. in Reston, Va. everyone -- from the janitor to the chief executive -- is entitled to a six-week sabbatical at full salary, in addition to accrued vacation.

Tandem, a computer design and manufacturing firm headquartered in Coopertino, Calif., instituted the sabbatical as part of a liberal benefit package designed to attract and retain employes in the competitive Silicon Valley labor market. When Tandem was developing its benefit package, it asked employes to rank possible benefits; they voted for the sabbatical ahead of retirement and profit-sharing, according to Pat Becker, a company spokeswoman. She says Tandem believes the sabbatical and its other liberal benefits are one reason the company's turnover rate is a third of the industry average.

If necessary, Tandem may ask other company employes to fill in for the worker on sabbatical. Besides making sure that the work goes on, the person acting as the replacement, says Becker, has an opportunity to "get some extra experience and perspective on the company."

Prime introduces repackaged versions of its 9955 and 9750 uniprocessors. (22)

Peripherals: Centronics attributes a drop in quarterly revenues to a fall-off in printer orders from IBM. (29)

Xidex names Charlton's two top executives to corporate posts after buying the rigid disk manufacturer for more than $39 million. (32)

Software: Cullinet supports IBM's Structured Query Language. (34)

Lotus discloses that shipments of its natural language link to its 1-2-3 business software will not begin until this fall. (34)

Communications and Data Networking: New York Telephone plans to introduce a private

The Air Force terminates $146 million contract with Hazeltine for enhanced JTIDS. (58)

Materials • Packaging • Production (61)

ASM grants TI the right to manufacture its own version of ASM's automatic molding system for its internal use. (61)

Insystems ships its first holographic mask inspection system to Motorola. (63)

Richard Rifenburgh, chairman, president and CEO of GCA, will earn a $250,000 bonus if the firm is sold to another company. (63)

$42.6 mil
31. (80)
Data G
second-qu
Genera
before ta

Clari
Unde
elimina
involvi
1950s, a
misstat

GAO Backs Tandem Protest of $5.7M Navy-Federal Comp. Pact

WASHINGTON — The General Accounting Office, upholding a protest by Tandem Computers, has told the Navy to cancel a $5.7 million contract awarded Federal Computer Corp.

In challenging the procurement before the Congressional agency, Tandem charged that some of the IBM products Federal Computer offered did not comply with key technical requirements of the Navy's solicitation.

Specifically, Tandem argued that the IBM PCs Federal Computer offered in place of Tandem workstations did not meet the requirements that the keyboard contain 16 programmable function keys, 10 IBM PC-compatible function keys and an adjustable "click" sound feature.

Additionally, Tandem noted that the Tandem 6600 cluster controller offered by Federal Computer Corp., instead of the Tandem 6820 cluster concentrator specificed by the Navy, does not support the required Tandem 6530 protocol for communication with mainframe equipment, but rather supports an IBM protocol.

The GAO rejected the Navy's argument that it waived some of the requirements because the IBM hardware offered by Federal Computer Corp. was functionally equivalent.

The agency disagreed with the Navy's claim that the action did not hurt Tandem, noting that had Tandem known the military would accept IBM PC-type equipment, the firm may have decided against participating in the procurement.

The GAO has recommended that the Navy terminate the award for convenience of the government and issue a new solicitation with less stringent requirements to allow additional bidders to compete. It also has allowed Tandem to recover legal costs of the protest and bid-preparation costs, but the latter expenses only if the firm decides against participating in the recompetition.

The Navy said it is reviewing the GAO's recommendation. A third qualifying bidder on the procurement, Federal Data Corp., offered the specified Tandem products.

ComputerLand Awards Microscience $10M Pact

SUNNYVALE, Calif. — Microscience International has signed a 2-year, $10 million agreement to supply 20M-byte Winchester disk drive subsystems to ComputerLand.

Microscience will supply its HH-725 half-height, 5.25-inch drive, along with a controller and software, in a subsystem package for use with the IBM PC and PC XT, and the AT&T 6300 microcomputers.

THIS WEE

Electronic New

VOL 32 NO 1599 MONDAY, APRIL 28, 1986

Ja

TO
the p
gain
mark
stym
coun
To
inter
recei
condi
have
mark
At t

S. Will Hit Mkt. Access Goa

attacked the series of preliminary DRAM and EpROM antidumping duties levied by the U.S. Commerce Department, but were divided over how the individual companies will cope with the tariff penalties if they become final.

"Your government shouldn't be the salesperson for American semiconductor companies," said Tadahiro Sekimoto, president of NEC Corp. "Your companies should be capable of marketing their products themselves."

Shinichi Yufu, executive vice-president of Mitsubishi Electric Corp., said the U.S. quid

Say Tandem Picks Unix Sys. Of Altos Over Convergent

By ERIC NEE

CUPERTINO, Calif. — Tandem Computers, Inc., has awarded Altos Computer Systems a three-year contract valued at approximately $50 million for its 68020-based Unix processors, it was learned last week.

Sources said Altos beat out Convergent Technologies, Inc., in landing the Tandem deal, reportedly the largest dollar value contract Altos has secured and one of the first major OEM pacts it has signed for its model 3068 multi-user system.

Tandem is believed to have called for the bids to fulfill portions of several larger federal government contracts calling for a front-end Unix-based processor not offered by Tandem. According to a source, one of those contracts is with the U.S. Air Force, which will use Tandem's fault tolerant on-line transaction processing systems.

Phillip White, Altos' vice-president of sales and marketing, and Gerry Held, Tandem's director of new ventures, declined comment when asked about the OEM agreement.

Convergent officials did not return calls by press time.

The contract reportedly was signed with Tandem's Austin, Tex., Terminal Products division, which manufactures Tandem terminals, workstations and peripherals. Phone calls

See SAY, Page 17

Eaton Test V-P/GM Exits to Lead Startup

By JEFF DORSCH

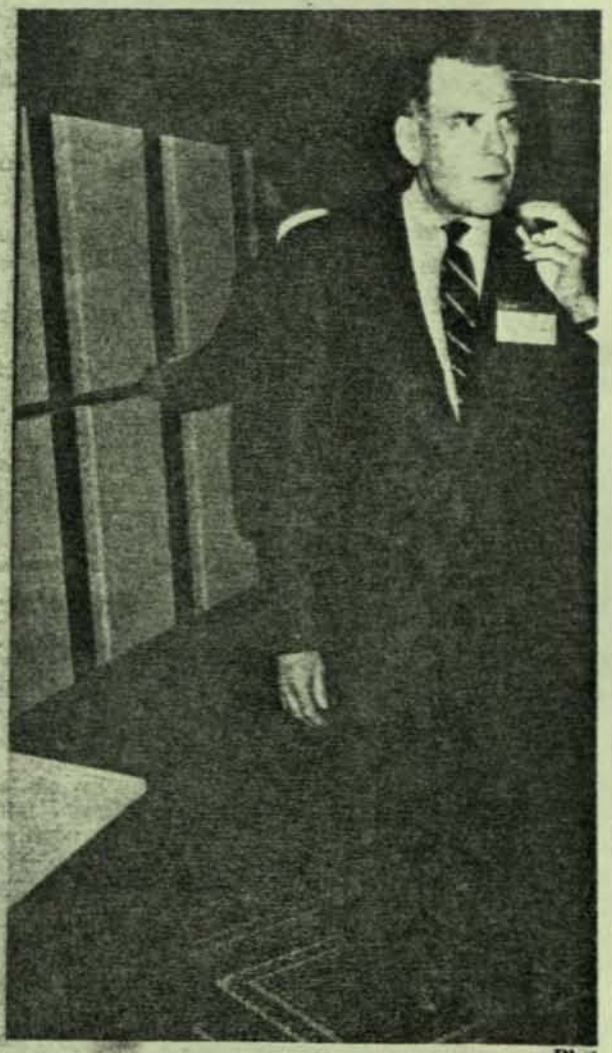
FREMONT, Calif. — Wayne Pittenger, vice-president and general manager of Eaton's Test Systems division, has resigned to become president and chief executive of a startup here developing products for the design verification field.

A spokesman for Eaton said Mr. Pittenger will not be immediately replaced. He had been vice-president and general manager of the division for just over a year.

Earl Jacobs, vice-president and general manager of Eaton's

See EATON, Page 74

GenRad Nets Its Largest Test Order — Page 69



— Phot

COMMAND REVIEW: Chuck Exley, chairman and pre Corp., leisurely puffs his way through an exhibit of the c 9800 family of high-end computers to make sure all is press demonstration held last week in New York. Story

has more than tripled in the past 7 years. "Graduates of 2-year programs," the handbook continued, "and people with less than a 2-year degree or its equivalent in work experience face stiff competition for programming jobs."

Earnings for programmers averaged about $500 a week in 1984.

Published every 2 years, the Occupational Outlook Handbook is a

Say Tandem Picks Altos Unix System

Continued From Page One

to the Austin facility were not returned, but it is believed that the Austin division would be responsible for developing the interface between the Altos and Tandem systems.

Because Tandem does not provide the Unix operating system on its own processors, it has been kept out of certain markets, sources said. Porting Unix to the Tandem system while maintaining its fault tolerance, modularity and on-line transaction processing capabilities is said to be a difficult undertaking.

While Tandem has won a number of major federal contracts in the past, including one with the U.S. Navy valued at about $500 million over 10 to 15 years, more and more government contracts going out at the present time — upwards of 60 per cent, it is estimated — require Unix capabilities.

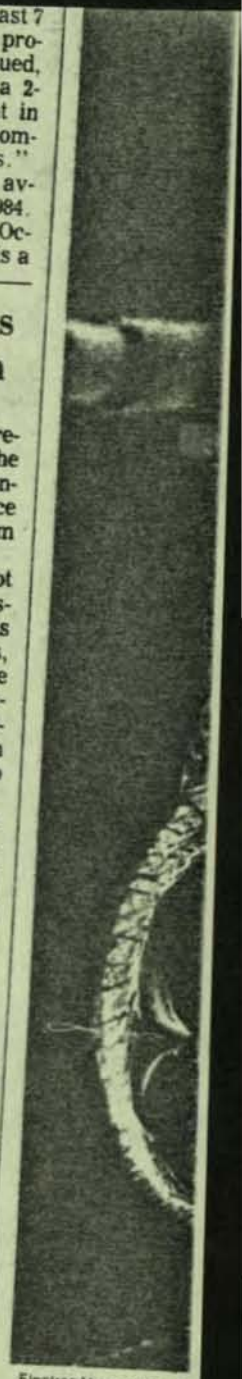
Altos, which introduced its 3068 multi-user system in March, 1985, began shipping the system in November of last year. It now accounts for about 20 per cent of Altos' sales, which totaled $37.7 million in the quarter just-ended.

Altos' Motorola 68020-based 3068 runs Unix System V and is targetted at OEM customers, while its Intel 8086-, 80186- and 80286-based systems are aimed at VAR customers. The 3068 uses either the 12.5-Mhz or 16-Mhz 68020, has up to 16M bytes of RAM and up to 240M bytes of Winchester disk storage capacity, and is said to be able to support up to 30 users.

Altos' major OEM agreement that has been disclosed so far for the 3068 is with ADP, which is selling it into the accounting and manufacturing market, Mr. White said. He would not reveal the dollar value of the agreement. ADP is also Convergent's fourth largest OEM customer.

The largest OEM deal Altos had signed previously was a 3-year $20 million agreement earlier this year with Trans World Airlines, Inc., which is remarketing Altos' Intel microprocessor-based systems.

While Mr. White would not comment on the Tandem agreement, he did say that "we're now starting to take off with a lot of OEM business under contract, and some to be signed soon."



Electron Micrograph. Lic

Final
to find t
structur
The 2
perform
With
provides
multiple
With i
module,
10MHz
100MHz
for rand

LEVEL 1 - 2 OF 2 STORIES

April 28, 1986, Monday

DISTRIBUTION: Business Editors

LENGTH: 466 words

HEADLINE: TANDEM-COMPUTERS; (TNDM) Amherst Group selects Tandem NonStop computer system for point-of-sale network

DATELINE: CUPERTINO, Calif.

BODY:

Tandem Computers Inc. (OTC:TNDM) announced Monday that The Amherst Group Inc., a North Hampton, N.H., provider of point-of-sale network services, has installed a Tandem NonStop EXT computer system and software from LeRoux, Pitts & Associates for POS network operation.

The Amherst Group provides retail POS services to approximately 100 banks and 2,600 merchants in New England. The 3-year-old firm, which currently supports 3,000 POS terminals, will run LPA's Total Payment System, a credit/debit authorization and draft capture software package designed to operate on Tandem equipment.

Ted Keith, Amhert president, said the firm has relied on service providers to route transactions to major credit card and check guarantee companies for authorization.

''We installed the Tandem/LPA system to give us in-house capability to develop transaction capture, switching and cash-management services. In-house systems will also enable more timely billing of customers for transactions,'' said Keith.

The high availability and expandability of the Tandem system are benefits, Keith added. ''Our good record of uptime should improve further with the new system. And expandability is key in the growing credit card/check authorization marketplace. In December 1985 we processed 821,000 transactions -- up greatly from the previous year.''

Commenting on Amhert's selection, Gerald L. Peterson, Tandem vice president of marketing, said, ''As a quality provider of point-of-sale services, Amherst is a welcome addition to our customer list. Their choice reaffirms the leadership of Tandem and key business partners such as LeRoux, Pitts in the competitive point-of-sale arena.''

LeRoux, Pitts & Associates is an 8-year-old firm specializing in Tandem-based software for the POS marketplace. Its systems are designed to handle a wide variety of POS terminals. The address is 557 S. Duncan Ave., Clearwater, Fla. 33516. The phone number is 813/461-3671.

Tandem Computers Inc. manufactures and markets computer systems and networks for the on-line transaction processing marketplace. The company is headquartered at 19333 Vallco Parkway, Cupertino, Calif. 95014, 408/725-6000.

Note to editors: Tandem, NonStop and NonStop EXT are trademarks of Tandem Computers Inc. Total Payment System is a trademark of LeRoux, Pitts & Associates.

CONTACT: Tandem Computers Inc., Cupertino
Tom Waldrop, 408/725-7191
or
The Amherst Group, North Hampton, N.H.
Ted Keith, 603/964-9874
or
LeRoux, Pitts & Associates, Clearwater, Fla.
Roger A. Cooper, 813/461-3671

Quarter

his is very good per- We expect to contin- so that through this ents. Areas that we asset management, vith receivables and

increased 15 percent ago to $37.1 million. here was a 2-cents-a- lization under FASB oftware development

ools
tion
peration
Versions

M

rts help

193

t 03750

SOCS is a trademark of

were $58.7 million, more than twice the previous year's $27.1 million for the same period. Nine-month earnings for the company, which in a public offering earlier this month doubled its shares outstanding, were $1.03 per share.

DEC's plan to add a higher-capacity disk drive for the MicroVAX 2 meanwhile sparked speculation about the impact on Micropolis, which rode a flood of orders from DEC to a year-to-year tripling in its first-quarter revenue. DEC contributed nearly half of Micropolis' $50.7 million in sales for the quarter ended March 28.

But Micropolis appeared neither surprised or concerned by the DEC decision. "Our forecasts with DEC run well ahead and we've known about their interest in offering that product for a long time, so it really doesn't affect our plans," said Dundas I. Flaherty, senior vice-president for finance and chief financial officer.

"If none of that happened, we would sell more disk drives for the MicroVAX 2," he continued. "It's not clear how much of that business will be supplanted. . .or how long that would last."

Over a three- to five-year period, Flaherty concluded, "We would expect the lion's share still would be 85-Mbyte drives. Probably three or four of the 85s would go out for

ing the Shugart Computer Systems Interface for evaluation.

Industry observers expect DEC to seek a second source for the 190-Mbyte disk drive. Only Priam Corp. is expected to offer a product comparable to the Maxtor unit, and its 191-Mbyte ST506 model is due for volume delivery beginning in August.

In related developments, Maxtor last week said it has inked a first-time contract to supply disk drives to Northern Telecom Inc., as well as a new deal with a previous customer, Convergent Technologies Inc.

Sources said the two-year agreements are expected to total $25 million to $30 million, with as much as two-thirds of the figure from Northern Telecom. Maxtor began deliveries under both contracts during the quarter ended in March.

Northern Telecom plans to use Maxtor's XT-1000 and XT-2000 85- to 190-Mbyte disk drives in its Meridian M6000 workstations and Vienna terminals, while Convergent will use the 140-Mbyte XT-1000 in its MegaFrame and MightyFrame multiuser systems. Both deals are initially for ST506 disk drives, but reportedly can be extended to include other models.

Convergent bought Maxtor 50-Mbyte disk drives under an earlier contract that has expired.

Tandem's Earnings Increase 81.4 Percent In 2nd Quarter

CUPERTINO, CALIF. — Tandem Computers Inc. has posted an 81.4 percent jump in net income for its second fiscal quarter, citing improved manufacturing operations and a weaker dollar.

Net income for the quarter ended March 31 was $12.4 million, or 29 cents a share, compared to $6.8 million, or 16 cents a share, in the same quarter of 1985.

The fault-tolerant systems maker reported a 20.4 percent increase in revenue to $176.3 million, up from $146.5 million a year ago.

Pretax income was $22.4 million, or 12.7 percent of revenue. That represented a sharp increase from the like period a year ago when Tandem reported pretax income of $11.3 million, or 7.7 percent of revenue.

For the six-month period, Tandem revenue rose 13.1 percent to $346.4 million, while net income advanced 15.3 percent to $24 million, or 56 cents a share.

Tandem president James Treybig said, "While we have seen no change in the economy, we have seen improvement in our business. In particular, business in Europe remains very strong.

Computer Systems News 4/28/86 P102

er manufacturers to remarket Rabbit's 3270-Plus micro-to-mainframe link.

The package, unveiled last year (*CSN*, June 10, 1985), is terminal emulation software for PCs allowing the microcomputer or multiuser system to emulate IBM 3270 devices. According to Rabbit, the software, running under the Unix operating system, features a program interface module (PIM) that provides users with a transparent interface between local applications and host programs.

The PIM supports data transfer between the desktop and host systems in 3270 screen

Lear Terminals Unit Feeling The Pressure

(Continued from Page 99)

"Frankly, since then we've lost market share, and people like Wyse [Technology Inc.] have gone from zero to $150 million a year in sales," he said.

Rodgers said Lear Siegler lost its advantage in the terminals market to competitors with high-volume Far East manufacturing capabilities—like TeleVideo and later Wyse—offering better performance at a cheaper price. "Over the past four years, the price/performance of our products has not been up to that of the competition," he said. "We were one of the few manufacturers to continue operations in the U.S. We're moving offshore now—we're going to save quite a bit of money doing that."

"Wyse went away from the boxy look and went to a sleek, streamlined look," Blatnick said. "If customers were looking for a sleek design, Lear didn't have something to offer them.

"They got hit the hardest in the midrange. Compared to Wyse, and some others, they were less attractive on price." Lear Siegler's midrange offering, the ADM 12+, is priced at $895; competitors' midrange products are typically priced in the $599 range.

LEVEL 1 - 3 OF 5 STORIES

April 25, 1986, Friday, Late City Final Edition

SECTION: Section D; Page 16, Column 5; Financial Desk

LENGTH: 52 words

HEADLINE: TANDEM COMPUTERS INC reports earnings for Qtr to March 31

BODY:

** COMPANY REPORTS **
TANDEM COMPUTERS INC (OTC)

Qtr to March 31	1986	1985
Revenue	142,754,000	120,088,000
Net inc	12,410,000	6,841,000
Share earns	.29	.16
6mo rev	346,388,000	306,142,000
Net inc	24,058,00	20,869,000
Share earns	.56	.50

TYPE: Statistics

SUBJECT: COMPANY REPORTS

LEVEL 1 - 1 OF 5 STORIES

Financial Times

April 25, 1986, Friday

SECTION: SECTION I; International Companies & Finance; Pg. 30

LENGTH: 132 words

HEADLINE: Tandem Computers Ahead 80 Per Cent

BYLINE: Jane Rippeteau

BODY:

Tandem Computers, the California-based computer systems group, has posted strong sales and earnings for the second quarter ended March 31. Revenue is up 20.4 per cent to Dollars 176.3 m and earnings have soared more than 80 per cent to Dollars 12.4 m or 29 cents per share.

The result exceeded analysts' forecasts. Six-month results show revenue up 13.1 per cent to Dollars 346.4 m from Dollars 306.1 m for the period last year. Net income climbed 15.3 per cent to Dollars 24 m or 56 cents a share. The company predicts at least 20 per cent growth for the year over fiscal 1985 revenue of Dollars 624 m.

Mr James Treybig, president and chief executive, attributed the strong performance in part to overseas business. "In particular, business in Europe remains very strong," he said.

SJ Mercury News (morning)
April 25, 1986

Earnings

Convergent's profit comes on lower sales

Convergent Technologies Inc., a San Jose manufacturer of computer work stations, reported net income of $1.9 million, or 5 cents a share, for the first quarter ended March 31, on lower sales. That compares with profits of $200,000, or 1 cent a share, in the same quarter a year earlier.

In part because of fewer orders from its largest customer, American Telephone & Telegraph Co., Convergent's quarterly sales were $73.5 million, compared with $92.6 million a year ago.

"Sales to AT&T decreased significantly from the fourth quarter's $12 million to $15 million, but orders from Burroughs Corp. picked up to over $10 million," said Paul C. Ely Jr., chairman and chief executive officer.

Despite the sales downturn, Ely said, the company's gross margins have improved to 28 percent because of a steady effort to cut costs and become more efficient in managing manufacturing and inventory. Convergent's stock closed up 13 cents at $10.38 in Over-the-Counter trading.

Tandem profit, sales show strong gains

Tandem Computers Inc. of Cupertino, which makes fault-tolerant computers for on-line transaction processing, reported strong improvements in earnings and higher sales for the second quarter ended March 31. Net income increased 81 percent to $12.4 million, or 29 cents a share, compared with $6.8 million, or 16 cents a share, a year ago. Sales climbed 20 percent, to $176.3 million from $146.5 million. Tandem's stock closed up $2.63 at $31.50 in Over-the-Counter trading.

Scientific Micro has a 1st-quarter profit

Scientific Micro Systems Inc. of Mountain View, which makes computers and computer-memory equipment, posted a profit of $362,000, or 5 cents a share, for its first quarter ended March 31. That compares with a loss of $175,000, or 2 cents a share, for the same period last year. Sales rose 65 percent, to $14.4 million from $8.7 million. Scientific Micro's stock closed up 25 cents at $6.63 in Over-the-Counter trading.

Priam reports profit on higher revenues

Priam Corp. of San Jose, a disk drive maker, posted a profit of $2.5 million, or 10 cents a share, for its fiscal third quarter ended March 31. That includes a tax credit of $1.2 million, or 5 cents a share, and compares with a loss of $4.8 million, or 21 cents a share, for the same period last year. Sales rose 24 percent, to $36.2 million from $29.2 million. Priam's stock closed down 13 cents at $7.13 in Over-the-Counter trading.

Alza profits rise 67% in 1st quarter

Alza Corp., a Palo Alto pharmaceuticals firm, posted a profit of $3.5 million, or 23 cents a share, for the first quarter ended March 31. That was an increase of 67 percent over profits of $2.1 million, or 16 cents a share, for the same period last year. Sales rose 80 percent, to $16.4 million from $9.1 million. Alza's stock closed up 38 cents at $41.63 on the American Stock Exchange.

S.V. Bancshares has income of $115,000

Silicon Valley Bancshares, the holding company for Silicon Valley Bank of San Jose, reported net income of $115,000 or 23 cents per share, for the first quarter ended March 31. That compares with $93,000, or 18 cents a share, a year earlier. As of March 31, assets totaled $80 million, up 45 percent over a year earlier; loans increased 32 percent to $47 million, and deposits increased 47 percent to $74 million. The bank's stock is traded Over-the-Counter.

Britton Lee Inc.

1Q 3/31	1986	1985	%chg
Sales	$7.2 million	$6.5 million	+11
Net income	189,000	938,000	-43
Per share	2 cents	12 cents	-83

The Los Gatos software manufacturer, which specializes in data-base management programs, said it had an order backlog of $1 million. (OTC, up 25 cents at $7.25)

After victories by Hanson Trust and Guinness in their fights for the Imperial Group and Distillers respectively, employees at Woolworth and its subsidiaries, Comet and B&Q, are waiting for details of a £1.6 billion bid from retailer Dixons.

At Imperial and Distillers any decisions about merging of computer operations and cuts in staffing that may result

bid. Dixons said: "For us the computers are not important. Woolworth does not have much of a computer system anyway."

Woolworth riposted: "We are resisting the Dixons bid on the basis we do not think Dixons has the expertise or knowledge to run such a large outfit. If that has a bearing on computers, ob-

staff; Dixons has over 100.

Managers at Hanson Trust are meeting their counterparts from Imperial Group companies, which include Imperial Tobacco and the brewer Courage, to discuss future organisation.

A spokesman for Hanson says: "There is no way we will even begin to consider computer needs until we

rial Tobacco's computer department and 140 at Courage in London could be affected by any organisational changes.

At Guinness, which staged a friendly takeover of Distillers, the head of group management information services, Trevor Davis, says it is too early for forecasts.

"We will gather the facts

portant, so we a get a handle on tion." The two ates together e 100 computer number of centre

Dixons, meanw ting up a joint based on IBM kit sidiary, Currys, nage, reducing it sites from two t

Tandem set a timing record.

Computing staff run on

by John Kavanagh

Over 800 computing specialists were among the 19,200 people who started the London Marathon last Sunday.

The hardy 807 were the fourth biggest occupational group of entrants, after the 2,613 engineers, 1,471 teachers and 811 builders.

Among the runners was Jimmy Treybig, founder of Tandem Computers, which ran the registration and results systems. Tandem had a team of 20 runners, plus 50 entrants from 35 customers.

Although the winner, Toshihiko Seko, broke no records with his time of two hours and 10 minutes, Tandem set a new record for getting all the timings out. By 7pm timings had been posted to 3,000 entrants.

During the peak finishing period, details of runners were being entered to the Tandem system at 10 a second, using bar codes attached to entrants' numbers.

Crash pushes up share

by Dave Madden

A computer services firm saw its system for stockbrokers crash last week but, despite inconveniencing customers throughout the City, its shares pushed to a year high.

NMW Computers, the City bureau, could offer no service on Monday last week; its volume of business was such that it could not recover from an ICL hardware fault the day before.

Startled brokers had to come in early on Tuesday, the first at 5.30am, to clear the backlog. One firm complained of "painful problems".

Demand for NMW's settlement and accounting services has grown dramatically with impending deregulation of the Stock Exchange and the demise of Centre-file's stockbroking system. Now it processes half of all Stock Exchange transactions.

David Fachiri, NMW marketing director, says trading volumes have "gone mad of late", with average volumes up by nearly three times in recent months. NMW's earnings are related to volumes; one broker comments: "The company is raking it in to the point of embarrassment." Its shares are surging ahead in response.

The glut is putting the company's ageing ICL 2976 mainframes under pressure, particularly at the end of Stock Exchange accounting periods.

In February it raised £2.8 million by rights issue to pay for two new ICL Series 39 Level 80 mainframes. They have been installed on an adjacent site in Na shire.

Fachiri says th the new machin nent, but custon move is seriously

Fachiri cla paradoxically, t failure has given dence in NMW even on the old its backlog was c hours.

But general the ability of finar such as NMW tants (Computer cial) to cope w demand for their mains.

Michael Enrigh ance director, ad slippage in install tems, but the co actively marketi business.

Sperry Van partner runs into trouble

by Nuala Moran

Sperry's Van partner Integrated Business Communications (IBC) has broken down. Sperry refused to comment on the exact position of IBC with which it was jointly developing and marketing a value added network service.

A recorded message at IBC's offices in Windsor, Berks says that the company is currently "concerned with its future structure" and advises creditors to write to an address in Leeds.

IBC's shares are quoted over the counter and were suspended about two months ago. One attempt to rescue the company has failed. There is no question of Sperry stepping into the breach, according to a company spokesman.

Sperry would not comment on the position of IBC even though it has been closely involved with helping to set up its Key valued added network service. The Key network is based on a Sperry 1100/72 central mainframe.

FTM

by Ian Holdsw

Future Techn tenance (FTM), ance arm of microcomputer-n Technology Syst has been snappe ceivership by FTS's largest O

Honeywell wi FTM's 400 m contracts valued a year, while c support the 1,10 own Microsyster built by FTS. T will re-employ ab

Honeywell's n

Printed in Great Britain for I Sutton, Surrey SM2 5AS, by Ltd. 1986. Registered at the P

LEVEL 1 - 1 OF 1 STORY

Financial Times

April 24, 1986, Thursday

SECTION: SECTION I; Technology; Pg. 16

LENGTH: 913 words

HEADLINE: No Stopping The Non-Stop Machines

BODY:

The Data processing world has been curiously resistant to the notion of computers which are tolerant of failure. As late as 1983, Dr Louis Robinson, IBM's director of university relations, dismissed the problem during a lecture in which he agreed it was never easy to have a global perception of how things were going to be.

"One doesn't exhibit much concern about the workability of the machine," he claimed. "Information systems todya are very reliable, some 10,000 times more reliable than the early machines.

And so they were and are. But as any banker or airline operator will tell you, not reliable enough.

Which is why, over the past eight years, Tandem Computers of Cupertino, California, has built a business which turned over Dollars 624 m last year through selling computers guaranteed never to stop running.

But it is also why Stratus Computer of Natick, Massachusetts, has, over the four years since its first machine appeared on the market, become a real threat to Tandem's dominance of the fault tolerant market-place, and why another dozen or so companies now look as if they could become serious contenders.

Only one of these is British, Information Technology (ITL), of Winchester, which two days ago was awarded the Queen's Award for Technological Achievement for its "Momentum" fault tolerant systems.

Until now, the fault tolerant marketplace has been slow and difficult, chiefly because of the expense of building a machine that never stops. There is only one way, and that is to duplicate all the critical hardware chips, communications lines, discs.

So Tandem computers have always been expensive - Dollars 500,000 or more has been the typical starting price. Only those organisations which could not afford the cost of computer failures - banks, stockbrokers, airlines - were prepared to pay so much over the odds to prevent what other companies simply saw as an occasional inconvenience.

What changed all that was the spectacular growth of on-line transaction processing, applications where there is a direct connection between the computer and the customers for whatever service is running on it.

Typical examples are an airline reservation system or a network connecting automated teller machines to a bank's central computer.

Frost and Sullivan, the marketing consultancy, says:* "The rapid increase in the number of on-line transaction processing applications is the single most significant industry factor relative to fault tolerance. "

Furthermore, the cost of providing fault tolerance is falling all the time.

Stratus, for example, made fault-tolerance economic by developing an architecture based on comparatively inexpensive off-the-shelf microprocessor chips (the Motorola 68000 family).

ITL will launch next week a new member of its Momentum family, the 10,000, which gets its power from using chips based on emitter coupled logic, the fastest available, and innovative memory chips from Inmos, the UK semi-conductor manufacturer.

"According to Mr "Spud" Taylor of ITL, the Momentum series best feature is the level of software protection built in, conserving the customer's data files and making restart easier after, say, a complete power failure. Momentum computers are being installed by London stockbrokers as the basis of dealing settlement systems.

Tandem, historically achieved fault tolerance through duplicated hardware and extremely efficient software for detecting errors and isolating faulty components.

Last week, it announced a new top-of-the-line machine, the Nonstop VLX. It features a new high performance gate array chip developed jointly by Tandem and Motorola. This features high speed emitter coupled logic and industry standard transistor-transistor logic on the same chip. Gate arrays are a short cut to the design of complex semi-conductor chips. Tandem reckons it saved a year of design time through its joint development with Motorola compared with conventional chip design methods.

The new Tandems start at around Dollars 1m but offer significantly higherly processing speeds and lower maintenance costs than previous systems.

Other US companies which look as if they could make some imapct in fault tolerance include August Systems, NoHalt Computers, Parallel Computers, Sequoia Systems, and Tolerant Systems.

The problem for all of them is that there is nothing distinctive about fault tolerance in itself. There is no reason why all computers should not be fault tolerant and indeed the availability of low priced, high performance processor chips of the kind used by Stratus of ITL or semicustom chips of the kind designed by Tandem make it easier for traditional manufacturers to take that route.

IBM for example, still has no fault-tolerant computer of its own although its researchers are working feverishly on a proprietary design.

In the meantime, it markets Stratus machines under its own label as does Olivetti of Italy.

Other mainframe computer manufacturers are likely to form alliances with fault tolerant makers while they work on their own designs.

So fault tolerance is fast ceasing to be a novelty; the name of the game is now high transaction processing rates. Tandem, the VLX of which is said to handle up to 250 transactions a second as a single system, is clearly still ahead of the game. Machines now under development are said to be orders of magnitude faster.

* Fault Tolerant Computer Systems, Frost & Sullivan, London and New York Dollars 1825.

GRAPHIC: Picture Semiconductor at the heart of Tandem's new computer

LEVEL 1 - 4 OF 5 STORIES

April 24, 1986, Thursday

DISTRIBUTION: Business Editors

LENGTH: 1499 words

HEADLINE: TANDEM-COMPUTERS; (TNDM) Financial results

DATELINE: CUPERTINO, Calif.

BODY:

Tandem Computers Inc. (OTC:TNDM) Thursday announced operating results for the second fiscal quarter, which ended March 31, 1986.

The California-based manufacturer of NonStop computer systems reported that revenue increased 20.4 percent to $176,327,000, compared with revenue of $146,489,000 in the second fiscal quarter of 1985.

The company's pretax income was $22,360,000, or 12.7 percent of revenue, compared with the 1985 second fiscal quarter level of $11,276,000, or 7.7 percent of revenue.

Net income increased 81.4 percent to $12,410,000, or 29 cents per share, vs. $6,841,000, or 16 cents per share, earned in the same quarter of last year.

For the six months ended March 31, 1986, revenue increased 13.1 percent to $346,388,000, from $306,142,000 in the same period of fiscal 1985.

Net income advanced 15.3 percent to $24,058,000, or 56 cents per share, compared with fiscal 1985 first-half net income of $20,869,000, or 50 cents per share.

Commenting on the company's financial results, Tandem president James G. Treybig stated, ''While we have seen no change in the economy, we have seen improvement in our business. In particular, business in Europe remains very strong. We continue to be optimistic about the second half of our fiscal year.

''Tandem's success this quarter was due to a positive cycle of new hardware and software products introduced over the past year. Most recently, we announced our new NonStop VLX computer, the most powerful system in the world for on-line transaction processing.

''In addition, we believe that measures we have taken have increased the effectiveness of our marketing organization, which is dedicated to the on-line transaction processing and networking market.''

Treybig added further, ''Our earnings gains reflect the progress we have made in improving the efficiency of our manufacturing operations, as well as reflecting the attractive margins of our new products. The weaker dollar also had a beneficial impact on our financial results.''

Tandem Computers Inc., one of the Fortune 500 largest U.S. industrial corporations, manufactures NonStop computer systems and networks for the on-line transaction processing market.

Tandem Computers Inc. is headquartered at 19333 Vallco Parkway, Cupertino, Calif. 95014. Telephone is 408/725-6000.

Tandem Computers Inc. and Subsidiaries
Consolidated Interim Statement of Income (Unaudited)
(In 000s, except per share amounts)

	3 Months Ended 3/31 1986	1985
Revenue:		
Product revenue	$142,754	$120,088
Service and other revenue	33,573	26,401
Total revenue	176,327	146,489
Cost and expenses:		
Cost of revenue	58,025	57,713
Research and development	21,318	17,075
Marketing, general and administrative	76,986	61,998
Total costs and expenses	156,329	136,786
Operating income	19,998	9,703
Interest income, net	2,362	1,573
Income before income taxes	22,360	11,276
Provision for income taxes	(9,950)	(4,435)
Net income	$12,410	$6,841
Earnings per share	$0.29	$0.16
Weighted average shares outstanding	43,385	42,156

	6 Months Ended 3/31 1986	1985
Revenue:		
Product revenue	$279,982	$254,223
Service and other revenue	66,406	51,919
Total revenue	346,388	306,142
Cost and expenses:		
Cost of revenue	116,869	119,734
Research and development	41,135	32,202
Marketing, general and administrative	149,071	121,994
Total costs and expenses	307,075	273,930
Operating income	39,313	32,212
Interest income, net	4,035	3,461
Income before income taxes	43,348	35,673
Provision for income taxes	(19,290)	(14,804)
Net income	$24,058	$20,869
Earnings per share	$0.56	$0.50
Weighted average shares		

outstanding	42,781	41,770

Tandem Computers Inc. and Subsidiaries
Consolidated Interim Balance Sheet (Unaudited)
(In 000s, except per share data)

	3/31/86	3/31/85
Assets		
Current assets		
Cash and cash investments	$160,767	$107,737
Accounts receivable	182,577	162,927
Inventories	69,872	91,273
Prepaid expenses and other	16,739	7,977
Total current assets	429,955	369,914
Property, plant and equipment, at cost	251,199	215,773
Accum. depreciation and amortization	(95,110)	(64,554)
Net property, plant and equipment	156,089	151,219
Other assets	9,373	4,882
Total assets	$595,417	$526,015
Liabilities and Stockholders' Investment		
Current liabilities		
Current portion of long-term debt and capitalized lease obligations	$7,721	$6,537
Accounts payable	36,679	39,856
Accrued liabilities	45,888	42,724
Accrued income taxes	3,945	3,551
Total current liabilities	94,233	92,668
Capitalized lease obligations	5,982	9,828
Long-term debt	4,445	2,672
Deferred income taxes	34,324	17,810
Stockholders' investment		
Common stock, $.025 par value; authorized 200 million shares; outstanding 42,139,637 in 1986 and 41,111,986 in 1985	1,054	1,028
Additional paid-in capital	250,946	235,139
Retained earnings	204,433	166,870
Total stockholders' investment	456,433	403,037
Total liabilities and stockholders' investment	$595,417	$526,015

CONTACT: Tandem Computers Inc., Cupertino
Cacey Tangney, 408/725-7555 (financial)
Pat Becker, 408/725-6035 (media)

LEVEL 1 - 3 OF 3 STORIES

Corporate EFT Report

April 23, 1986

SECTION: IN BRIEF; Vol. 6, No. 8; Pg. 6

LENGTH: 101 words

BODY:

Tandem Computers Inc. has taken the wraps off a new transaction processing mainframe computer system, which officials at the Cupertino, Calif. firm boast "delivers higher transaction throughput" than any other computer system already available to the financial services industry. The new NonStop VLX system, which is fully compatible with other Tandem NonStop computer systems, "is ideal for high-volume transaction processing requirements of large financial institutions and securities industry customers," Tandem officials said in their official new product announcement, released last week.

uots to be based on the NEC 2000, the company has plowed virtually all of its current processor R&D funds into the RPM series of machines.

"We're using our own R&D in the mid-range productions," he said. "Our R&D investments are going to be focused at the mid-range."

The RPM series machines are to be based on custom circuits using 1,500 gate equivalent technology. Honeywell recently established a satellite operation in Phoenix for its Colorado Springs, Col.-based Solid State Electronics division in large part to work with the Large Computer Product division on the new generation of computers.

The new family of mid-range mainframes, Mr. Raffel continued, internal code name Project Titan, Honeywell has a standing plan to introduce a system based on the NEC 2000 within the next 3 years to compete with IBM Summit-class processors, which are beleived to represent the industry leader's next generation of mainframes.

The Titan mainframes, whose design was jointly defined by Honeywell and NEC, are to have approximately three times the performance of the NEC 1000 systems, and will be the first liquid-cooled computers offered by Honeywell's Large Computer Products division. The 2000-class machines also are to feature six parallel processing pipelines, and be based on a mix of TTL and ECL circuitry.

— STUART ZIPPER

Tandem Introduces High-End System

CUPERTINO, Calif. — Tandem Computers, Inc., last week expanded its fault tolerant processor line with a new high-end system said to offer about twice the performance of the firm's previous high-end machine.

The new VLX system is said to offer performance of 40 and 50 transactions per second in its four-processor base configuration using full system software including the transaction monitoring facility. This compares with about 20 tps performance for a four-processor TXP, Tandem's previous high-end system.

Tandem president and chief executive James G. Treybig, said the firm is offering the VLX in a base configuration of four processors in part to compete more directly with mainframe transaction processing systems from IBM, but also to avoid cutting into sales of Tandem's existing TXP and NonStop II systems.

Tandem said about 50 per cent of the increase in performance over the TXP results from changes in the central processor, while the rest is due to software improvements, including the effects of using a new version of the operating system, changes in the I/O software architecture, and changes in the message system.

The base configuration of the VLX, priced at $995,275, includes four processors, 32M bytes of memory, four 5M-byte I/O channels, one VL8 disk drive subsystem with 2.1G bytes of capacity and one V8 disk drive subsystem with 650M bytes of capacity, a 200 ips tape subsystem, disk and tape controllers, the Check fault tolerant diagnostic subsystem, and a terminal. First customer shipments will begin in the second quarter.

The VLX, which uses both ELC and TTL technology, accomodates up to 16 processors, 256M bytes of main memory and 1M byte of cache memory. To maintain software compatibility with earlier processors, Tandem continues to use its 16-bit extended architecture.

The new version of the Guardian operating system, B-30, offers about a 10 per cent increase in tps performance on the TXP and somewhat less than that on the NonStop II.

Court OKs $6M Settlement In IRS Dispute: Comdisco

ROSEMONT, Ill. — Computer lessor Comdisco said the U.S. Tax Court has approved a $6.1 million settlement with the IRS on a $200 million assessment which came from an audit for the years 1980, 1981 and 1982.

The issue was whether cash gained from financing lease receivables should be taxed as income in the first year, or whether the income could be taken over the term of the lease as Comdisco had been doing.

According to Comdisco, the IRS conceded its principal claims that the company's equipment financing borrowings accelerated income and that executive incentive compensation was excessive and not deductible during those years.

John Vosicky, senior vice-president and treasurer of Comdisco, said the settlement calls on the firm to pay the IRS $6.1 million at this time, but as a result of accelerating some income, the firm's tax liability has been reduced $5.4 million in future years.

Comdisco had contested the $200 million tax assessment in a petition to the tax court in January.

4991 token-ring interface couplers (TICs), each of which support one token-ring LAN. Each TIC — essentially an MPU operating under control of resident microcode — is priced at $3,000. The addition of a 3726 communications controller expansion unit is said to allow a 3725 Model 1 to attach eight token-ring LANs. Under an earlier introduction, any PC could act as a dedicated S/370 gateway for only a single token-ring LAN as part of an SNA-emulation program.

Besides the LAN connection incentive, IBM apparently moved to migrate users to the 3725 communications by offering a 15 per cent discount on such machines when customers replace purchased 2701, 2702, 2703, 3704 or 3705 controllers. The discount offer — applying to systems ranging from $75,000 to $250,000 depending on configurations and options — will be in effect for orders placed through Oct. 16, 1986.

Meanwhile, additional connectivity to S/370s would require a PC 3270 Emulation Program Version 3 software package — also available in January, at $475 — allowing PCs on the ring topology to attach to the 3725 plus be configured as a standalone or gateway workstation.

Financial Chief Leaves Cullinet

Continued From Page 21

linet executive to resign in the past month following the hiring of a DG executive.

Robert N. Goldman resigned as president after Mr. Chapman, a former DG senior vice-president, was named vice-president and chief executive (EN, March 17).

"It all happended very quickly," Ms. Swersky said. "My decision to leave was a personal career decision. (The hiring of Mr. Pitts) appears to make may career goals (unreachable at Cullinet)."

She said she hopes to join a new firm in a finance post reporting to the chief executive.

The resignation "shouldn't be construed as (a signal) that David Chapman is going to bring in all kinds of people," Ms. Swersky said.

"It's just a question of my having someone between me and David (on the organizational chart)," she added.

Ms. Swersky also noted that she has agreed to remain at Cullinet for 90 days as a consultant to aid in the transition.

Mr. Chapman said Mr. Pitts was brought in to beef up Cullinet's strategic planning opeation as well as oversee the finance and administration operation.

— MICHAEL BUCKEN

MORE TO SHARE: network include 3725 LAN bridges and repe arrangements.

For connectivity be and System/36 Model 5362 via the token-ring tomers will be required a $2,500 attachment de $925 LAN communica gram.

IBM said the Syst 5364 does not require th attachment device but i be linked to the token via a PC AT equipped $695 LAN communica gram to act as a gatew

Also introduced were programs allowing in exchange and resourc between all System/36s via the LAN and allow station functions and emulation to be downlo the System/36 to the product. All of the Syste grams are available in t quarter of 1987.

Concerning the Serie embelished that syste connectivity and gene munications capabilities fice Connect Version 1 program running unde altime Programming S erating system for the The new program will able in the first quarter

IBM said Office Conn the Series 1 to particip office network scheme implementation of DIA, SNADS document int content and distribution tures, allowing PCs on t ring or PC network LA to DISOSS/370 and NET plications and use of th processors to file, distr print documents.

Office Connect is des use on Model 4956 p o:es 1 MB of main m ( ) 200 MB of D. several other I unveiled last quires PCs to us Advanced Program Communications (A software for PCs, w made available in Ma new Personal Services sion 1 Release 2 packa able in the fourth quart

to manufacture tape drives in Singapore. InterDyne will manufacture products at Carlee's plant and also will continue to produce tape drives and other products at its Milpitas plant. Carlee, which manufactures printers, floppy disks and circuit boards, is a subsidiary of Lam Soon Group, a diversified manufacturer.

Aegis Systems, a San Jose-based marketing firm, acquired **Intelligent Technologies International Corp.**. Terms of the acquisition were not disclosed. Intelligent Technologies supplies data communications products. With the acquisition, Aegis co-founders move to new positions. John Dougherty will become the president of Intelligent Technologies and Jerry Deems becomes executive vice president. Palo Alto-based Intelligent Technologies will move its headquarters to San Jose.

Datacopy Corp., a Mountain View-based designer and manufacturer of electronic scanners and image processing systems, signed an agreement with **Tandem Computers Inc.** for a version of its custom software. The software, called World Image Processing System will be used as a part of Tandem's support for a graphics display system produced by General Electric Co.

Sun Microsystems Inc. signed a joint development agreement worth $20 million with **Matra Datasystems**, a Paris-based supplier of computers and computer components. Under the agreement, Mantra will market Sun's workstations with its minicomputers. Mantra also serves its markets with the workstations throughout Europe. The two firms also will jointly develop a new product to be sold by Mantra in Europe and Sun Microsystems in the United States and other markets.

Reid-Ashman Inc. has completed the acquisition of **The Hybrid Technology Group Inc.** which will operate as a subsidiary. Hybrid, located in San Jose, manufactures equipment for the semiconductor and microelectronics industries. Reid-Ashman, based in Santa Clara, also manufactures equipment for the semiconductor industry.

New Accounts

Winkler Tawa McManus, a Santa Clara advertising firm, has signed **Xiox Corp.** of San Mateo.

J. Bunker & Associates in Hayward have signed **XO Industries Inc.** of Mountain View.

Mountain View-based **Tencor Instruments** has introduced Alpha-Step R & D, designed for surface profiling applications in research and development. The computerized instrument measures surface characteristics like step height, surface roughness, and etch depth for a broad range of finishes, coatings and surface types.

Vivix Corp. of San Jose recently introduced its initial product, the Plurimus Cardiac Evaluation System. The product is the first in a series of medical instruments designed to bring the latest diagnostic capabilities to the physician's office at reduced costs. Vivix uses personal computer technology rather than the development of a dedicated computer to do this.

Vitelic Corp. of San Jose has released a 98-page catalog that describes the specifications on its complete line of CMOS dynamic RAM and static RAM memory devices.

Scotts Valley-based **Borland International** will release its complete line of software on three-and-a-half inch disks for the new IBM PC Convertible. Borland expects to begin shipping the new version May 1. Borland also has announced that several of its software programs will support the new Direct Graphics Interface Specification by **Graphic Software Systems.**

Vicom Systems Inc. of San Jose is offering a 60hz, noninterfaced display for its image processing station. The screen is bit mapped and the cursor is programmable, the company said.

Santa Clara-based **Precision Monolithics Inc.** has released DAC-8212, a dual 12-bit, mutiplying CMOS digital-to-analog converter. The product features a 12-bit wide data port and internal latches for microprocessor interfacing, the company said.

Tandem Computers Inc. has introduced a system performance monitor that lets users collect and examine performance statistics for system software and hardware components. The new product, Measure, provides information to the system manager or system analyst that is useful in managing system growth requirements, application tuning and in balancing transaction volumes among central processing units.

VLSI Standards Inc. of Mountain View has announced Sheet Resistance Standards for accurate calibration of both contact and non-contact sheet resistance and thickness measurement instruments. These standards are used for both initial calibration as well as periodic monitoring of instrument performance.

allows 3270 terminal users to reach remote computers in private voice/data networks based on the Meridian SL-1.

Sigma Designs Inc. has announced an external streaming tape subsystem for the IBM family of personal computers. Called FasTrak, the product is designed for business and scientific applications within single or mulitple personal computer environments.

LSI Logic Corp. has introduced a megacell compiler, which operates with the company's LDS design system. The product will reduce the time for designing and producing new large scale integrated devices, the company said. LSI Logic also announced a 32-by-32 bit fixed-point multiplier accumulator. Called the L64032, the device is a computer-compiled integrated circuit available in three forms.

Profit & Loss

Seeq Technology Inc. of San Jose has reported a loss of $4.3 million, or 37 cents a share, for the second quarter of 1986 ended March 30, up from a loss of just over $3.9 million, or 30 cents a share, for the previous second quarter. Sales in the 1986 second quarter were $8.5 million, down from $9.1 million for the 1985 second quarter.

The company on March 25 announced the appointment of J. Daniel McCranie to the position of president and chief executive officer, replacing E. Floyd Kvamme, who has become chairman of the board.

Seeq makes non-volatile semiconductor memory devices.

International Business Machines Corp. of New York, which has two large plants in San Jose, recently reported a profit of just over $1 billion, or $1.65 a share, for the first quarter of 1986 ended March 31, up from $986 million, or $1.61 a share, for the previous first quarter. Sales in the 1986 first quarter was $10.1 billion, up from $9.8 billion the year before.

"First quarter results reflect an uncertain North American economy and slow growth in capital spending," IBM president John Akers said.

The company provides a wide variety of computer, information, and office products.

American Educational Computer Inc. of Palo Alto recently said it had a loss of $1.2 million for the 1985 fiscal year ended Dec. 31, up from a loss of $1.8 million for the 1984 fiscal year. Sales in 1985 were $1.1 million, down from $2.5 million for 1984.

During the fourth quarter of 1985, the company had a profit of $123,000, up from a loss of $480,000 for the previous fourth quarter.

Xicor of Milpitas had a loss of $1.9 million, or

SJ Bosiness Journal
Apr 21, 1986 p56

Tandem announces Measure

Performance monitor for Nonstop systems

Tandem Computers, Inc. of Cupertino, Calif., has announced Measure, a full-function system performance monitor for use on Nonstop systems.

Measure, a replacement product for Tandem's existing performance measurement product Xray, is said to allow users to collect and examine performance statistics for systems software and hardware components, including CPUs, disk drives, remote systems, communications lines and software components.

Measure was designed for the Tandem multiprocessor environment. It can make up to 64 concurrent measurements. Different users may start and stop measurements concurrently, interactively or at predesignated times. Measure also contains a capability for collecting application events through user-defined counters.

Measure has fault-tolerant features that automatically restart measurements when processors are restarted. According to the vendor, it is highly integrated with Tandem's Guardian 90 operating system.

Another feature is an open architecture with a programmatic interface that accesses data control functions, so software subsystems can communicate directly with Measure.

For the Nonstop EXT system, the initial license fee is $1,500 per system, with a monthly license fee of $100. For the Nonstop II and TXP systems, the initial license fee is $3,000 per system, with a $200 monthly fee.

ComputerWorld
April 21, 1986
p 87

Computer Systems News April 21, 1986 p26

Tandem Computer Comes Out With New Mainframe

By Susan Kerr

CUPERTINO, CALIF. — Tandem Computers Inc. last week unveiled a mainframe computer based on new bipolar gate array processors designed by Tandem and Motorola Inc.

Tandem's new top-of-the-line system, called the NonStop VLX, is software compatible with Tandem's other systems but provides twice the transaction throughput. An entry-level VLX processes roughly 50 transactions per second, Tandem said.

Because of the new internally developed VLSI technology, Tandem officials said the VLX is three times as reliable and will reduce maintenance costs by half when compared to previous Tandem computers. To date, all Tandem systems have been based on off-the-shelf technology.

Priced from $995,275, the VLX pits Tandem even more directly against IBM. While the two companies have always been competitors, the VLX "will give IBM a run for their money," said InfoCorp vice-president Sandra Gant. "It offers a real challenge at the high-end of IBM's product line. [The VLX] is an incredibly powerful machine, more so than [IBM's] 3090."

Aimed at Tandem's standard on-line transaction processing customers, the VLX is designed for use in such applications as computer-integrated-manufacturing, telecommunications and messaging, point-of-sale, and airline reservations. Tandem marketing vice-president Gerald Peterson said the system is already in the hands of some customers, including the NASDAQ stock group and Federal Express.

The VLX technology "gives us a base for our future," Peterson said. "It wasn't just built for the VLX but for at least our next decade of products. You'll see it [the technology] up and down our lines in terms of price and raw performance."

Tandem chief executive and founder James Treybig said that back in 1979, the company recognized the need for the new technology.

"We knew then we had to build the capability to build gate arrays, and we also had to have computer-aided-design capability within Tandem," he said. Thus in 1980, Tandem began developing CAD and simulation software, which was used to design the new VLX technology.

In 1981 Tandem entered into an agreement with Motorola that resulted in Motorola's MCA 2800 ALS—a bipolar ECL/TTL gate array chip that is the basis of the VLX. In 1983, Tandem invested in its own VLSI research and development facility, which allowed the company to reduce development time of the VLX by at least a year, according to Treybig.

In its base configuration, the VLX consists of four new processors, 32 Mbytes of memory, 2.7 Gbytes of disk storage, four 5-Mbyte I/O channels, disk and tape controllers, a 200-ips tape subsystem, and the CHECK fault-tolerant diagnostic subsystem.

A VLX processor unit consists of two plug-in printed-circuit boards with a total of 31 gate arrays. Tandem's previous high-end system, the NonStop TXP, has four boards per CPU, one reason why the VLX boasts better reliability, Peterson said.

Each VLX can be expanded to hold 16 CPUs, 256 Mbytes of main memory, and "hundreds of gigabytes of disk storage," Peterson added.

Processors are interconnected by an interprocessor bus with an aggregate transfer rate of 40 Mbytes per second.

A new fault-tolerant VLSI-based fiber optic controller, dubbed FOX II, allows up to 14 VLX systems to be connected together. Additionally, Tandem's EXPAND networking software allows up to 255 distributed nodes to be linked. The system supports SNA, X.25, OSI and MAP communications environments.

Tandem officials said the company has no immediate plans to drop any of its older systems.

U-B Revises Suit Vs. Ex-Eng. Director

By Mary Brisson

SANTA CLARA, CALIF. — Ungermann-Bass Inc. has revised its theft-of-trade-secrets lawsuit against former engineering director Joseph S. Kennedy and his new company apparently to clarify the nature of the secrets allegedly stolen.

At the same time, Ungermann-Bass has added one former employee who joined Kennedy's company, Phoenix Technology Corp., to a list of three other former Ungermann-Bass engineers cited as co-defendants in the original action (*CSN*, Oct. 14, 1985).

In response to Ungermann-Bass' latest action, an attorney for Phoenix Technology disparaged Ungermann-Bass' effort to indicate what trade secrets allegedly had been misappropriated and promised to file a countersuit after the present action is settled.

"They have a pathetic case," said Robert Feldman, an attorney with Wilson, Sonsini, Goodrich & Rosati, Palo Alto, Calif., which is representing Phoenix. "We're going to sue them for malicious prosecution as soon as we kick their corporate butt."

Kennedy founded Phoenix Technology, Los Altos, Calif., last year with plans to develop local-area networks for military and other specialized applications. Among former Ungermann-Bass engineers who joined him were Richard Broberg, named in the most recent action, and George D. Marshall, Philip S. Spencer and Steven J. Kuhn, named in the original suit.

Feldman said Ungermann-Bass filed its amended complaint in response to a written request in which Phoenix Technology sought clarification concerning what trade secrets were allegedly stolen.

However, the original complaint cited a threat to misappropriate trade secrets, while the current action charges actual theft. The new suit expands the language concerning the nature of the trade secrets in question, but does not go into technical detail.

ComputerWorld
April 21, 1986
p 1

Tandem boosts Nonstop line

By Jeffry Beeler and David Bright

CUPERTINO, Calif. — Capping a five-year proprietary chip development effort, Tandem Computers, Inc. last week introduced a mainframe-class transaction processing system that reportedly boasts twice the throughput of the firm's largest existing processor.

According to Tandem President Jim Treybig, the latest addition to the company's line rivals, in its maximum configuration, the computing speed of IBM's 3090. Such performance levels are crucial to the new system's target market, users clus-

See **TANDEM** page 10

Tandem boosts Nonstop line

From page 1

tered at the extreme high end of the on-line transaction processing scale.

The Nonstop VLX, featuring processors based on very large-scale integration bipolar emitter-coupled logic/transistor-transistor logic gate-array circuit technology jointly developed with Motorola, Inc., delivers from 40 to more than 50 transactions per second in its smallest configuration, the company said. New circuit technology and an internal diagnostic subsystem also result in a 50% lower maintenance cost than is available with the existing Nonstop TXP.

One beta-site user, Bill Strange, manager of distributed communications support with Federal Express in Memphis, said his company has been operating a four-processor VLX for one month, mostly for batch processing, and has found it lives up to Tandem's claims. Strange could not comment on specific purchase plans but did say, "For the large-size systems that we need, it will certainly be a VLX."

Single VLX processor

A single VLX processor consists of two circuit boards, compared with four for the TXP, and incorporates a total of 31 gate arrays.

Four such CPUs, 32M bytes of main memory and 2.7G bytes of disk storage are required to form a basic VLX configuration, according to Gerald Peterson, vice-president of marketing with Tandem.

From the entry-level configuration, the VLX can grow in four-processor increments to a maximum of 16 CPUs, 256M bytes of main memory and hundreds of gigabytes of disk storage inside the same cabinet. Because Tandem's architecture permits linear expansion, each four-processor increment increases throughput by another 40 to 50 transaction/sec., Peterson said.

One expert who said Tandem's VLX improves the company's competitive position with IBM was Omri Serlin, a consultant and researcher of the fault-tolerant market who heads Itom International in Los Altos, Calif. The VLX, Serlin said last week, could compete with the 3090 "possibly in some cases" where transaction processing applications produce heavy I/O loads and have relatively low CPU requirements.

Linking VLX cabinets

Users who wish to link up several VLX cabinets can do so by means of a Fox II fiber-optic controller, also introduced last week. The Fox controller also allows as many as 14 VLX units, each containing 16 CPUs, to be linked at distances up to four kilometers. Up to 255 geographically distributed VLX nodes can be linked through the vendor's existing Expand networking software, Peterson said.

Serlin said the product "is a nice evolutionary system" for Tandem and incorporates technology that will be significant in future products. The performance boost over the TXP is substantial but not dramatic, Serlin said. "I wouldn't expect it to turn the entire industry on its ear," he said, but added that high profitability of the equipment may boost the company's financial performance when volume shipments begin.

David Wu, an analyst at Warburg Rowe & Pitman Akroyd, Inc. in San Francisco, said the price/performance of the VLX is "quite a significant improvement" over earlier Tandem models. "If you look at comparable systems — systems meaning systems, not CPUs — the cost of doing an automatic teller machine transaction per second on the VLX is about $23,000; on the TXP it is about $40,000."

Compatible with existing Tandem hardware and software, the VLX is integrated with Check, a diagnostic subsystem that uses expert system technology to automate many of the fault analysis tasks that would otherwise be performed manually. Through remote sensors and dedicated microprocessors, the Motorola 68000-based subsystem monitors the status of the VLX's processors, power supplies, fans and fiber optics.

Check also provides an optional dial-out capability that electronically reports urgent systems problems to Tandem's maintenance specialists by automatically calling the company's remote service centers, Peterson said.

The combination of an automated diagnostic subsystem and a threefold improvement in circuit reliability accounts for most of the VLX's maintenance-cost advantage over the TXP, he added.

Faster interprocessor bus

Compared with the TXP, the VLX provides a 65% faster interprocessor bus, rated at 40M byte/sec.

The bulk of the VLX's performance edge over the TXP stems from proprietary bipolar logic, which will form the "technological foundation" for Tandem's systems family for years to come, Peterson said.

Working with Motorola's semiconductor subsidiary, the supplier of on-line transaction processing systems developed a very large-scale integration 2,000-gate logic chip that gives the Nonstop VLX threefold-denser circuitry than Tandem's previous high-end system, the TXP.

The superior density reportedly contributes to the VLX's performance edge over the TXP by minimizing its number of components and interconnections.

Shipments of the Nonstop VLX, which costs slightly less than $1 million in a basic configuration, are scheduled to begin during the current quarter.

MISWeek
April 21, 1986
p 1

3 Users Like Tandem VLX

By JULI CORTINO

CUPERTINO, Calif.—Tandem Computer Inc.'s new "million-dollar baby" is already a hit with three customers—Federal Express, Barclays Bank of England and the NASDAQ stock exchange, all of which have committed to the new $995,275 Tandem NonStop VLX system unveiled last week.

Code-named "Check," Tandem's powerful new on-line transaction processor was generally viewed as the machine that will challenge large-system vendors, such as International Business Machines Corp. and Digital Equipment Corp., in the mid- to large-sized mainframe market.

SEE 3, PAGE 14

INFORMATION SYSTEMS

3 Love Tandem 'Million-Dollar Baby'

CONTINUED FROM PAGE 1

Check processes 40 to 50 "ET1" transactions per second. Tandem's most powerful system prior to Check's introduction, the TXP, processed about 20 transactions per second. An ET1 transaction is the equivalent of one automated teller machine (ATM) transaction.

"We think this will take on anything from IBM, from the 4381 to the 3090," said Tandem president and chief executive officer James G. Treybig.

Consultant Ted Costello, of the Destek Group, said, "The VLX, pitted against the 3090, will be tough for IBM to beat in the on-line transaction market. The VLX expands the breadth and depth of Tandem's offerings."

Key to Tandem's new processor is the MCA 2800 ALS semiconductor from Motorola. The high-performance bipolar gate-array chip, jointly developed by Tandem and Motorola, is featured in Data General Corp.'s Eclipse line and is marketed commercially by Motorola.

The 2800 features emitter-coupled logic (ECL) technology, which is considered to be much faster than the older TTL (transistor-to-transistor logic) employed in Tandem's NonStop II, EXT and TXP processors.

"We agreed to let Motorola market the chip to make sure it stayed alive," Tandem engineering director Al McBride told MIS Week. In order to guarantee a commitment to the design and development of the chip, which the two companies have been developing since 1981, McBride said Tandem agreed to Motorola marketing the product commercially.

Data General reportedly chose the Motorola chip after its first choice, a piece of silicon from Texas Instruments, was discontinued.

McBride said Tandem has committed to buying 2,000 of the MCA 2800 ALS chips per month from Motorola for the foreseeable future. He noted that 67 percent of the chip is "common to all designs." But 33 percent is "specific to each implementation."

Tandem has etched its own instructions into that 33 percent layer with its computer-aided design (CAD) system. The CAD layout of the chip is done in Tandem's own $5 million prototype laboratory, established specifically for the VLX project.

"This is a smart move on Tandem's part," said Kimball Brown of the Dataquest market research company based in San Jose, Calif. "By doing its own CAD implementation, Tandem is not locked into the Motorola chip. It can use semiconductors from other vendors."

A Challenge To IBM

Brown also said the VLX presented a strong challenge to IBM's 3090. "This gives Tandem a chance to go after the 3090 marketplace. The VLX is a normal progession for Tandem's systems."

Tandem currently lays claim to six percent of the on-line transaction market, according to Dataquest, while IBM owns two-thirds of the market. "Tandem has, over the last 12 years, survived by skimming," said Brown. "They go after little market niches. They won't ask a corporation to convert from IBM to Tandem, which is expensive, but will go after that customer when they see that he is ready to migrate to new applications."

Brown, and Tandem's Treybig, said they expected the VLX to expand Tandem's share of the on-line processing marketplace. Neither was prepared to say by how much. But, Tandem's McBride said, the company expects the VLX to account for 20 percent of its revenue in the fourth quarter.

Tandem's revenue for the 1985 fiscal year, ended last Sept. 30, was $624 million.

Tandem's four-processor VLX is compatible with the company's current line of hardware and software. The VLX is also said to provide "twice the transaction throughput of a comparably configured NonStop TXP and reduce the cost per transaction by 30 percent."

Tandem also cut the cost of maintenance for the VLX system by 50 percent. The company said it was able to drop the maintenance cost because the new technology for the VLX is "three times as reliable as previous processor technology and because the VLX contains a new internal fault-tolerant diagnostic subsystem" called Check.

An entry-level VLX has four processors, 32 Mbytes of memory, 2.7 Gbytes of disk storage, disk and tape controllers, four 5-Mbyte input-output channels, a 200-inch-per-second (ips) tape subsystem and the Check diagnostic system.

The VLX system can be expanded to 16 processors.

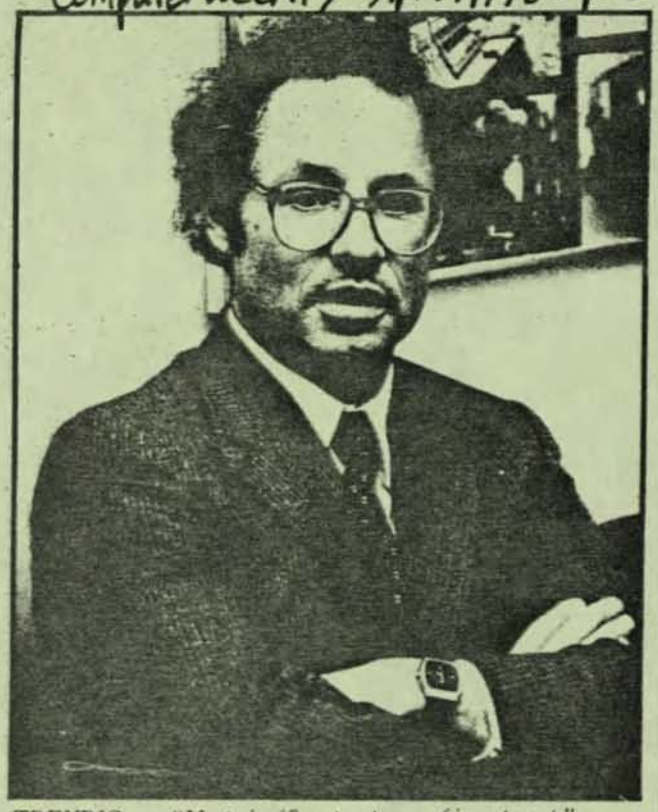
Tandem has also enhanced its Fox communications system for the VLX. The new VLSI-based (very-large-scale-integration, or ECL-type chip) fiber-optic controller is called Fox II. It allows the VLX processors to link with each other, or with other Tandem systems, at distances of up to four kilometers.

Fox II consists of two printed circuit boards, each having 10 gate arrays. The original Fox system used a six-board controller.

In order to speed up the development of new applications, Tandem recently introduced the Pathmaker application generator, which is optimized for the VLX. System-sizing tools, called Measure, were also introduced for the machine.

Tandem's Treybig said the VLX was introduced a full year early because of the company's prototype lab. Had Tandem been required to wait for Motorola to develop a chip specifically for Tandem, Treybig said the VLX would not have come out until next spring.

Computer Weekly Apr 17, 1986 p3



TREYBIG . . . "Most significant outcome of investment."

Tandem hopes to set standard

by J. Green-Armytage

Tandem Computers has launched a top-of-the-line generation of fault-tolerant computers. John Kane, director of corporate marketing, describes it as setting "a completely new standard for the industry."

In a simultaneous announcement in the US, president James Treybig said the new VLX range of mainframe machines "is the most significant outcome to date from our investment in VLSI (very large-scale integration) design and product development facilities."

The VLX gives a 36% gain in price/performance to customers, while letting them transfer existing applications with no more effort than when recompiling source code, claims Kane.

An entry-level VLX, costing just under £1 million, can handle about 40 to 50 transactions per second through its four processors. Adding further processor boards can build a system up to a maximum 16 processors.

Up to 14 systems can be linked over a new fibre-optic communications system, to give a configuration capable of delivering 672 mips (million instructions per second). Kane, however, says: "We're not interested in mips."

By rating the machine in terms of transactions (as defined by IBM's ET1 specification) Tandem is reaffirming its commitment to existing markets for fault-tolerant transaction-handling in banks, point-of-sale networks, airlines and city institutions.

Tandem is also starting to look at possibilities in factory automation. It has recently signed a marketing agreement with the US Triflex corporation, which makes factory equipment controllers.

First shipments of VLX machines are scheduled for this quarter.

BT manage IBM in CSS

by Charles Arthur

Local managers in British Telecom (BT) districts are spurning IBM, and pressing for volume discounts from plug compatible suppliers on mainframes for the £200 million Customer Service Systems (CSS) project.

With 15 top-end mainframes – IBM 3081s or equivalent – yet to be bought, sources in BT districts say their managers are talking to National Advanced Systems (NAS) about a volume-purchase agreement.

But Amdahl and Hitachi are also understood to be in the running for lucrative contracts, both for computers and disc storage. NAS has so far sold £3 million worth of kit for use in CSS.

The move is a reverse for IBM, which had been the favoured choice of the 250-strong London division which is co-ordinating CSS. It could be the biggest boost in years from BT for plug compatible firms.

So far nine IBM 3081s have been bought by districts. But because each district must account for its expenditure, other managers are keen to cut capital costs so they IBM-sk tive rat

In L sidering cruits hiring I

CSS ambitio intende focus in districts tomer billing, enquirie bases o

Origi have t mid-198

ComputerWeekly

Alison Turnbull explains why race-organisers have taken up computers in order to provide a more satisfactory results service – for the runner in the street as well as the world-beater

April 17, 1986 p28

Tandem races to bring results

There are 25,196 entrants in this week's London Marathon and every one who finishes must be given a time and position.

Most of the UK's major participant running events use computers – whether marathons (26.2 miles), half-marathons, or shorter fun runs.

It is the goal of every race organiser – from the *Sunday Times* National Fun Run (30,000 participants) and Great North Run half-marathon (25,000) down to the Benbecula Marathon (four) – to offer runners fast and accurate processing of results.

Some smaller races often disappoint. While the organisers can work out times and placings for leading men, the team results and results for runners further down the field and in special categories like women and veterans are not available before the prize-giving.

For smaller races hand-timing and recording are still the quickest way. But organisers are quickly recognising the potential of the personal computer for producing mailing lists, taking late entries and checking the runner lists for errors and duplication. Predictably, a number of enterprising enthusiasts are marketing race management packages for the more popular models of personal computer.

The London Marathon, which this year has a record 25,196 entrants, could not be staged without computer support. This year it comes from Tandem Computers.

The confectionery firm, Mars, is the event's major sponsor, while Tandem is putting in £250,000-worth of manpower and resources. It promises some results facilities that its predecessors, Olivetti (1981-84) and DEC (1983), did not provide, but which runners are very keen to have.

Apart from a medal and a free Mars Bar at the end of the race, what do runners expect when they finish their marathon?

Every finisher, whether a world-beater or a "galloping granny", is given a position and an accurate finish time. But as you watch the mass of runners snaking away from Greenwich this Sunday (April 20), you may well wonder how order can be made of such chaos.

The principles used in the grand-scale London race can easily be applied to races with smaller fields.

Tandem has been working on the entry database since the first entry forms started to arrive at the London Marathon Office before Christmas. The database for each accepted entrant includes surname, forenames, address, home and business telephone numbers, age, date of birth, occupation code, previous marathon best time, expected time for London, nationality, and club.

Some of these details are not necessary for the smooth running of the race on April 20, but are vital for Mars's public relations executive, Gwynne Hart, if it is to answer all the statistical, demographic and biographical questions put to it by the media.

How else would we know, for example, that after engineers (2,613), teachers (1,471) and builders (811), those in the computer industry (807) comprise the largest occupational group in this year's London Marathon?

Once the runner database is established, each accepted applicant is issued with a registration card, which he or she is required to present in person at the Royal Festival Hall from the Wednesday before the Marathon.

In return the runner is given a waterproof number with a bar code at the bottom, and strict instructions not to tear off or stick pins through the bar code.

It is on this bar coding system that the success of the London Marathon results service relies. The event starts at 9.30am; although the first runner will not cross the line until after 11.37am, from early morning a formidable army of volunteers and computer staff, each person with a clearly defined task, gathers at the finish line at Westminster Bridge.

The bridge is divided into three lanes, each of which is roped off into four chutes. At the "peak", which occurs between midday and 1pm, five to 10 runners may cross the finish line every second.

It is essential that they are lined up and their numbers recorded in order of arrival, without a jam of exhausted runners building up in front of the line.

As the runners reach the crown of the bridge, they are shepherded into one of the lanes. As they cross the line, the timekeepers at the entrance to each lane press the button on a hand-held timer, which is linked directly to the Tandem EXT system in County Hall.

The timekeeper also holds a keypad, itself directly linked to the EXT, into which the running numbers of a sample of runners are entered. It is impossible to enter every runner number, which in any case is unnecessary – in conjunction with the bar codes, times accurate to one second can be recorded for all runners whether sampled or not.

At the end of each chute volunteers called "bar code pluckers" rip the bar code from the running numbers, and "spindlers" hang them on giant safety pins. These are rushed to a caravan adjacent to the finish line where they are read by light pens, and the numbers transmitted to the EXT to be married up with the timings.

"Plucking" the bar codes is a quick, simple operation for the runner, who is immediately free to collect his or her medal, and can rush off to be reunited with dry clothes, drinks, family, friends and, if necessary, first aid.

Runners can move quickly and smoothly out of this primary finish area and avoid a backlog building up, though by this stage they often need the help of "chute pushers" to egg them along the chutes and keep them on their feet if necessary.

Tandem Dynamite workstations will be set up in the BBC TV outside broadcast unit, the public address commentary box on Westminster Bridge, and the press office. These will allow the users to access the database by keying in the runner number.

This means that during the broadcast Ron Pickering and David Coleman can identify anyone in the field; while the commentators on the public address system at the finish line can lift the hearts and legs of struggling runners by calling out their names.

Times and places for el · runners have always been available almost immediately for release to the media. But it is the ordinary runner who stands to gain this year. Though larger in size, the London Marathon has until now compared unfavourably with the New York City Marathon, on which it is modelled, because of the long time it has taken to produce results for runners finishing further down the field.

In New York, times and placings for every runner are posted in the windows of the main sponsor, Manufacturers Hanover, on the Monday morning, and appear in the *New York Times* on that morning.

The Sunday evening presentation in New York includes prizes in all the veteran and special categories – these have not always been available in London because placings could not be established in time.

Tandem promises results for everyone across the line before 3pm (5½ hours into the race) by 7pm, when printout can be viewed at the post-race party at London's Guildhall.

It hopes to display a copy at another prime central London site during Monday; to make results available through Prestel; to send results by electronic mail to Tandem's offices worldwide; and perhaps at least some of the grassroots results in a national newspaper.

These results are unratified, though usually pretty accurate. It takes about a week to weed out the "pirates" – runners who ingeniously (and often quite convincingly) draw up fake numbers with bar codes from groceries.

Each runner will receive a postcard with a printout of his or her ratified time and placing – the quicker this arrives, the quicker those settling wagers or collecting sponsorship for charity can start.

All the times and places – including those for runners finishing after the computer cut-off time, who are timed manually – are published in the *Official Results Book*, available a few weeks after the event.

Alison Turnbull is a contributing editor of Running Magazine, *and assistant PA commentator at the London Marathon.*

IBM COMPUTER
TODAY
Independent coverage for users
16 -29 APRIL 1986 · PUBLISHED FORTNIGHTLY

CITY REJECTS IBM (London) NON-STOP COMPUTER

Fault-tolerant System 88 has made just one sale in the lead up to deregulation of the Stock Exchange

City firms have given the thumbs-down to IBM's fault tolerant computer, the System 88.

Despite the need for ultra-reliable systems created by preparations for October's 'Big Bang', it appears that IBM has sold only one System 88 machine, which is based on the Stratus 32 series. IBM reached an OEM agreement with US firm Stratus in January 1985, and started selling the 88 in the UK at the end of last year.

John Woods, a freelance computer market researcher and IBM-watcher for analysts Frost and Sullivan (F&S) remarks: 'The System 88 has come a year too late for the City, and I am almost certain only one firm, Citicorp, has bought one.'

And sources within several leading software houses confirm that IBM has had little success with the 88.

Bob Brown, marketing director with Software Sciences comments: 'Many informed observers believe that the 88 offering is a stop-gap marketing policy, to deal with situations where IBM was losing to Tandem.'

Tandem is the leading supplier of fault-tolerant systems. and according to F&S will take about 60 per cent of that market — in the UK — in 1986. Stratus is expected to get 12.5 per cent.

Various sources indicate that about 20 fault-tolerant systems have been bought by City firms, with 14 or so coming from Tandem, and the rest from Stratus, and UK firm ITL (Information Technology Ltd), which makes the Momentum.

Tandem's successes include merchant bank Morgan Grenfell, and brokers Hoare-Govett, and Mills and Allen. These three were won in competition with IBM's System 88.

A source at Tandem, who handles its City marketing, believes that IBM is not 'pushing' the 88. 'One ex-IBM salesman who has joined us says the salesmen never go into accounts to sell an 88. They want to sell mainstream systems. And they tell clients that "something better" is coming from IBM in the fault-tolerant field.'

But US analyst Robert Fertig, who follows the fault-tolerant market, reckons that IBM is 'doing well' in American with the 88. He thinks the giant may 'gobble up' Stratus, or it may build its own fault-tolerant system using experience gained on the 88.

IBM, as usual, will not comment on 88 sales. Nor will it say how it has 'improved' the machine in relation to the Stratus 32. System 88s cost from £300,000 to £500,000.

According to Brown, IBM's 88 push has been hampered by its agreement with Stratus. 'For instance IBM is always one release behind updated versions of VOS, the Stratus operating system. Also Stratus has developed an interface for City information feeds — called City Protocol Support — which helped it win orders in New York. I wonder whether IBM has access to this.'

Alan Lindsay, who is head of computer systems development at City firm James Capel & Co, bought Stratus rather than the 88, 'because it's a fairly new situation, and we felt we had to go to the experts.'

John Charlton

LEVEL 1 - 1 OF 6 STORIES

Financial Times

April 15, 1986, Tuesday

SECTION: SECTION I; International Companies & Finance; Pg. 32

LENGTH: 163 words

BYLINE: Alan Cane

BODY:

Tandem Computers, the Cupertino, California company which pioneered " fault-tolerant" computing, yesterday launched a new family of machines claimed to be the most powerful of their kind, writes Alan Cane.

The new machine range, the NonStop VLX, is said to be twice as powerful, three times as reliable and to need only half as much maintenance as Tandem's previous top end machine family.

The company is important because of its commitment to transaction processing, the kind of computing required by banks and other financial organisations.

This includes applications such as electronic corporate cash management and electronic funds transfer at the point of sale. Banks and other financial organisations predominate among Tandem's customers.

Up to 250 transactions a second are possible using one of the new VLX computers, the company says, making 1,000 transactions a second possible with four linked machines. Prices for the new computers start at Dollars 1.3 m.

LEVEL 1 - 2 OF 6 STORIES

April 15, 1986, Tuesday, Late City Final Edition

SECTION: Section D; Page 2, Column 5; Financial Desk

LENGTH: 143 words

HEADLINE: New Tandem Computer

BYLINE: Special to the New York Times

DATELINE: SAN FRANCISCO, April 14

BODY:

Tandem Computers Inc. introduced a new computer today that could help the company's battle against the International Business Machines Corporation. The machine, called the Nonstop VLX system, handles such transactions as banking, telecommunications and airline reservations.

The machine is based on a new chip, the first designed and built in-house by Tandem in collaboration with Motorola. It uses very-large-scale integrated circuit technology. The company said the new chip enables the VLX to process about 50 transactions a second, a 65 percent improvement over the company's previous systems, and faster than any I.B.M. mainframes.

Tandem, now 11 years old, has grown to a $600 million company based on the strong market for its fault-tolerant computer systems, which use multiple processors to prevent a major breakdown should a circuit fail.

SUBJECT: Terms not available

CORPORATE
INFORMATION CENTER
4/14/86

DOW JONES STOCK QUOTE REPORTER SERVICE
STOCK QUOTES DELAYED OVER 15 MINUTES
*=CLOSE PRICE ADJUSTED FOR EX-DIVIDEND

N TNDM 01/02 AQ
1/1 /EDP /
/TNDM
04/14 TANDEM COMPUTERS INTRODUCES
(DJ) NONSTOP VLX SYSTEM
CUPERTINO, CALIF. -DJ- TANDEM COMPUTERS INC. SAID IT IS INTRODUCING A NONSTOP VLX SYSTEM.

THE NONSTOP VLX IS A TRANSACTION PROCESSING MAINFRAME THAT DELIVERS HIGHER TRANSACTION THROUGHPUT THAN THE INDUSTRY'S LARGEST COMPUTER SYSTEMS, TANDEM SAID. IT FEATURES NEW PROCESSORS BASED ON BIPOLAR ECL-TTL GATE ARRAY CIRCUIT TECHNOLOGY JOINTLY DESIGNED BY TANDEM AND MOTOROLA.

THE ENTRY LEVEL CONFIGURATION IS PRICED AT $995,275, TANDEM SAID, AND FIRST CUSTOMER SHIPMENTS WILL BEGIN IN THE SECOND QUARTER OF 1986.

11:36 AM

LEVEL 1 - 3 OF 6 STORIES

Business Wire

April 14, 1986, Monday

DISTRIBUTION: Business Editors

LENGTH: 497 words

HEADLINE: TANDEM; VLSI R&D development facility makes contributions in both computer system design and semiconductor chip technology

DATELINE: CUPERTINO, Calif.

BODY:

Tandem Computers Inc. (OTC/TNDM) Monday announced that its investment in an in-house VLSI research and development facility reduced by one year the development time for its gate array-based high end system, the NonStop VLX, introduced today. In addition, the investment resulted in a major technology contribution within the semiconductor industry -- the development of Motorola's MCA 2800 ALS, a new high performance bipolar ECL/TTL gate array chip, which was jointly developed by Tandem and Motorola. Tandem's VLSI facility includes a semiconductor prototype fabrication lab as well as computer-aided design (CAD) and simulation capability which runs on Tandem's own NonStop TXP systems. The facility allows prototype gate arrays to be built in four to five weeks, compared to the industry average of 10 to 16 weeks. ''This facility gives us the means to manage the design time involved in developing increasingly complex, leading edge technologies,'' stated James G. Treybig, president and chief executive officer. ''The investment will help us deliver future transaction processing technologies to our customers much sooner, and we will continue to make significant contributions in semiconductor designs as well.'' Tandem used its VLSI facility during its joint development with Motorola of the MCA 2800 ALS, the bipolar gate array chip used in Tandem's new VLX computer system. The MCA 2800 ALS features a unique blend of internal ECL circuit technology with TTL interfaces. This blend provides the performance advantages of ECL technology and it allows the utilization of widely available TTL components such as memory and interface chips. For instance, compared to ECL memory chips, TTL memory chips are higher density, require less power, cost less and are available in both static and dynamic versions. Tandem and Motorola jointly developed the production version of the chip using Motorola's Mosaic II bipolar production process. The chip is now a standard offering within Motorola's semi-custom bipolar line. Tandem's investment in VLSI development capability had a significant impact on the VLX processor's final design and reliability. Compared to TXP processors with four printed circuit boards, VLX processors have only two. The higher reliability and increased density VLSI help make the VLX processor three times more reliable than the TXP and improve the speed and price/performance of the new VLX system. Tandem Computers Inc., a Fortune 500 company, is the leading supplier of computer systems and networks for on-line transaction processing. The company is headquartered at 19333 Vallco Parkway, Cupertino, Calif. 95014. Phone is 408/725-6000.

Note to Editors:
Tandem, NonStop, NonStop VLX and NonStop TXP are trademarks of Tandem Computers Inc.

LEVEL 1 - 4 OF 6 STORIES

Business Wire

April 14, 1986, Monday

DISTRIBUTION: Business Editors

LENGTH: 639 words

HEADLINE: TANDEM-2; (TNDM) Unveils VLSI-based OLTP mainframe

DATELINE: CUPERTINO, Calif.

BODY:

Tandem Computers Inc. (OTC/TNDM) Monday extended the high end of its NonStop computer family with the introduction of the NonStop VLX system. The Nonstop VLX, the company's first computer system based on VLSI technology, is a transaction processing mainframe that delivers higher transaction throughput than the industry's largest computer systems. The VLX, fully compatible with previous NonStop system models, features new processors that are based on bipolar ECL/TTL gate array circuit technology jointly designed by Tandem and Motorola. The VLX provides twice the transaction throughput of a comparably configured NonStop TXP (the company's previously high-end offering) and reduces the cost per transaction by 30 percent. The VLX delivers 40 to over 50 transactions per second in its smallest configuration and is targeted for use in high volume on-line transaction applications such as computer-integrated manufacturing, telecommunications and messaging, banking, point-of-sale and airlines. Tandem also announced today that VLX system maintenance pricing is 50 percent less than previous systems for customers who opt for remote service. Lower maintenance pricing is possible because the new technology of the VLX processors is three times as reliable as previous processor technology, and because the VLX contains a new internal fault tolerant diagnostic subsystem, CHECK. CHECK monitors system operations, works with Tandem's expert system-based diagnostic software to analyze faults, and provides hardware support for the remote diagnostics capability. In making the announcement at a news conference at the company's Cupertino headquarters, James G. Treybig, Tandem president and chief executive officer, stated, ''The VLX is the most significant outcome to date from our investment in VLSI design and product development facilities. ''It demonstrates our ability to produce large-scale gate array designs and gives us the knowledge base we need to leverage these designs into future products incorporating many different VLSI technologies.'' The entry level configuration, priced at $995,275 (US), includes four processors connected via 40 megabytes (MB) per second interprocessor bus, 32 MB of main memory, 256 kilobytes of high-speed cache memory, 2.7 gigabytes of high-performance disk storage, four 5 MB I/O channels, VLSI-based disk and tape controllers, a 200 inches per second tape subsystem, a system terminal and the CHECK fault tolerant diagnostic subsystem. First customer shipments will begin in the second calendar quarter 1986. The VLX is expandable to 16 processors in a single system with up to 256 MB of main memory, up to 1 MB of cache memory, and hundreds of gigabytes of disk storage. Up to a 14 systems can be connected locally using a new VLSI-based fiber optic controller, FOX II, that allows systems to be linked at distances up to four kilometers. For geographically distant locations, up to 255 NonStop systems can be linked using leased lines, satellites or public packet networks using Tandem's EXPAND fault-tolerant network software. Systems can communicate with other environments using a

number of industry standards including SNA, X.25, X.21, OSI, MAP and local area networks. Tandem Computers Inc., a Fortune 500 company, is the leading supplier of computer systems and networks for on-line transaction processing. The company is headquartered at 19333 Vallco Parkway, Cupertino, Calif. 95014. Phone is 408/725-6000.

Note to Editors:
Tandem, NonStop, NonStop VLX, NonStop TXP, NonStop II, EXT, FOX II, EXPAND, and CHECK are trademarks of Tandem Computers Inc.

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

DATA TOPICS

In an effort to strengthen its position in the on-line transaction processing market against high-end competitors such as **IBM** and soon-to-be competitor **NCR**, **Tandem Computers** will introduce this week a new system code named Check reportedly offering twice the performance of Tandem's previous high-end system, the TXP. The base configuration of the system is a four processor complex, priced at about $1 million and available this quarter. The machine uses ECL technology with TTL. In addition, Tandem has cut the number of boards in each processor from the four used in its TXP systems to only two boards in Check. Tandem will continue to use its extended 16-bit architecture in Check to provide software compatibility. NCR's new 9800, meanwhile, is expected to include a loosely-coupled multi-processor arrangement and fault tolerant option.

ELECTRONIC NEWS, MONDAY, APRIL 14, 1986 17

MIS Week p 11
April 14, 1986

Tandem To Display ECL On-Line Transaction Processor

By JULI CORTINO

CUPERTINO, Calif.—Tandem Computers Inc. will introduce the first in a generation of on-line transaction processors featuring emitter-coupled logic (ECL) technology this week.

Code-named "Check," the new fault-tolerant system is expected to operate 50 percent faster than Tandem's current high-end system, the TXP, and is reportedly priced about 30 percent higher than the TXP, at about $300,000.

Check is built around a chip jointly designed by Motorola and Tandem. A source close to the companies said Motorola will market the chip commercially. The chip, which is reportedly a bipolar semi-custom piece of silicon, has been already, in fact, implemented in Data General Corp.'s Eclipse product line.

PRODUCTS

A Data General spokesman said the company chose the ECL 2800 chip because of its "density, speed and low power consumption."

The ECL technology, recognized as much faster than the TTL (transistor-to-transistor logic) currently employed in Tandem's processors, is what gives the new processor its speed.

But an analyst at the San Jose, Calif., market research firm, Dataquest, noted, "There is a big difference between using new silicon technology and using a new architecture."

Dataquest's Gwen Peterson said the new Tandem processor will be faster, but she said it does not represent a full-scale new architecture for Tandem's product line.

Analysts expect Check to challenge International Business Machines Corp., which holds claim to over 60 percent of the on-line transaction processing market.

Check may also hold Digital Equipment Corp. at bay, as the minicomputer giant has recently introduced features for its systems that could present a challenge to Tandem, according to observers.

A Tandem spokeswoman noted that the company "runs up against DEC and IBM in the manufacturing marketplace" but does not compete directly with DEC in its traditional marketplaces, which include financial institutions, airlines and other heavy users of data who require 100 percent up-time for their computer systems.

Carol Muratore, an analyst with Prudential-Bache Securities in New York, said, "DEC has a VAX cluster. That makes for higher up-time. But, it's not geared for lots of transactions. It does not guarantee automatic data recovery or data integrity."

Jeffry Canin, an analyst with Hambrecht & Quist Inc., San Francisco, said Tandem should "enjoy good margins with its first ECL system." He said Tandem has "shrunk the board count" with its new machine, which he characterized as an "evolutionary development" in Tandem's product line.

Canin noted that IBM and DEC do not offer "true fault-tolerant" systems. He said Stratus and Tolerant Systems present a more direct challenge to Tandem in the marketplace.

Tandem lays claim to 6 percent of the on-line transaction processing market. Its new Check system could garner the company a share of the mid-end and high-end mainframe market, where it has not yet established a presence, Canin added.

Accord Signed For DBS Buyout

Thursday, April 10, 1986

San Francisco Chronicle

TECHNOLOGY / JOHN ECKHOUSE

Tandem Bets Its Chips on Its New Computer

Tandem Computers Inc. will drastically overhaul its line of highly reliable computers in the next couple of years.

The first of a series of new products will be introduced Monday at the company's Cupertino headquarters.

Code-named Check, the machine reportedly will offer 50 percent more processing power at a price 20 percent above the current top-of-the-line Tandem model TXP that carries a base price of about $300,000.

The computer also will be the first featuring computer chips custom-designed by Tandem at its new in-house semiconductor facility.

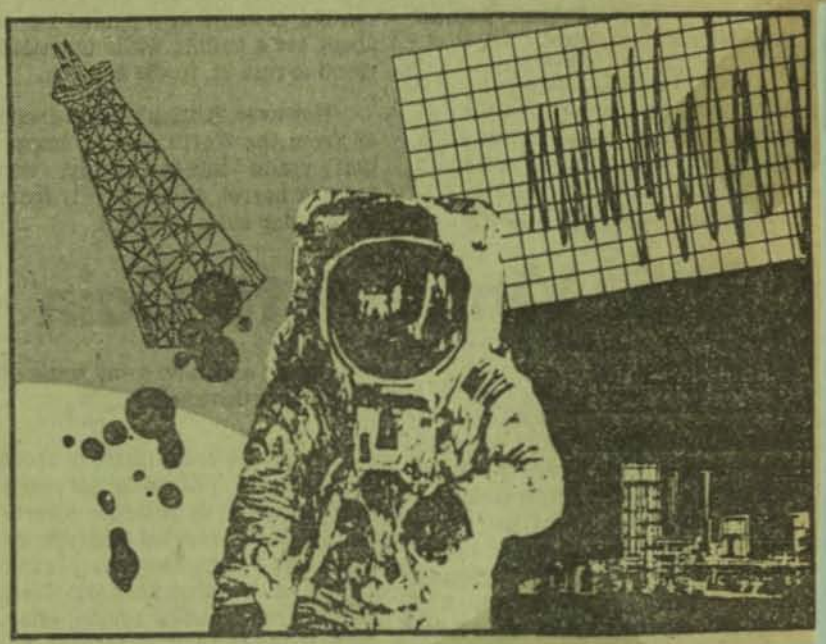
Tandem specializes in selling computers for on-line transaction processing chores such as those performed by airline reservations clerks or bank tellers.

The Check machine reportedly can handle about 10 transactions per second per central processor (Tandem's computers are modular, so you can add additional processors).

Coming next year will be the Check Plus, which Tandem hopes eventually will be able to process hundreds of transactions a second.

"Tandem has had an image of stumbling, and that is going to come to rest right now," said Frederic Cohen, analyst at L. F. Rothschild, Unterberg, Towbin. "This high-end system offers customers upward migration and the company higher profit margins."

One doubter is Omri Serlin of Itom International in Los Altos. "This represents a very significant improvement over past machines, but my assessment is it's not likely



to get Tandem a lot of new customers who may be considering DEC or Data General machines," he said.

COMPUTERWORLD p14
NEWS
APRIL 14, 1986

Tandem to announce top-of-the-line Nonstop

By Jeffry Beeler

CUPERTINO, Calif. — Tandem Computers, Inc. today will extend its Nonstop processor family with a high-end machine that reportedly provides 50% greater performance than the company's existing top-of-the-line system for a 20% to 30% higher price.

The machine marks the Nonstop series' first use of proprietary chip technology and is intended to strengthen Tandem's position relative to IBM at the high end of the on-line transaction processing sector, according to analysts.

Jeff Canin, an analyst with Hambrecht & Quist in San Francisco, said last week that Tandem's ability to increase the performance of its existing line had been in question, but the technology involved in today's release should resolve that issue.

At the CPU's heart lie 31 Motorola Semiconductor Products, Inc. A2800 ALS gate arrays, the same technology that forms the foundation for Data General Corp.'s recently announced MV/20000 superminicomputer. Roughly comparable in switching speed to emitter-coupled logic, the gate arrays reportedly reside on Motorola-produced wafers that are later shipped to Tandem for customization.

At Tandem's own in-house very large-scale integration fabrication facility, the wafers then receive their last three layers of metalization and have their gates connected, according to Omri Serlin's "FT Systems" newsletter. Serlin, an industry analyst who specializes in on-line transaction processing, heads Mountain View, Calif.-based Itom International, Inc.

Another feature that will also contribute to the product's throughput is an expected new release of Tandem's Guardian operating system, the newsletter says.

Besides using the Motorola gate arrays, the top-of-the-line Tandem unit incorporates 256K-bit random-access memory chips, the building blocks for the machine's basic memory boards, each of which stores 8M bytes.

To: Steve Rentmeesters Loc: 116 (Austin)

Forward to: Reed Rinn Loc: 116

Date:_____

From: Corporate Information Center

LEVEL 1 - 9 OF 13 STORIES

Corporate EFT Report

April 9, 1986

SECTION: IN BRIEF; Vol. 6, No. 7; Pg. 6

LENGTH: 108 words

BODY:

Bank of Tokyo has tapped Tandem Computers Inc. for computer systems that will run in the bank's New York and London offices as part of a new international banking network, Tandem officials have announced. Bank of Tokyo's new system initially will be used for wire transfer activities, interfacing with CHIPS and Fedwire, and to handle facsimile transmissions between the bank's worldwide offices, Tandem officials said. Bank of Tokyo will be running BESS (Banking Electronic Support System) software on its new Tandems. BESS is the international wire transfer package marketed by Data Architects Inc., the Waltham, Mass., software house.

LEVEL 1 - 5 OF 5 STORIES

Business Wire

April 7, 1986, Monday

DISTRIBUTION: Business Editors

LENGTH: 481 words

HEADLINE: TANDEM-COMPUTERS; (TNDM) Announces performance measurement tool

DATELINE: CUPERTINO, Calif.

BODY:

Tandem Computers Inc. (OTC:TNDM) Monday unveiled a full-function, system performance monitor that lets users collect and examine performance statistics for system software and hardware components. This includes central processing units, disk drives, remote systems, communications lines, and system or application software components. The new software, MEASURE, provides information to the system manager or system analyst that is useful in managing system growth requirements, application tuning and in balancing transaction volumes among central processing units. New features provided with MEASURE make it particularly valuable for the performance management of complex high-volume transaction processing systems. MEASURE is the replacement product for Tandem's existing performance measurement product XRAY. MEASURE has been designed for the Tandem multiprocessor environment. MEASURE has fault-tolerant features that automatically restart measurements when processors are restarted. It is highly integrated with the GUARDIAN 90 operating system so that MEASURE requires a minimum amount of system resources to run. MEASURE can make up to 64 concurrent measurements. Different users may start and stop measurements concurrently, interactively or at pre-designated times. These features now make it practical to continuously collect performance statistics for capacity planning purposes. User programs need not be modified or recompiled to be included for measurement. Further, MEASURE includes a new capability for collecting application events through user defined counters. MEASURE also features an open architecture with a programmatic interface that accesses data and control functions. This allows software subsystems to communicate directly with MEASURE. Higher level performance evaluation products such as resource accounting and capacity planning products or customized performance evaluation products can now be developed. MEASURE provides a variety of ways to examine data. Data may be obtained graphically or in report format. Data is available in real time or can be written to files for post-processing. MEASURE will be generally available in May 1986 for use on NonStop systems. The initial license fee is $1,500 with a monthly license fee of $100 per NonStop EXT system. For the NonStop II and TXP systems, the initial license fee is $3,000 per system and a $200 monthly license fee. Tandem Computers Inc. manufactures and markets computer systems and networks for on-line transaction processing. The company is headquartered at 19333 Vallco Parkway, Cupertino, Calif. 95014. The telephone number is 408/725-6000. Tandem, GUARDIAN 90, MEASURE, NonStop, NonStop EXT, NonStop II, NonStop TXP and XRAY are trademarks of Tandem Computers Inc.

CONTACT: Tandem Computers, Cupertino
Pat Becker, 408/725-6035

Computer Systems News
April 7, 1986 p60

$2.5 Million In Venture Capital

last year after successive
ays prevented it from se-
ing a foothold before IBM
d Digital Equipment Corp.
de their entries.

or Investors

he financing came from
r investors Alan F. Patri-
Associates, Smith Barney,
Hutton, Phoenix Part-
s and Orange Nassau. Mo-
, as a start-up, raised
.6 million in three rounds of financing.

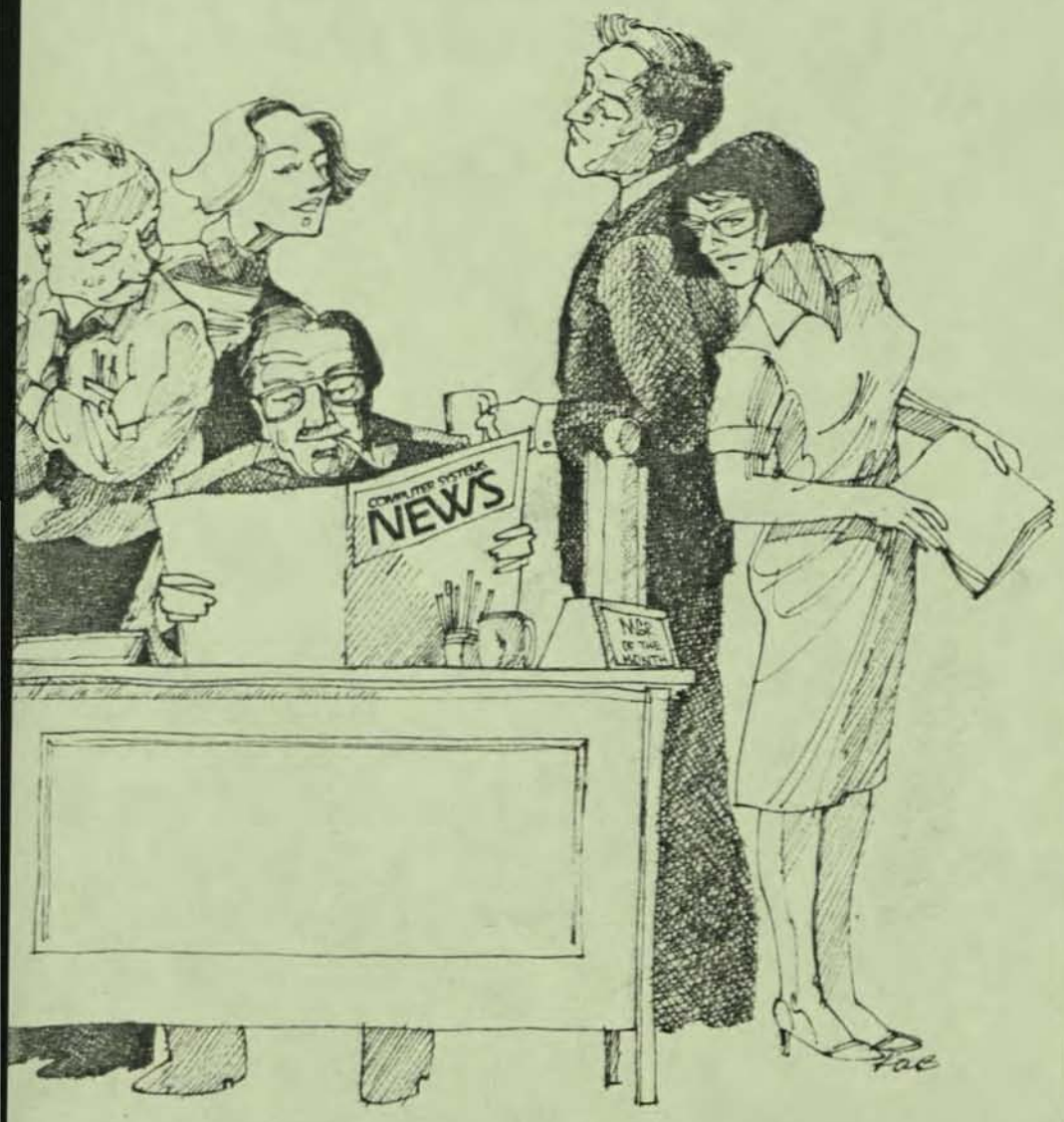
The DBMS would enable CAD/CAM users to store objects rather than as X-Y coordinates, said president Robert Berkowitz, a former consultant and co-founder of Prime Computer Inc. Like text-oriented DBMS, the graphics DBMS under development is designed to speed applications creation.

While industry sources have said General Electric Co.'s Calma Co. CAD/CAM operation is negotiating for rights to the DBMS, Berkowitz declined comment.

Nearing Deals

He said several vendors have demonstrated interest and the company is "close to signing some major league players."

The company now has about 20 employees, down from a high of 100 a year ago.



Tandem Makes Investment In Triplex Inc.

CUPERTINO, CALIF. — Tandem Computers Inc. last week continued its push into the factory automation market with an equity investment in Triplex Inc., Torrance, Calif.

Terms of the investment were not disclosed.

Privately held Triplex, founded in 1983, next month is expected to ship its first product: the T32 fault-tolerant programmable logic controller. Tandem has been granted marketing rights to the T32, which it will sell in conjunction with its NonStop fault-tolerant systems.

Tandem said the deal will allow it to provide "fault-tolerant technology from the manufacturing floor to the factory host system, greatly increasing plant productivity." The two systems will communicate via Tandem's implementation of the Manufacturing Automation Protocol (MAP), it was noted.

A Triplex spokeswoman said Texas Instruments Inc. also has marketing rights to the T32 but TI is not an investor in the company.

About $5 million has been pumped into Triplex by Tandem and six other investors, she noted.

Through its investment, Tandem has been granted one seat on Triplex's board, a Tandem spokesman said. The company plans to name operations vice-president Stephen Schmidt to fill that slot.

Average price for the T32 is $110,000, the Triplex spokeswoman said.

Oracle Posts Earnings Rise

BELMONT, CALIF. — Oracle Corp., on the heels of a successful initial public stock offering, last week reported that third-quarter net earnings were nearly double those reported in the second fiscal quarter on 45 percent higher sales.

The company said its net income rose to $2.1 million, or

've got a good thing going,

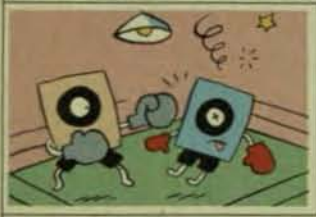
EDITED BY GORDON BOCK

EAVESDROPPING TO CATCH A THIEF

Burglary alarm systems are often like the boy who cried wolf—they tend to go off without due cause. That's because most audio security systems respond to any sound above a certain level—be it a break-in or a truck backfiring. Sonitrol Corp., of Orlando, Fla., has developed a solution: a computerized, audio-activated security alarm system that lets operators in a central station actually hear what is going on in a building. Since it came up with the idea in 1975, privately held Sonitrol has sold 80,000 systems, at $1,000 to $500,000 each. It also set up 160 franchises around the country—but never found a franchisee well-heeled enough to tackle New York City.

Now Sonitrol is hitting the Big Apple. The market looks ripe, with a 98% false-alarm rate for all burglary reports. Sonitrol hides microphones and wires them through telephone lines to a local listening station. When a noise is picked up, the location of the disturbance, plus emergency contacts and their phone numbers, automatically come up on the operator's screen. Because the police find Sonitrol more credible than other systems, the company claims, their response time averages 5½ minutes, one-third the normal time.

THE SOFTWARE DERBY: ASHTON-TATE NOSES OUT LOTUS



After holding nearly a three-year lock on the top of the charts, Lotus Development Corp. is being toppled by Ashton-Tate. On Feb. 10, a revised version of Ashton-Tate's popular data-base management program, called dBase III PLUS, grabbed the top spot on Softsel Computer Products Inc.'s Hot List, a weekly tabulation of the distributor's best-selling packages. Since then, dBase III PLUS has held on to the No. 1 position, edging out Lotus' 1-2-3 financial-analysis package, which had led since Mar. 28, 1983.

Softsel predicts that 1-2-3 may recapture the lead in a few weeks. It reasons that dBase III PLUS's position could be an aberration because of high initial orders. But if Ashton-Tate manages to keep the top spot, it could be a signal that the glory days of 1-2-3 are drawing to a close. That may be part of a bigger trend: Some market researchers expect financial-analysis programs to suffer from market saturation, while sales of file-management software could pick up.

CAN NIXDORF STAY ON COURSE AFTER ITS FOUNDER'S DEATH?

The heart attack that killed 60-year-old Heinz Nixdorf during a "Wild West" company bash at the Hanover Fair trade show on Mar. 17 stunned clients and employees. But few expect dramatic changes at Nixdorf Computer, his $1.8 billion company. Nixdorf's heirs control all the company's voting stock. And Vice-Chairman Klaus Luft, 44, will take over from Nixdorf, an engineer who was considered one of Germany's most successful entrepreneurs.

Still, Nixdorf's death creates a void in production and manufacturing, which were his personal fief. Analysts say Nixdorf knew the company had to devote more resources to automating its factories. Just two weeks before his death, it reorganized management and promoted Karl-Heinz Stiller, who used to be a director of manufacturing, to take charge of worldwide production. The question is whether Stiller or anyone else in the company knows this area as well as Nixdorf did—and can marshal the resources necessary to finish the job. Another problem is how to sustain the company's rapid growth rate. Nixdorf himself was cool to joint-venture proposals, including a recent approach by Bosch to link up in telecommunications, and a board member says the company doesn't need outside help. But industry experts think it needs a partner to improve its weak U.S. performance.

FAIL-SAFE COMPUTERS: IT'S TANDEM'S MOVE IN THE MATCH WITH IBM

Like a pair of chess players, Tandem Computers Inc. and International Business Machines Corp. have been matching wits over who could sell the best fail-safe computers—ones that keep running even when a component breaks. Tandem had the field almost to itself for 10 years until 1985, when IBM began selling machines made by Stratus Computer Inc. Tandem is expected to make its next move in mid-April with a powerful new unit—code name, appropriately, Check. Analyst John B. Jones Jr. of Montgomery Securities expects Check to be at least as powerful as the top of the IBM-Stratus line.

Check is reportedly based on complex chips similar to those in the latest superminis from Data General Corp. and Digital Equipment Corp. The technology should cut costs and boost Check's performance, contributing to an improvement in margins that has already helped push Tandem stock up 25%, to 25, in the past three months. Jones predicts that earnings will jump 40% or more in fiscal 1986, to around $50 million, on a 20% sales increase to about $750 million. But consultant Omri Serlin questions whether the new machine will solve a key problem: winning new customers. "Tandem is shipping a lot of stuff," Serlin says, but mainly to existing customers. "I don't get the sense they are capturing a lot of new accounts."

TAKING THE TANTRUMS OUT OF HOTEL CHECKOUTS

A long wait to check out of a hotel can turn the most pleasant guest into a loudmouthed grouch. So large hotels, such as Marriott Corp. and Sheraton Corp., have begun installing a new video-checkout system that might placate even the most impatient customers.

Spectradyne Inc., a maker and operator of hotel pay-TV equipment, is adding a computer that ties the hotel's billing system to the televisions in rooms. Guests can call up their bills on the screen using a keyboard attached to the TV. With a few keystrokes they can arrange to pay the bill by credit card. When they drop off their room keys at the desk, a printed receipt is waiting. About one-third of the guests at test sites pick video checkout, saving as much as 20 minutes per person at the front desk.

ILLUSTRATIONS BY MICHAEL BAHTALOO

Tandem, Others Buy 60% of Triplex

CUPERTINO, Calif. — Tandem Computers, Inc., and five investment firms have purchased for a total of $4 million a 60 per cent equity position in Triplex, a privately-held manufacturer of fault-tolerant programmable logic controllers for industrial machinery.

Tandem also received rights to remarket the Triplex controllers with its NonStop systems into the computer-integrated manufacturing (CIM) market.

A breakdown of the investments by Tandem and the other investors was not revealed and the firm did not say whether any of its representatives will take positions on the Triplex board.

The other investors include Union Venture Corp., Edelson Technical Partners, DSV Partners, Michigan Capital and SAS Associates.

The controller to be resold by Tandem, designated the T32, is just about to begin beta testing and will be shipped sometime in the second half of 1986, the Tandem spokesman said. There are working prototypes of the controllers, he added.

The T32 controller can be interfaced to function with a variety of computer systems besides those of Tandem, the spokesman said. The interface to Tandem's system will be via Tandem's implementation of the Manufacturing Automation Protocol (MAP).

Tandem has non-exclusive rights to remarket the controller with its NonStop systems into the manufacturing market. Triplex is also free to sell the controller itself or sign distribution agreements with other computer system firms that want to sell the controller, the Tandem spokeman said.

Torrance, Calif.-based Triplex was founded in 1983. Its founder and president is Jonathan A. Humphry.

This is only the second time Tandem has taken an equity position in another firm, but is part of a new strategy disclosed by Tandem to work more closely with other firms it decides are important to Tandem's strategy.

Tandem in February purchased a 19.5 per cent interest in Integrated Technology, Inc., a privately-held Plano, Tex., telecommunications company.

ELECTRONIC NEWS, MONDAY, APRIL 7, 1986 27

To: Ed Soloko Loc: 103

Date:_____

From: Corporate Information Center

million for the year ended last June 30, sells IBM, Apple and Compaq PCs. Amerisource sells, in addition to the IBM and Compaq computers, AT&T's PCs as well as small telephone systems from AT&T and TIE/Communications.

United Telecom said it was talking with Businessland about having the computer chain act as an "agent" for its US Telecom long distance unit, which is merging with GTE Sprint. Although no agreement has been reached, it is planned that Businessland stores would help market US Telecom's long distance services to small and mid-sized businesses.

Alice Brown, a vice president of Future Computing, called the deal a "strong statement of Businessland's intention to go for larger market share (through the acquisition) of distribution channels." With the IBM moratorium, she said, growth through acquisition will prevail this year, with an estimated 20 percent of all computer retail stores changing ownership.

But she cautioned that Amerisource was a "tremendous number of stores to swallow" and that Businessland "will have to pay attention to the cost in time and personnel" needed to integrate the chains.

Could Overtake Sears

According to Brown, the addition of Amerisource will place Businessland ahead of the Sears Business Systems Centers as the largest chain of company-owned computer retailers. However, both are still much smaller than ComputerLand, which has more than 800 franchised outlets.

The new Bell Atlantic stores will be the first in the company's service region and will be located in Washington, Baltimore, Philadelphia and King of Prussia, Pa., and in Rosslyn, Alexandria and Vienna, Va. Although the company would not reveal the amount it will spend to expand, an insider suggested the cost was at least $1 million a location.

They will be named Bell Atlantic Business Centers and carry the Bell System logo. Bell Atlantic said the CompuShop name could not be used because it was little known outside of the West and Southwest.

However, the stores will sell the same computer products found in CompuShop centers, including IBM, AT&T and Compaq computers, software and other peripherals, and local area networks from IBM and Novell. Bell Atlantic received IBM's authorized dealer stamp for the stores before Big Blue's moratorium was put into effect.

Bell Atlantic, in a move to tie together several of the businesses it has bought since divestiture, said the Bell Atlantic Business Centers integrate, for the first time, the resources of a number of Bell Atlantic's companies," he said.

The stores will, in fact, draw upon several of Bell Atlantic's recently acquired ventures. They will sell small telephone systems from TIE and Eagle Telephonics, provided by Bell Atlanticom, the company's unregulated equipment unit. Maintenance services will be offered through its Sorbus unit and customer financing of sales will handled by Bell Atlantic Leasing, a division of its TriContinental Leasing unit.

Also, customers will be able to sign up for Bell Atlantic Mobile System's cellular telephone service and buy the unit's Alex mobile phones.

"Our research reveals that small to mid-sized business customers in particular want a single source for computers and communications hardware, Kelly said. "They want to rely on that same source for financing options" and "the gamut of after-sales support."

There is no specific timetable for opening additional Bell Atlantic Business Centers or changing the existing CompuShop stores to fit their mold, according to John Purtell, CompuShop's executive vice president and chief operating officer.

But he said CompuShop was moving away from being an outlet mainly for computer hobbyists to offering "solution-oriented sales for small and mid-sized businesses." The stores will also provide more customer training and service and increase their direct sales efforts, he said.

GTEL has entered the electronic funds transfer business with the purchase of the assets of National Transaction Systems Inc. of El Segundo, Calif.

GTEL, a wholly owned subsidiary of General Telephone of California, will purchase and resume operation of more than 300 automated teller machines (ATMs) located in 7-Eleven convenience stores and Safeway supermarkets throughout California.

The ATM network has been inoperative since last December when NTS went out of business.

"We are presently negotiating with the retail outlets and the financial institutions, because we would like to get this network back up again real quickly," said Tom Leweck, a General Telephone of California spokesman.

Terms of the agreement were not disclosed.

Leweck said that once negotiations were settled between the commercial outlets and the financial organizations, normal service could resume within 30 to 60 days.

The ATM machines are currently leased from Diabold and Fujitsu. GTEL is attempting to purchase that hardware, Leweck said.

The Tandem computer system that serves as the hub of the network is located in El Segundo, a suburb of Los Angeles. The purchase price GTEL paid included the computer system, a software package from Applied Communications Inc., the network itself and some miscellaneous office furniture, Leweck said.

GTEL will acquire and operate the system in a joint effort with GTE-EFT Services of Carmel, Ind. GTE-EFT will bring its expertise in the ATM business to the California market, a company spokesman said.

—Robert Rhein

Tandem Buys Triplex Share

CUPERTINO, Calif.—Tandem Computers Inc., by making an equity investment last week in Triplex, a manufacturer of programmable logic controllers (PLCs), demonstrated its commitment to computer-integrated manufacturing (CIM).

Terms of the agreement were not divulged. A Tandem spokesman would say only that the investment in Triplex represented less than a .50 per cent share of the privately held company.

Tandem will market the Triplex fault-tolerant PLCs with its NonStop processors. The combination will be offered as a fault-tolerant processing solution for the factory automation marketplace.

Communication between the Tandem and Triplex systems will be made possible through Tandem's implementation of the Manufacturing Automation Protocol (MAP).

Programmable logic controllers are used for real-time monitoring and control of motors, robots, sensors and other devices. The Triplex T32, which will be available in the second half of 1986, will make it possible for Tandem to offer fault-tolerant processing "from the PLC level up to the factory host system level."

MIS Week 4/7/86 p37

buted $500,000 to JSE's
its first full year of
uld experience 50 per-
1986, Yamada said.
dy SE currently has 46
king for 20 companies.
Toshiba and Time-

naging director and de
Lady SE, said she for-
because she was con-
's computer industry
and that it offered ideal
or women.

panies based in Tokyo's fashion district, was added to his company to help more women find work in the software industry. "There aren't many women working as programmers," he said.

A spokesman for the Japan Information Service Industry Association (JISIA), a confederation of 383 software companies with 90,000 employees, or about 70 percent of all software workers in Japan, said that women account for about 20 percent of workers in the industry, including keypunch operators.

Despite the achievements of Japanese women in the computing industry, Lady SE and other computer service companies that employ women face obstacles in existing and pending Japanese law.

At NEC, Akiyama and other women employees are prohibited from working at night, due to a company rule based on Japan's protectionist employment law.

Professional Service and Temporary Service Room.

Suehiro said that current practices do not clearly define which company is responsible for the seconded workers' welfare.

The new law would affect a significant portion of Japan's software labor force. The JISIA spokesman said that about 10 percent of member companies' 90,000 workers might be classified as seconded workers. He added that the percentage could be higher among companeis that are not members.

Yamada said she was confident that Lady SE would be able to clear the new legislative hurdle somehow, although she had no specific plans.

She said that she began Lady SE to offer women opportunities to work and that "I certainly don't want them to work in bad conditions."

'Suspenders its Of Lotus'

pple
they
that

h the
ford,
en he
the
"The
cut
ng to

re-
rf to
lucts

er at
heir
ness
aid.
said

get
rom
nan,
the
ome
rod-
ar.

ts
itch
got
the
Vell,
new
ucts
out

first
sing
ists
d to

be released this quarter, he said.

Sherlund estimated that Jazz sales only accounted for 6 percent of Lotus's revenues in 1985. He said he felt that percentage will drop to only 2 percent this year.

He estimated the company sold 50,000 packages of Jazz last year with sales now at about 3,000 to 4,000 copies a quarter.

Regarding the drop in Jazz's price, the analyst said, " It looks like Jazz was sitting up there in left field at a very high price, compared to what everything else was selling for."

He said Lotus ran the risk of losing sales by retailers steering cutomers to Excel because of the large price difference. "It was just out of line and they had to bring it down," he added.

New 1-2-3 For Scientists

Sherlund said Lotus will be coming out with a new version of 1-2-3 which will be tailored to scientists and engineers. The products will have some equation-solving capability. It will also be a data-acquisition and analysis package, he said.

He added that while Lotus is ruling the spreadsheet software market, it cannot presently control the word processing or database markets with new products.

"They can't dominate word processing and database at this point because they are already companies that are well-entrenched in those markets," he said

The analyst said Lotus will enter such markets only in 1987, when the new version of an operating system for personal computers is expected out. The operating system will enable memory to be expanded beyond 640 Kbytes.

Such technology, he said, will allow companies like Lotus to leapfrog vendors that are established in such markets. "A lot of companies are looking at that as a real technological window of opportunity in '87 to leapfrog existing vendors in the market. But until it's available, it's very difficult to leapfrog anybody that's well-entrenched in the market, because you're working with the same constraints that they are, which is 640 Kbytes."

Sherlund said he expects 1-2-3 to continue to provide Lotus with most of its revenue. He projected that the spreadsheet package and related products will account for roughly 65 percent of its revenues this year.

He estimated that Symphony would contribute 15 percent while scientific and engineering products will bring 10 to 15 percent.

In announcing the price cut, Lotus said it has begun shipping an enhanced version of Jazz.

The enhanced version, Jazz 1A, Lotus said, is designed to take advantage of the Macintosh Plus computer.

Morton Rosenthal, chairman and chief executive officer for Corporate Software Inc. of Canton, Mass., said he did not feel the price cut would help Jazz. "The product is not a great product—combined with the fact that the Macintosh is not a great market. So, I don't think that the price is really the key factor in this instance."

Tandem Orders WIPS Jr. For GE

CUPERTINO, Calif.—Tandem Computers Inc. has commissioned Datacopy Corp. to modify Datacopy's Word Image Processing System (WIPS) software for use in a General Electric assembly plant.

"WIPS Jr.," as the GE software is called, will run on the Tandem TXP system and 40 Tandem Dynamite workstations at General Electric's Aircraft Engine Business Group in a prototype program.

General Electric will purchase five of Datacopy's image scanners to use in the assembly-floor control system. The value of the agreement was not disclosed.

James McNaul, Datacopy vice president of strategic planning, explained how the custom jet aircraft assembly plant will use the Datacopy scanners and software, combined with Tandem's hardware, to control shop floor activities.

"Datacopy image scanners will be used with Tandem's mainframe to record and store information on assembly processes," he said.

"This information will be downloaded onto workstations on the assembly floor so that, at the start of the day, plant employees can see what changes have been made to work instructions. Updates to instructions can also be made throughout the day."

McNaul said GE would benefit from the Datacopy document-scanning hardware and software because Datacopy's system will be used at the turbine manufacturing plant."

MIS Week · p34

COMPUTING TODAY!
Monday April 7, 1986

DATACOPY IN AGREEMENT WITH TANDEM COMPUTERS

Datacopy Corp. (Mountain View, CA) has signed an agreement with Tandem Computers Inc. for a custom version of their Word Image Processing System (WIPS) software. The software will be used as part of Tandem's support for General Electric's AEBG Division Graphic Display System - Production Sub-system (GDS). The GDS is being developed as part of GE's Assembly Control System to provide manufacturing assembly information on the production floor.

LEVEL 1 - 1 OF 4 STORIES

April 1, 1986, Tuesday

DISTRIBUTION: Business Editors

LENGTH: 434 words

HEADLINE: TANDEM-COMPUTERS; (TNDM) First Interstate Bank of Arizona to use Tandem system for point-of-sale network

DATELINE: CUPERTINO, Calif.

BODY:

Tandem Computers Inc. (OTC:TNDM) announced Tuesday that First Interstate Services Co. (FISC), headquartered in Torrance, Calif., will use a Tandem NonStop TXP computer system to support point-of-sale (POS) services for Phoenix-based First Interstate Bank of Arizona. FISC is a subsidiary of First Interstate Bancorp, a Los Angeles-based multistate bank holding company with assets over $49 billion. FISC provides data processing services to member banks, franchise banks, and other clients of First Interstate Bancorp. The Tandem system will handle POS transactions initiated by consumers using debit and credit cards at merchant locations and route them to financial institutions for authorization. The system will connect to POS terminals, controllers, and systems used by retail merchants as well as to FISC's Electronic Banking Center in El Segundo, Calif., and to other Arizona financial institutions. The BASE24 POS software package from Applied Communications Inc. (ACI), of Omaha, Neb., will run on the Tandem system. BASE24 POS is an integrated on-line electronic funds transfer system designed to provide continuous fail-safe operation. The new Tandem/ACI system is in addition to one already used by FISC to support shared ATM and POS network services in California. George Ellenburg, senior vice president of FISC, said ''The Tandem/ACI solution was chosen because of its ease of installation, easy connection to our corporate system, and proven capability, as well as its favorable price/performance ratio.'' Lawrence W. McGraw, Tandem vice president of U.S. sales operations, stated, ''This is a particularly satisfying win for Tandem because the decision was made after an exhaustive price/performance evaluation between Tandem, Stratus and IBM System/88. It again confirms our strong leadership position in the point-of-sale marketplace.'' Applied Communications Inc. develops computer software for electronic funds transfer (EFT) systems. ACI designs, markets and maintains a comprehensive family of EFT software products under the tradename of BASE24. ACI is located at 330 South 108th Ave., Omaha, Neb. 68154. Phone is 402/390-7600.

Note to editors: Tandem and NonStop TXP are trademarks of Tandem Computers Inc. BASE24 POS is a registered trademark of Applied Communications Inc.

CONTACT: Tandem Computers Inc., Cupertino
Tom Waldrop, 408/725-7191
or
First Interstate Services Co., Torrance
Jan Beck, 213/543-6611

common shares, $400,000 in cash and $1.7 million worth of notes that can be converted into Reid-Ashman stock. Reid-Ashman's stock closed up 50 cents at $4 a share Monday.

JUSTICE OPPOSES MERGER: The Department of Justice voiced its total opposition to the proposed merger of Northwest and Republic airlines on grounds that it would suppress competition. If approved by the government and shareholders, the merger would create the nation's third-largest carrier, behind United and American airlines. The Department of Transportation has final authority to accept or reject any airline mergers.

EASTERN CONTRACT APPROVED: Eastern Airlines' flight attendants approved a proposed labor agreement Monday, but the air carrier and the union still disagreed on which version of the contract is valid. Eastern's creditors extended the terms of its loan and lease agreements, taking the carrier out of technical default.

PACTEL TO SPLIT STOCK: Pacific Telesis Group, the San Francisco-based holding company for Pacific Bell, said it will split its common stock two-for-one and increase its quarterly dividend. The split will take effect June 9. PacTel, which currently has 107.4 million shares outstanding, closed Monday at $94.50, unchanged. The company boosted its dividend by 6 percent to $1.52 a share from $1.43 a share, payable May 1 to holders of record on April 8.

IN BRIEF: A lawsuit alleging that American Educational Computer Inc. of Palo Alto and one of its major stockholders, The Economy Co., violated securities laws has been dropped by the New York City brokerage firm of Rooney, Pace Inc. The Economy Co. has agreed to buy up to 400,000 shares of American Educational stock from Rooney, Pace for 62.5 cents a share until Aug. 31. ■ Television equipment maker Ampex Corp. of Redwood City agreed in principle to buy a 20 percent stake in Cubicomp Corp., a Berkeley computer graphics company, for an undisclosed amount. The deal gives Ampex the right to make and market Cubicomp's PictureMaker three-dimensional graphics animation products for three years. ■ Tandem Computers Inc. of Cupertino has made an equity investment in Triplex, a privately-held Torrance company that makes fault-tolerant programmable logic controllers, for an undisclosed amount. ■ Coast R.V. Inc. of San Jose filed a registration statement to sell 900,000 shares of common stock in a secondary offering. Of the total, 500,000 would be sold by the company and 400,000 would be sold by existing shareholders. A date wasn't announced.

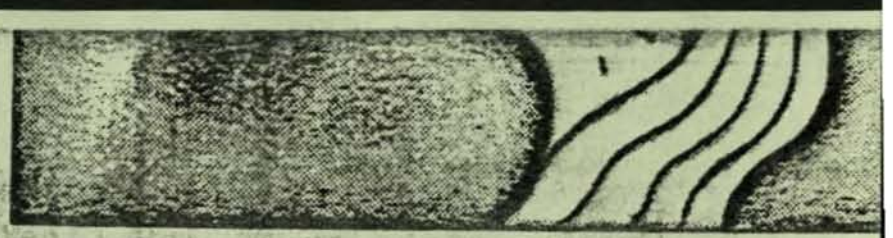
From Mercury News Staff and Wire Reports

MoneyList

STATES THAT SPEND THE LEAST PER RESIDENT

State	Expenditures per Resident
1. Florida	$ 940
2. Tennessee	1,024
3. Missouri	1,051
4. Texas	1,056
5. Arkansas	1,122
National average:	1,492

SOURCE: U.S. Census Bureau



More women choose self- as their corporate advanc

By Sara Solovitch
Knight-Ridder News Service

PHILADELPHIA — There is growing evidence of an exodus of women from the corporate world. While some are dropping out primarily to spend more time at home, a sizable number are leaving to go into business for themselves.

The Small Business Administration (SBA) says the number of self-employed women in the United States grew by 74 percent between 1974 and 1984, from 1.5 million to 2.6 million. In the same decade, the number of small businesses started by men increased by 24 percent. Women represent the fastest-growing segment of the business community, according to the SBA, and they come with an average of seven years' managerial experience elsewhere. They are the new entrepreneurs.

An inhospitable corporate climat is the reason most often cited b women who have opted out. Sinc women began entering the busine world in large numbers in the 1970 they have made giant strides in lowe and middle management. But on the climb up the corporate ladder, the have bumped their heads against th "glass ceiling" — the invisible an nearly impenetrable barrier to th most senior-level positions.

"Five years ago I began to notice pattern. A lot of people I talked to corporations were leaving the corp rations, and they were all setting u their own small businesses," said Bo nie Kasten, who, in a brief capacity manager of human-resources develo ment systems at the Sun Co., was th most senior woman until her depa

Oil prices drop to $10

Mercury News Wire Services

Oil traded on open markets plunged to the $10-a-barrel range Monday after Saudi Arabia's oil minister said his kingdom does not plan to reduce the surplus production that triggered the oil price collapse.

Saudi Oil Minister Sheikh Ahmed Zaki Yamani, in an interview with the Middle East Economic Survey, said his nation has no intention of lowering current oil output from its quota of 4.4 million barrels a day, set by the Organization of Petroleum Exporting Countries (OPEC).

John Herrington ... *'Near bottom'*

"Our policy is not to cut production from the present level," Yamani told the Nicosia-based oil journal, which has close ties to Saudi Arabia.

In Washington, Energy Secretary John Herrington said, "I think we are getting near the bottom" of the oil price slide.

"I would be surprised to see it fall much further," he said. "Prices are going to go back up, there's no question, because there will be less people producing."

Officials at the Department of Energy said Herrington's remarks were intended as a signal to the Saudis that the time has come to stabilize oil prices, which have dropped more than 60 percent since December. The precipi with the U.S. oil indus world oil price, largel OPEC members.

For some domestic p sidered the break-even have predicted that pric a barrel the next few we and non-OPEC oil pro production limits.

"It's got to be apparen the Arabs that their pro lems in our producer reporters in an informa

On the New York Texas intermediate — for immediate delivery s low of $10.42 a barrel. T exchange in March 1983

Domestic oil prices ha since 1978, before the Ir for the near tripling of

Oil prices have plum from an average $28 a Organization of Petrole by Saudi Arabia, floode market in a bid to force prices by restraining the

COMPUTERIZED MANUFACTURING
April 1986

NEW ARC MULTIPLE-FILE DATABASE SOFTWARE RELEASED FOR SPSS USERS ON TANDEM

MULTIFILE
Category: Data transfer
American Research Corporation
2885 East Aurora Avenue, Suite 20
Boulder, Colorado 80303
303/443-2620
Contact: Aaron Harber
Date product introduced: October 1985

Product Description & Applications:
MULTIFILE (for MULTIple FILE interface program), specifically designed for users of the SPSS Information Analysis System on Tandem Computers Inc. equipment, is a software link between two or more Tandem files which allows the user to create a new data file by drawing data selected by the user from different data files. It can be used in an interactive, real-time or batch environment and allows data capture across different volumes, discs, systems and networks. The created data file can be analyzed on SPSS and any other analysis tool available on Tandem systems.
Technical Specifications:
MULTIFILE allows the user to build a new data file from up to 64 different and separate data files.
Suggested list price: $4,500 for Tandem SPSS sites
$7,500 for non-Tandem SPSS sites

Delivery time: n/s
Warranty: n/s

PERSONAL COMPUTERS TODAY
April 1986

TANDEM PLEDGES SUPPORT FOR BIG BLUE'S SNA,

Major computer maker Tandem Computers Inc. has stepped closer to easing communications between its systems and those of IBM by announcing a product to support the LU 6.2 protocol in IBM's Systems Network Architecture (SNA) at Interface '86 in Atlanta last month. Called SNA/APC, Tandem's new product provides access to IBM's LU 6.2 protocols, which are "quickly becoming a standard" to permit advanced program-to-program communications between various devices in an SNA environment, IBM's umbrella architecture through which all IBM devices talk to each other, a Tandem spokesman told our sister publication DATA CHANNELS.

SNAX/APC allows Tandem users to communicate with IBM applications by using a programmer interface tailored for program development in a distributed environment, said Tandem.

ABA Banking Journal

April, 1986

SECTION: NEW PRODUCTS AND SERVICES; Pg. 88

LENGTH: 133 words

HEADLINE: Disc and tape storage improve volume work

BODY:

Tandem Computers has developed high-end disc and tape storage subsystems that improve the performance of the company's NonStop mainframe computer system for high-volume transaction processing. New products include a disc storage facility, a tape subsystem, and VLSI-based controllers that incorporate gate array technology.

The XL8 disc storage facility features eight 520 megabyte drives that use parallel data access architecture with thinfilm Winchester technology. The XL8 gives users rapid access to up to 4.2 gigabytes -- i.e., 4.2 billion bytes -- of data.

The 5130/31 tape subsystem enables users to archive data from discs more quickly and efficiently. The tape speed is 200 inches per second.

Write: Tandem Computers, Inc., 19333 Vallco Parkway, Cupertino, Calif. 95014, or

GRAPHIC: Picture, no caption

nice tee," Mr. Blackwell says. As for the celebrities, "they got a six-week holiday where their only obligation was to have a good time."

Celebrity Service's star-tracking activ-

Tandem Computers Expected to Introduce Transaction Processor

By a WALL STREET JOURNAL Staff Reporter

CUPERTINO, Calif. — Tandem Computers Inc. on Monday is expected to unveil a computer which analysts say may challenge International Business Machines Corp.'s dominance in the multibillion-dollar transaction-processing market.

The new computer, nicknamed "Check," is expected to operate 50% faster and cost about 25% more than Tandem's current top machine.

On-line transaction processing refers to what banks, airlines and other large data users do in their daily shuffling of customer information. Currently, IBM holds more than two-thirds of this market, according to Dataquest Inc., a San Jose, Calif., market researcher, with Tandem owning just 6%. But analysts say Tandem's new, speedier computer, its first to use a chip of the company's own design, may attract new business in the mid-end and high-end mainframe market, a segment Tandem has yet to penetrate.

"It's one more step for Tandem in the direction of being able to compete with IBM in the very large on-line transaction-processing market," said Jeffry Canin of Hambrecht & Quist Inc., San Francisco.

Unit of 2 Stock Exchanges To Stay in New York City

By a WALL STREET JOURNAL Staff Reporter

NEW YORK—Joining the exodus of companies from Manhattan's expensive office space, Securities Industry Automation Corp. said it will relocate its headquarters and 800 employees to the borough of Brooklyn.

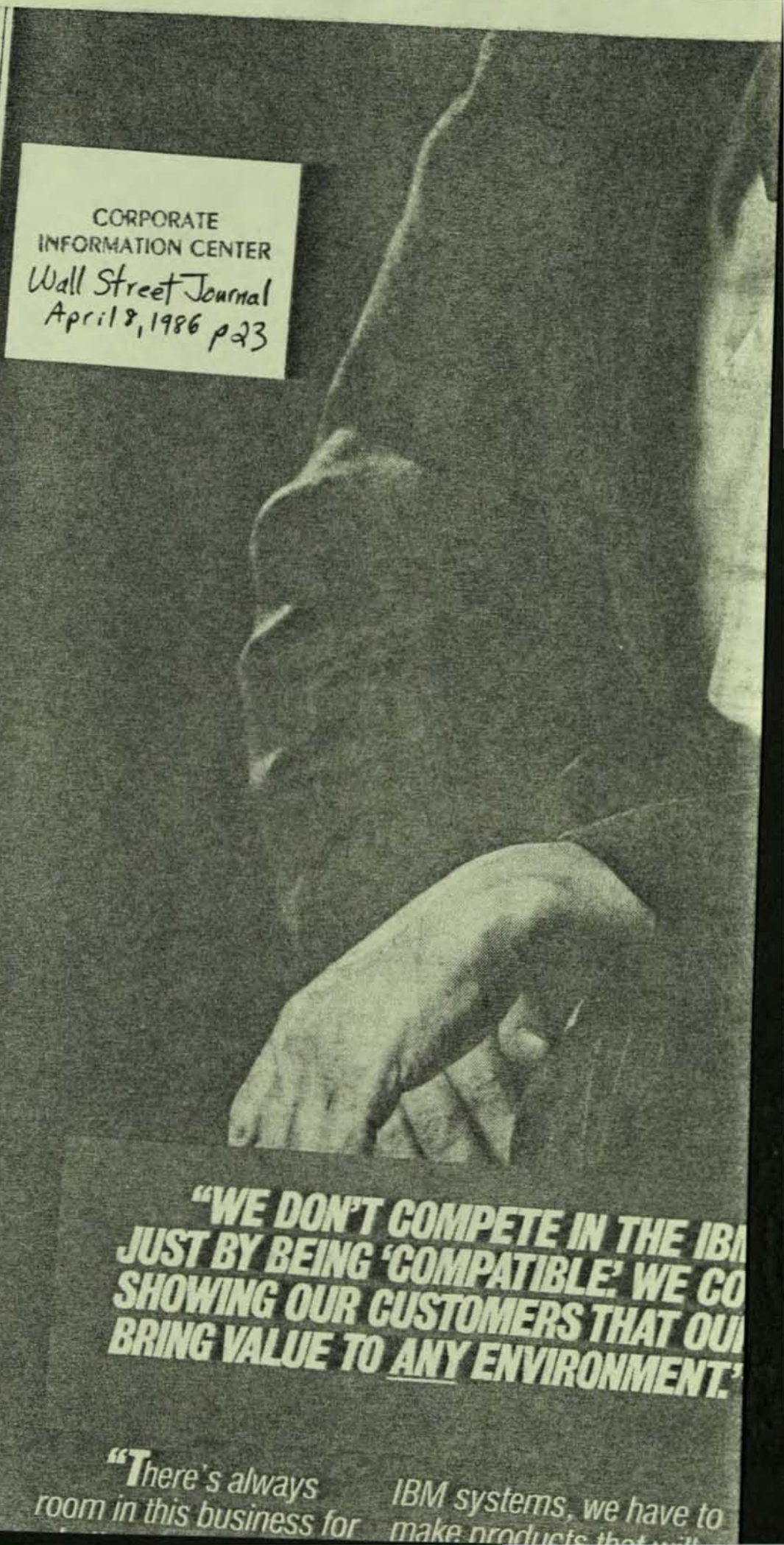
SIAC, a jointly owned unit of the New York and American stock exchanges, said it plans to move to an $88 million building that will be part of Metrotech, a $770 million academic and commercial office center. Construction on the new building will begin in 1987.

The move is a coup for New York City, which has been trying to keep companies looking for lower-cost locations within its bounds, rather than watching them flee to New Jersey and Connecticut. In June, Morgan Stanley & Co. said it would move about 500 employees in its data and operations departments to a $100 million building in the complex.

"SIAC's decision is more good news for Brooklyn and New York because it signals the willingness of the city's financial institutions to move across the East River rather than the Hudson River," said Mayor Edward I. Koch.

Metrotech tenants will receive tax breaks and lower energy costs as an enticement. Forest City Enterprises Inc., a Cleveland developer, is building the complex.

According to New York City officials, the SIAC move will generate $61 million in lease payments and tax revenue over



Mergers, Acquisitions & Alliances

Tab Products Co., a Palo Alto-based manufacturer and marketer of office systems and computer products, signed a letter of intent with **Acctex Information Systems** to buy a 20 percent interest in the firm. The agreement also grants Tab the option to acquire 100 percent of Acctex's common stock. Acctex, a privately held firm based in San Francisco, develops computer software indexing and filing systems.

Wilkinson/Kavish Inc. has combined its advertising, public relations and graphic design services with **Exdyn Corp.'s** exhibit design and construction operations. Wilkinson/Kavish, based in Santa Clara, specializes in advertising, design and public relations, and Exdyn is a trade show coordinator.

Entertainment software publishers, **Accolade Inc.** and **Artech Digital Productions** formed a production development alliance. Accolade, which designs an publishes entertainment software for Commodore, Apple, Atari and IBM personal computers, will provide design expertise, marketing and distribution for Artech products. Artech, which was formed last November, will offer design capabilites.

Adia Services Inc., a national supplier of temporary help services, has agreed to purchase **Accountants On Call Inc.** Accountants On Call, based in Paramus, N.J., finds permanent and temporary jobs for accounting personnel. Paramus operates seven offices on the east coast and recorded revenues of about $6 million last year. The addition will boost Adia's accounting offices to 15. Adia reported revenues of $216 million last year and operates 199 offices throughout the country.

Commercial Scientific Corp., a developer of office publishing and electronic library systems, acquired **LaserWrite**, a laser printing service. Based in Palo Alto, LaserWrite will enable Commercial Scientific to expand a product called TGV Vitesse, which forms the core of the firm's office publishing and electronic library designs.

Intel Corp. has agreed to develop a speech workstation product line for industrial applica-

Semiconductor Test Solutions in Santa Clara.

Hayes/Rothwell Advertising and Public Relations in Santa Clara has signed **Fortune Systems Corp.** in Belmont.

McDonough Communications Inc. an advertising and public relations company in Mountain View, has signed **Racore Computer Products Inc.** of Scotts Valley.

New Products

Equatorial Communications Co. of Mountain View has introduced its Private Newswire message generation and delivery system. With the product, any business can originate text and graphics from an IBM personal computer or compatible machine and distribute it to mulitple sites instantly, simultaneously, and inexpensively via satellite, the company said.

Cupertino-based **Tandem Computers Inc.** has announced a new data communications package called SNAX/XF. The new software package adds communications network management capabilities and network services to Tandem's existing SNAX product, introduced in 1982.

Nanometrics Inc. has introduced a general purpose scanning electron microscope for nondestructive measurement and viewing at low accelerating voltages. Called CWIKSCAN/GP, the system is for general analytical and research uses, as well as for process and defect analysis of semiconductor wafers.

Borland International Inc. announced a new Corporate Standardization Program for customers who wish to make volume purchases of their software products. The new program is the result of Scotts Valley-based Borland's year-long survey of Fortune 1,000 companies and their purchasing preferences and procedures. The program partially replaces the company's site license program, introduced in September 1985.

Borland also announced a new language development system called Turbo Prolog. The program represents the company's entrance into the world of artificial intelligence, the company said.

Sunnyvale-based **Cermetek Microelectronics Inc.** has upgraded its 'AppleMate' 1200 three new additions to its monolithic microwave integrated circuits converter series. The subsystem-level integrated circuits are more dense and 10 to 20 times smaller than subsystems based on discrete-level technology, the company said.

San Jose-based **Valid Logic Systems Inc.** recently announced Networked Realchip, a new member of Valid's Realproducts family of application-specific hardware. Based on Valid's Realchip hardware modeling technology, Networked Realchip provides designers who are validating their electronic designs with concurrent, multi-user access to models of Valid's devices, the company said.

Sun Microsystems Inc. of Mountain View has added Sun-3/160G grayscale workstation to its Sun-3 product family. The new workstation provides a cost-effective solution for applications that require high graphic clarity but not full color, such as computer-aided publishing, contour mapping, document examination and image analysis, the company said.

Profit & Loss

Engineered Systems & Development Corp. of San Jose recently reported revised profits for its 1985 fiscal year and its 1985 fourth quarter, both ended Dec. 31, due to a customer filing for Chapter 11 bankruptcy.

During the 1985 fiscal year, revised profits were $1.1 million, or 58 cents a share, down from a profit of $2.6 million, or $1.53 a share, for the 1984 fiscal year. The previous profits for 1985 had been $1.2 million, or 66 cents a share. Revised sales in 1985 were $39.9 million, up from $28.8 million in 1984. Initially, 1985 sales were reported at $40.4 million.

During the fourth quarter of 1985, the revised earning was $728,000, or 39 cents a share, down from a profit of $845,000, or 45 cents a share, for the previous fourth quarter. The figure initially reported was $586,000, or 31 cents a share.

The firm produces automation equipment to make floppy diskettes.

Voicemail International Inc. of Cupertino had a loss of $334,000, or 11 cents a share, for the 1985 fiscal year ended Dec. 31, up from a loss of $1.5 million, or 58 cents a share, for the 1985 fiscal year. Sales in 1985 were $5.6 million, up from $2.4 million for 1984.

In the fourth quarter of 1985, the company lost $434,000, or 14 cents a share, down from a

Apr 7, 1986 p45
SJ Business Journal

BusinessMond

Computers

Tandem computer could put dent in titanic IBM

San Jose Mercury News (morning)
April 7, 1986 p 17D

By Mary A.C. Fallon
Mercury News Business Writer

Tandem Computers Inc.'s newest computer, to be unveiled next Monday, will give the company its most powerful ammunition yet in its battle against International Business Machines Corp.

The new machine — which can handle airline reservations, automatic banking and other data shuffling vital in everyday commerce — is Tandem's latest product for the multibillion on-line transaction processing market.

IBM owned more than two-thirds of the $10.3 billion market in 1984, far more than Tandem's 6 percent share, according to Dataquest Inc., a San Jose market researcher. But the new chip technology inside Tandem's latest machine is expected to give Tandem its first good chance to make a big dent in IBM's market lead, analysts say.

Tandem has been criticized for not moving fast enough into new technology. Capitalizing on that weakness, new companies have invaded Tandem's special niche in fault-tolerant computers.

Gerald L. Peterson, Tandem's vice president of marketing and sales, hopes that unveiling a large computer powered by a home-grown chip will help Tandem "put a cap" on the argument that it is behind the times.

Replacing off-the-shelf chips with proprietary chip technology is critical to Tandem's future, the company says.

With relatively little fanfare, Tandem for two years has been making chips of its own design in small, sterilized rooms in Cupertino. Later this year, the new chips will play a starring role in the biggest rollout of new products in Tandem's 12-year history.

Tandem has spent more than $10 million developing the chips, intent on making the most of its computers' two prime features — built-in redundancy, which is commonly called fault-tolerance, and a modular architecture, which allows power to double by putting another processor inside the computer.

Peterson claims the new chip will give Tandem's newest computer the speed to outdistance all IBM mainframes in transactions per second — the name of the game in the fast-growing market for on-line transaction processing.

"This will be the first major system that totally uses our new technology," said Tandem's Peterson. "That puts us up with the big boys in terms of computer design."

The higher power should make Tandem more competitive against IBM's mainframes for on-line transaction processing, analysts say. They expect the computer, code-named "Check," to operate 50 percent faster and cost 20 to 30 percent more than Tandem's current top machine, the 2-year-old TXP, which costs $293,775.

As far back as 1979, Tandem had planned to build a small semiconductor facility, but it wasn't until 1984 that the 70-person engineering group began fabricating its first chips, said Al McBride, Tandem's director of VLSI engineering.

Tandem buys partially finished semiconductor wafers from several major chip makers, including Motorola Corp., and completes them with a custom design. Tandem believes that designing its own chips can shave six months off product development time.

"The whole purpose of our own wafer fabrication facility was to accelerate our product development schedule," McBride said.

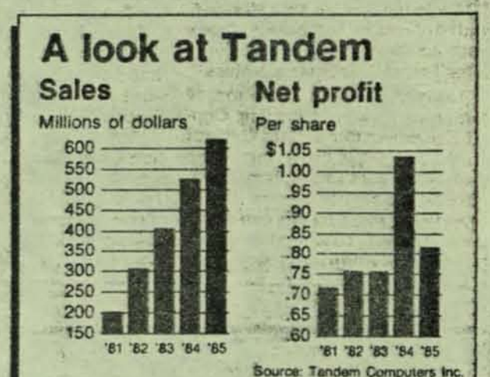
Tandem will limit its chip work to design and testing, and leave volume production to major chip makers, he said.

Tandem needs a faster, customized chip to stay on top of the fault-tolerant market it created and still dominates. For many years, Tandem alone offered fault-tolerance as a main feature. Not only do bankers, airlines and retailers demand speed in transaction processing, they can't afford to be paralyzed by a computer that breaks down when a minor circuit fails.

"At the high-end of the market, companies are willing to pay for fault-tolerance because the cost of down time is so much higher than the cost of fault-tol-

See TANDEM, Page 18D

A look at Tandem



Mercury News

Computers

Tandem squares off against IBM

TANDEM, from Page 17D

erance," said Gwen Petersen, a Dataquest analyst.

Sales of on-line transaction processing systems are expected to grow to $35 billion by 1989, with fault-tolerant computers taking a $2 billion share.

Last year, IBM bowed to the popularity of fault-tolerant machines. Under its own name, IBM sold the System 88, a low-end, fault-tolerant computer from start-up company Stratus Computer Inc. of Marlborough, Mass.

Analysts believe that major computer makers, including Digital Equipment Corp., Data General Corp. and NCR, will introduce computers with fault-tolerant features in the next few years.

Analysts say Tandem can make inroads into IBM's stronghold because computers designed strictly for on-line transaction processing are better suited for the job than IBM's standard mainframes.

"The needs of the market are being satisfied in a force-fit sort of way with mainframes because they are built to do anything that comes along — and does none of them very well," Dataquest's Petersen said.

New technology isn't the cure-all for Tandem's problems.

The company's profits have been "stuck in a rut" since 1981 and the firm has been "overly optimistic" when talking to Wall Street, said Tandem's Peterson.

Part of the problem, said Tandem Chief Executive James Treybig, was that "we grew so fast that we let some quality fall off on major software, subsystem and disk products."

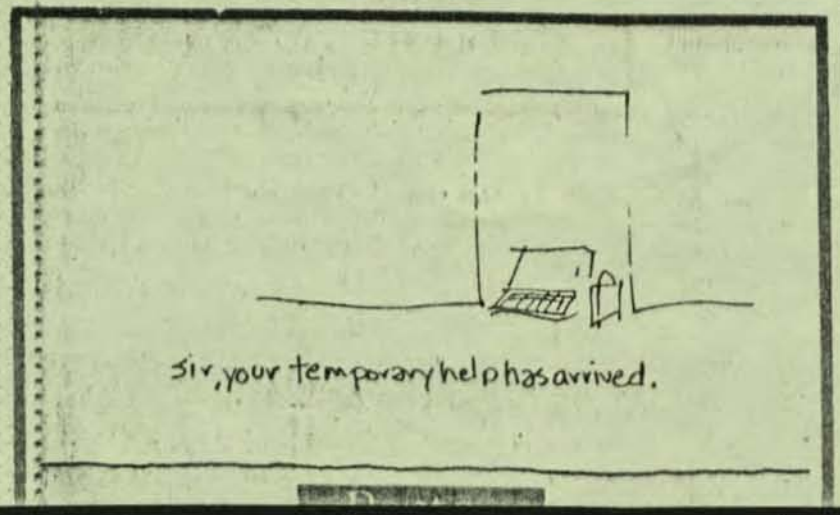
Last year, Tandem bolstered its line with a low-end computer, cut expenses and reorganized its sales force.

"We started this year with a conservative outlook," said Peterson. "Even if revenues only grow by 12 percent, we have an expense budget set so profits increase by 50 percent."

Analysts are divided about Tandem's prospects in the short term.

"The internal dynamics for improved profitability at Tandem are in place," said Carol E. Muratore of Prudential-Bache Securities. "After three years of repositioning the company for a more competitive environment, Tandem is about to emerge in a strong product position and with a more effective sales strategy."

Unlike Muratore, Stephen K. Smith of Paine Webber isn't recommending Tandem stock. He says he is concerned that Tandem will repeat its performance with the TXP, which was priced low enough to cut into sales of Tandem's other computers. "If Tandem prices its new machine more aggressively than the current family of machines, that will be a negative impact on the business," Smith said.



A McGRAW-HILL PUBLICATION

Electronics

THE WORLDWIDE TECHNOLOGY WEEKLY

APRIL 14, 1986

TANDEM MAKES A GOOD THING BETTER

TANDEM MAKES A GOOD THING BETTER

ITS FIRST MAINFRAME RUNS TWICE AS FAST

In the competitive world of computer technology, a company is only as good as its latest design. And on that benchmark, Tandem Computers Inc. gets high marks with its first mainframe-class machine, the NonStop VLX. The new model not only lops 30% off the per-transaction cost of the two-year-old NonStop TXP superminicomputer, but it also rests on a hardware base that is three times more reliable, the company says (see related story, p. 39).

Designed for heavy-duty on-line transaction processing in such areas as airline reservations, banking, computer-integrated manufacturing, and telecommunications switching, the NonStop VLX executes 12 million to 48 million instructions per second. The Cupertino, Calif., company says that's roughly twice the performance of the TXP for about the same price. It attributes the higher price/performance ratio and reliability primarily to the extensive use of the MCA2800ALS, an emitter-coupled-logic gate array that serves as a building block in critical parts of the central processing unit (see "Easy-design features make macrocell a hit," p. 35). Other performance hikes come from streamlined instruction execution, reorganized cache memory, and a faster interprocessor bus.

Although speed was the paramount concern in designing the VLX, its developers also concentrated on fault tolerance and compatibility with the previous-generation system. The NonStop configuration of both the TXP and VLX provides dual paths to every element in the system. If one path fails, a second is available to make the connection. If one processor fails, another assumes its workload. Although this duplication slows throughput to a small extent, it guarantees that failures will not affect system operation.

When all units are functioning, they carry their full share of the processing load—there are no idle spares. This fault-tolerant architecture, which remains unchanged on the new VLX system, can be described as a loosely coupled parallel-processing system with distributed, non-shared memory.

One benefit of the distributed processing architecture is that it does not require one large central processor running at the highest possible clock speed. "Our design was at a point where we needed a faster central processor—but not the fastest possible," says Al McBride, Tandem's technology director. "We could get higher total system performance from the parallelism of the system architecture."

The parallel architecture allows Tandem to be more conservative in processor design than manufacturers of high-speed CPUs. For example, the company limited the number of circuits implemented on a gate array to 2,000 out of the 2,800 available gates. This meant that the macrocell arrays were easier to design and yielded a more reliable system.

The minimum VLX system consists of four CPUs, but the architecture can accommodate as many as 16. Thanks to the macrocell technology it developed jointly with Motorola Inc., Tandem was able to implement a two-board processor that executes 3 mips. By comparison, the TXP's 1.5-mips CPU fit on four printed-circuit boards using medium-scale-integration TTL chips.

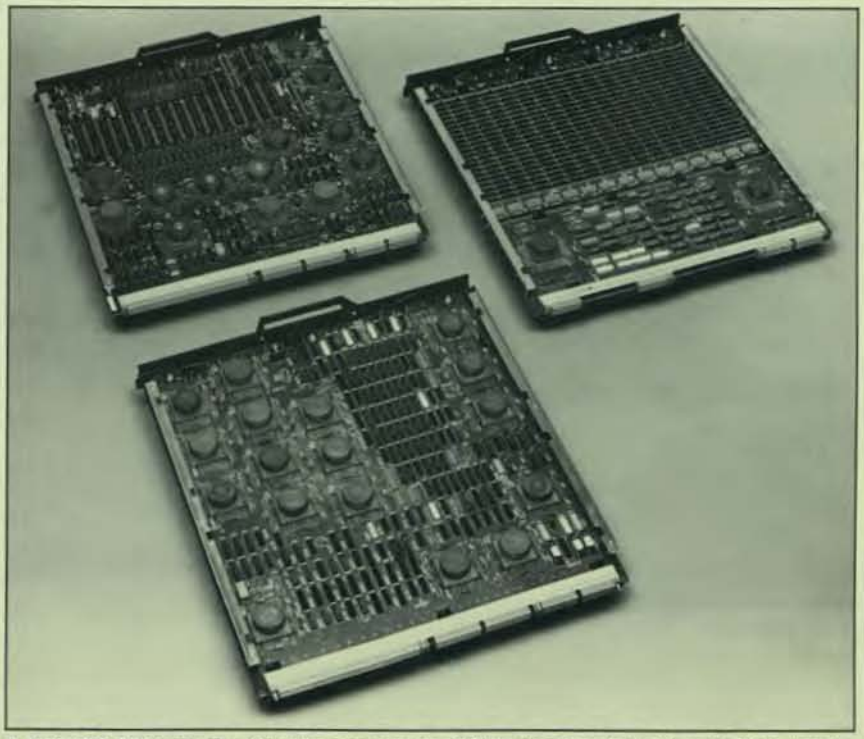
The denser macrocell array chips allowed each VLX processor board to contain about three times as many gates. Much of the VLX's speed improvement came from packing more logic onto fewer chips and boards, which reduces the number of interchip and interboard signals.

CIRCUITS TO SPARE

"We went from approximately 53,000 gates on four logic boards to approximately 85,000 on two," says John Beirne, engineering manager for VLX hardware development. "The macrocell arrays allow up to 2,800 circuits per array. But 2,000 to 2,300 is a more reasonable count for this circuit."

The mainframe's CPU holds 21 types of custom macrocell arrays (Fig. 1). In total, there are 33 different macrocell arrays in the Tandem two-board processor set. Of these, 31 are on the two logic boards that make up the CPU and two are on the accompanying memory boards. These include clever macrocell array designs that speed instruction execution from cache and branch operations.

Two critical elements of the new CPU that improve its overall speed in these areas are the instruction unit and execution unit (Fig. 2). The instruction unit consists of 10 macrocell arrays. One is a chip that makes a four-stage pipeline for simultaneously processing four instructions obtained from the



1. ARRAYS ABOUND. The 31 gate arrays in the CPU's two boards (left) make high-density logic circuitry. Two arrays and 256-K chips populate the 8-megabyte memory board (right).

64-K static-random-access-memory cache. The processor can fetch one instruction, decode a second, preprocess a third, and execute a fourth.

Two more macrocell arrays build a displacement adder that does address arithmetic for prefetching operands. This unit adds a displacement number to a virtual address to determine its physical address on a board. When the instruction unit prefetches instructions, address processing occurs in parallel with execution to anticipate the next instruction address.

In the older TXP, microcode-carried-out address calculation used discrete logic chips. In both systems, the processor instruction set holds 220 machine instructions that handle such jobs as stack operations, integer and decimal arithmetic, and byte-oriented functions. In addition, 43 other instructions perform scientific calculations.

The instruction set is implemented by microinstructions in the control store, which users can use to implement new instructions or improve existing ones. Two of the 10 instruction-unit macrocells handle addressing of the control store.

Another macrocell array in the CPU is dedicated to branch control. It examines the conditions of all branch (or jump) instructions being executed. If the conditions indicate a jump, the array helps determine the next address to be accessed. This look-ahead capability tests the jump condition prior to execution of the jump instruction. By knowing that a jump is imminent, the contents of the cache can be flushed and reloaded with the contents of the new jump address and the subsequent addresses in this new sequence of instructions. Anticipating the jump can shave microseconds off an operation.

Four macrocell arrays in the address-translation unit cut the cache-fill time in half when the cache must be flushed and reloaded, as when a jump is executed. Tandem says this alone contributes several percentage points to the performance improvement of the new-generation system.

The cache itself got a speed boost. Cache cuts the time required to access data and instructions from slower main memory. During operation, several instructions following the one being executed have been prefetched into the cache. For example, when there is a program in memory that the computer needs to execute, the processor fetches the program instructions from the high-speed cache instead of directly from main memory, thus reducing the amount of time to get an instruction. Besides being slower than cache memory, main memory is located off the processor board, which delays fetches from it even more.

New cache-hashing algorithms ensure a higher number of cache hits—that is, that needed instructions are in cache rather than in main memory. "Improving the performance of the

EASY-DESIGN FEATURES MAKE MACROCELL A HIT

The best-seller in Motorola Semiconductor Products Inc.'s cell library is the MCA2800-ALS. The emitter-coupled-logic macrocell array, the product of a joint development effort between the Phoenix, Ariz., Motorola Inc. subsidiary and Tandem Computers Inc., is a critical component in Tandem's fault-tolerant VLX NonStop computer.

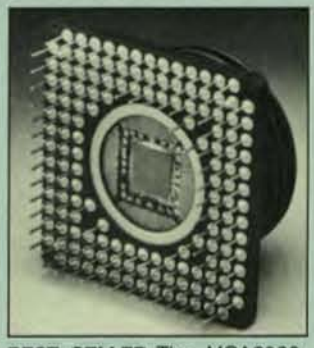
Built with an advanced process called Mosaic II (Motorola oxide-isolated, self-aligned integrated circuits), the array outperforms discrete 100K ECL chips. With a single 5-V power supply, it runs at 125 MHz with a typical 600-ps gate delay.

Mosaic II is a bipolar process that uses oxide isolation, which produces much smaller transistors than junction isolation. Some of the MCA-2800ALS speed improvement results from compressing the 2,000 or so gates down to an area no larger than 100 mils^2.

"One significant contribution Tandem made to the macrocell array is making it easier to design with," says John Carey, Motorola's merchandising manager. An especially attractive feature to logic designers is the TTL input/output capability Tandem added to the macrocell. TTL I/O cells, not found on other any ECL macrocell arrays as yet, make it easy for designers who are adept at using TTL logic to incorporate the device into their designs. There are 120 signal pins on the chip, hence 120 TTL I/O cells. Each I/O cell is tied to a bonding wire coming off the chip and can be an input or output buffer.

With the array, a designer does not have to learn new design techniques to create his final design on the chip because the library of macro functions is very similar to existing discrete TTL circuits. Using a gate array with TTL I/O pins affords other benefits as well. For example, the designer does not have to use controlled-impedance boards, a must for ECL designs.

All 120 I/O cells can be used. "It is one of the more dense I/O structures on the market," says Carey. "There are no restrictions concerning which pins can be an input, output, or bidirectional. Any one can be an input, output, or a tristate [high-impedance state] cell." Most arrays impose restrictions on which pins can be used.



BEST SELLER. The MCA2800-ALS comes in a pin-grid array with a heat sink on the back.

The I/O cell is a significant addition to the Motorola library, but Tandem didn't stop there. The Cupertino, Calif., company changed the components making up the macrocell, which made it possible to implement a circuit element, such as a flip-flop, more efficiently. Tandem also improved the implementation of plain NOR and NAND gates inside the macrocell. These gates constitute about 20% to 25% of a chip's real estate. By implementing the NOR gates more effectively, for example, the designers achieved a 20% chip-density improvement.

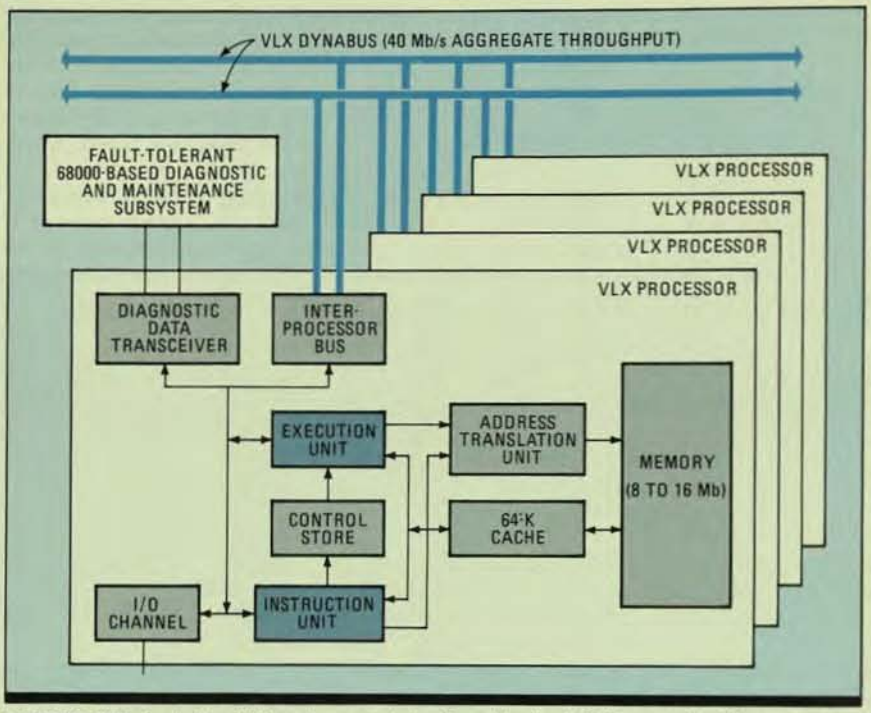
For its NonStop mainframe, "we changed the distribution of the types of resistors and transistors in the macrocell," says Al McBride, Tandem's technology director. "We made changes to both the simple and complex functions to make sure we used a large percentage of the 2,800 circuits on each array."

Tandem also trimmed the power consumed by individual gates by changing the output resistor's rating. ECL internal structures have an emitter-output follower circuit. The output signal is dropped across the emitter resistor.

A variety of values are possible with this resistor. If the cell is used in a relatively low-speed data path, for example, a designer can reduce the power of the circuits in this path to reduce system power consumption.

"We changed the operating point of the current gates in the chip's internal ECL," says McBride. Very high-performance ECL products dissipate more than 8 W. Tandem needed to have no more than 5 W in worst case. "We changed the output-switch operating current. As current flow is lowered, the performance, is necessarily decreased. The output-switch operating current is a value we traded off to reach our design goal," McBride explains. The tradeoff gave Tandem the necessary system performance without having to use liquid cooling.

Tandem and Motorola also created a three-level ceramic pin-grid-array package that has heat sinks. This further improves reliability of the chip. Reducing the operating point by 10° to 15°C doubles the chip's life.



2. BASIC SET. A starter VLX system contains four identical CPUs, each with one or two memory boards, tied together by the Dynabus. A system can be expanded to 16 processors.

cache-hashing algorithms [the way cache is organized for quick retrieval] is an important means of getting the hit rate up," says Beirne. "We took benchmarks on our early designs and tried various hashing algorithms. By running the benchmarks in a simulator to determine hit rates early in the design process, we knew what kind of performance we were going to get with the architecture."

Like the displacement adder, the address-translation unit converts virtual addresses to physical addresses. There are two identical arrays on the memory board for moving 64-bit data words (8 bytes wide) to and from memory. Two macrocell arrays located between memory and cache provide error-correction codes.

The loadable control store, which contains the microinstructions that tell the instruction unit how to execute its instruction set, been made even faster with a dual interleaved design. It consists of fast SRAM that supplies microinstruction words to both the execution and instruction units.

Two more arrays control the addressing of microinstructions in the control store and four chips receive the output of the control store and put it into the three-stage pipeline of microinstructions. The four chips are identical, each one fourth of a total data flow path to the logic that executes the instructions.

TWIN MICROINSTRUCTION BANKS

In the control store is a unique design feature that contributes significantly to improving the operating speed of the macrocell arrays in the instruction unit. It consists of two separate banks of SRAM, each containing identical copies of the microinstructions.

A conventional interleaving scheme divides the microinstructions into two halves, even-address microinstructions in one bank and odd-address ones in the other. The state machine—or instruction unit, in this system—would execute one microinstruction from bank A, the next from bank B, the third from bank A, and so on, because the cycle time of the instruction unit is faster than the RAM access time.

In Tandem's implementation, the instruction unit fetches a microinstruction from bank A, and as it executes, fetches the next microinstruction from bank B. One reason for this approach is that microinstructions are of variable length. Thus microinstruction A may be 1 cycle long and microinstruction B could be 3 cycles long. Having duplicate copies of the same microinstructions in each bank affords the most amount of overlap between microinstruction fetches, hence allowing a greater increase in speed over the conventional interleaving.

A fallout of the duplicated banks of microinstruction store is increased reliability, because a soft error in one bank can be repaired by loading the suspect bank with the known-good bank. In addition, if one of the two banks has a hard failure, the processor can continue operating—but at slower speed—using only one bank.

The company had to use the same instruction set as in its previous-generation systems, but it had some flexibility and freedom in improving the microinstructions used to realize the macroinstructions, or common machine instructions. Tandem's NonStop system instructions can require from one to five microinstructions. Reducing the number of microinstructions needed for one instruction required some additional logic. But Tandem decided that the increased performance resulting from faster execution of instructions was significant enough to warrant the extra logic.

"From what our early benchmarks told us about our existing computer architecture, we discovered which instructions to optimize," says Beirne. "We plotted histograms of instruction usage to see how much time it requires to execute each instruction. Looking at instructions that were executed the most told us where to look for the greatest savings in instruction-execution time. From this data we were able to perform analysis which would tell us we would get so much improvement in performance by adding logic to improve instruction-execution performance. We made the changes, then reran the simulations to see that the benchmarks improved."

OLD BUS, NEW PROTOCOL

Another increase in speed is provided by using a new bus protocol on the existing Dynabus. The previous bus protocol had radial clock distribution, which requires costly cabling. The new protocol uses a double-clocking scheme in which the clocks are distributed with the data. This method automatically reduces the amount of skew between the clock and data, thus allowing the system to more tightly compress the interval of data transmission.

The clock and data slow down the same amount over a longer length—if the data arrives later, so does the clock. Once transmission begins, the interval between data bursts can be very tight.

The new protocol allows Tandem to extend the length of the bus as well as increase its speed from 13 to 20 megabytes/s per bus. With two buses in the system, the aggregate bus transfer rate went from 26 to 40 megabytes/s. "We have not seen a case where bus speed is a bottleneck," says Beirne. "However, we feel that the improvement positions us well for future processors as well as allowing heavier loading on the VLX processor. It gives us more margin."

When the system is operating, packets of transaction information move to and from the CPU through its I/O channel and the Dynabus. A high-speed bus on the CPU connects the Dynabus, I/O channel, and diagnostic data transceiver (a mi-

croprocessor that automatically monitors the CPU) with the execution and instruction units. Packets enter a one-packet-wide input queue in the Dynabus, diagnostic data transceiver, or I/O channel, depending on which is active, and their arrival generates an interrupt flag to the instruction unit. The interrupt causes the instruction unit to begin processing the packet. During this time, the processor's instruction unit begins fetching instructions from memory to determine what kind of processing the incoming packet requires. The incoming packet enters the execution unit when the program running in the instruction unit executes a Receive instruction.

ONE MACROCELL PER BUS

On the Dynabus board are two macrocell arrays that execute a sequence of prescribed instructions for receiving data off the bus. There is one macrocell array for each part of the dual bus. These chips receive data from the bus, check it, and pass it into the one-packet-wide input queue on the Dynabus. Previously, discrete logic performed this operation by executing microinstructions.

Functional logic that handles packet receipt and transmission is in the same macrocell array that receives and transmits data to and from the bus. Processing occurs much faster because more processing is performed inside the chip, with fewer chip crossings—movements of signals from one logic chip to another on a pc board.

Two macrocell arrays make up the I/O channel and perform a function similar to the Dynabus. The two arrays replace the 70 or so discrete TTL components comprising the earlier system's I/O function. Improved reliability and a reduced chip count were the main benefits of using macrocells in this instance. Improving performance was a secondary consideration because the system was required to remain compatible with existing TXP I/O channels.

The execution unit holds seven macrocell arrays: four arithmetic-logic-unit slices, two register-file slices, and a barrel shifter. The ALU is a slice of the execution data flow path. It includes all the registers, parity-prediction logic, multiplexers, and the data path. Each of the four arrays represents one fourth of a 32-bit-wide ALU, each identical eight-bit-wide units. Each operates on eight bits of the total data word being processed.

The ALU follows the strategy of creating one common macrocell and using it four times, rather than partitioning the ALU function into several distinct functions. The former method reduced the number of unique array designs for the ALU by a fourth. This strategy was used wherever possible throughout the processor and memory boards.

Each two-board CPU can have one or two memory boards, which store 8 megabytes each, for a total of 16 megabytes per

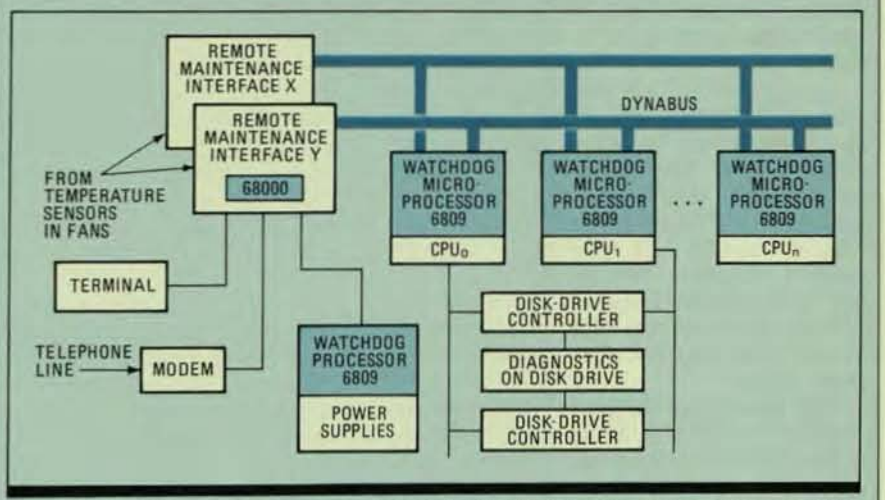
CHANGING COMPUTER FAULT SIMULATION AND REPAIR

The conventional wisdom in fault diagnosis and repair says wait until the problem occurs, then begin. But too often, the fault is a transient failure that cannot be recreated. So in the new NonStop VLX system from Tandem Computers Inc., the TMDS (Tandem Maintenance Diagnostic Subsystem) constantly monitors the system environment: processors, interprocessor bus, and tape subsystem. Microprocessor-based sensors scattered throughout the system can detect a fault as it occurs.

There are microprocessors throughout the system. The two system bus controllers contain the 68000-based remote maintenance interface. Hall-effect sensors inside the fans monitor intake and exhaust temperatures. On power supplies, TMDS can measure the actual analog output level. "These microprocessors collect this information and feed it into the remote maintenance interface and it is then fed back into TMDS, where it is analyzed constantly," says software manager Jamie Allen.

If a fault occurs, say, on one of the main processors, its 6809 microprocessor captures its entire state, 4,000 bits (500 bytes) of information called the event signature, and stores it on disk. It stops the processor clocks within one cycle and captures all the registers and states of the parity checkers throughout the machine. "We do parity checking across the control lines," says Allen.

Expert-system techniques are used to perform the fault analysis. In 90% of the cases, the program isolates problems down to field-repairable units, such as circuit boards and disk-drive modules. Eventually, the TMDS designers expect to achieve 100% accuracy.



WATCHDOGS. Microprocessors scattered around the VLX system gather maintenance data.

There are other fault analyzers in the system. A general-purpose program called the Mother Fault Analyzer is written in Lisp using MRS, a rule-based language that sits on top of Lisp. Developed at Stanford University, MRS is similar to Prolog.

Because it is rule-based, the general-purpose analyzer knows nothing about the events. The program interprets the rules against the event to determine what to do next. It may do nothing, for example, if it reasons that an event is of no importance, such as a corrected soft memory error. The fault analyzer can make some repairs itself.

A user can trace the entire analysis process, including results, at a terminal running a program called Problem Reporter. A Tandem engineer can also perform the analysis over the phone. Remotely, he can perform maintenance operations such as measuring the power-supply voltage, checking the operation of fans, adjusting power-supply margins, and adjusting the clock frequency up or down by 5%.

"We can come in over a modem and perform the analysis and in some cases actually perform the repair, especially if the cure is to rebalance the system, reload a processor that had an intermittent error, or patch a software bug," says Allen.

The remote capability addresses one of the most troublesome parts of the maintenance problem, the "no fault found" service call caused by intermittent faults. With this system, the actual event is captured without having to duplicate the trouble after it has gone. □

processor set. The company points out that memory capacity can be expanded up to 256 megabytes as higher-density megabit RAM chips become available.

Gathering maintenance data has been speeded up, too. Two macrocell arrays inside the diagnostic data transceiver can capture every internal state of the VLX processor board in one clock cycle. Once the data is grabbed, it is shifted serially to a separate maintenance processor. Another macrocell array controls the collection of reliability data. There are eight strings of reliability data collected from each board in the VLX system.

MICROPROCESSOR-MACROCELL INTERACTION

One chip in the diagnostic data transceiver controls all the scanning for data and multiplexes it into a serial bit stream that goes to a 6809 microprocessor on-board the diagnostic transceiver. From the 6809, the information is routed to a separate 68000-based maintenance processor. The second macrocell interfaces the 6809 to the execution and instruction units. "Here is a case where a single microprocessor is used but its related support circuits are put into one custom macrocell array," says Beirne.

Another way macrocell arrays improve processing speed is by allowing the system designer to concentrate on maximizing the performance of circuits that have the greatest impact on the overall system processing speed. Tandem's analysis revealed that about 50% of a computer's operating cycle is spent either in the cache or control store.

Another 20% of the total operating cycle is spent moving data between chips: the output of one logic chip is routed into the next. Gate delays and travel time between chips combine to slow computer performance. Finally, 30% of a computer's operating cycle is spent in the logic of any given chip in a computer design.

Thus in designing VLX, the company spent much of its design effort improving the cache and control store and using high-speed ECL internal chips to speed processing. But they chose to compromise speed for simplified board design in the 20% of the total processor time spent moving data between chips.

Up until recently, ECL macrocells all came with ECL I/O cells. These cells require special interfacing translations if the macrocell I/O is to be connected with TTL circuits. They also require specialized pc boards. All of these requirements conspire to make ECL difficult to design with.

Tandem chose to change the macrocell array so that it offered a TTL I/O cell instead of ECL. "It was a design tradeoff that paid off," says McBride. "We did not have to use controlled-impedance circuit boards, which would be required if using full-ECL gate arrays."

In addition, the company is able to build its boards using many off-the-shelf VLSI and LSI RAMs and microprocessors without having to redesign the entire computer from the ground up. Tandem's designers could have used ECL arrays throughout. But then they would not have been able to use non-ECL VLSI and LSI and the whole processor would have cost more.

A TTL I/O buffer interface on a macrocell chip is slower than ECL I/O buffers typically found on ECL macrocell arrays. "ECL is about two times as fast as TTL, but I/O only affects 20% of the total performance of the computer, so you're talking about only a 10% effect on the total cycle time of the computer," says McBride. In addition, implementing macrocells with ECL I/O could raise the price of the design considerably.

Tandem's design resulted from the fact that they could get enough system performance improvement even using TTL I/O, but TTL I/O allows the chips to be interfaced with all general-purpose commodity parts, RAMs, microprocessors and other non-ECL circuits. It gave Tandem a better system solution in terms of other components on the board as well as the pc-board technology. □

THREE YEARS AND A MILLION DOLLARS LATER...

Tandem's NonStop mainframe project was one program that lived up to its name—technology director Al McBride can attest to that. "My first day, when I entered an empty office, I had $1 million and a note from Jim [James G. Treybig, Tandem's president and chief executive officer] saying turn this into chips," he recalls.

The Cupertino, Calif., company's VLX project began in the fall of 1983 and was fully staffed to meet product requirements by March of the following year. McBride was charged with developing the semiconductor technology.

The first order of business was finding a supplier that could produce high-performance semicustom chips for the VLX, and developing a symbiotic relationship was the key. "When we went into the agreement with Motorola Inc., we were looking at a nine-year marriage. If anything should happen during that time, it could jeopardize our product coming out."

Tandem would help define a new macrocell array, thereby getting the semiconductors it needed. Motorola, in turn, got to sell it as a standard part. "The rationale was simple," McBride says. "When you are a $100 million company and have never bought gate arrays before, and you have a one-man circuit-design department, you make a deal."

McBride worked at IBM Corp. for 15 years before joining Tandem. Since the early 1970s, he has worked on microprocessor and microcomputer chips, some for IBM's Personal Computer.

It took about two years to develop the silicon technology, and then the system architects began. "We dovetailed the effort," McBride says. "We developed the silicon technology, and with about a three-month overlap, the system architects began their effort to develop the central processing unit."

That's when hardware manager and fellow IBM alumnus John Beirne took over. "I had two roles: CPU development manager and hardware program manager," he says. "We staffed up a team that designed the macrocell chips for the CPU."

Before coming to Tandem, Beirne, an energetic young man with engineering degree and MBA, spent seven years with IBM. "I was a technical leader and led a software project and worked with advanced chip technologies," he says. "One reason I got on the VLX project was my experience with very large-scale integration."

Though McBride developed the chip technology separately from the actual system, there was considerable interplay. "If we had an idea for a circuit, we could evaluate it within a day or two against what impact it would have on system performance."

JOHN BEIRNE

AL McBRIDE

PROBING THE NEWS

TANDEM'S OLD ARCHITECTURE PAYS OFF IN NEW MARKETS

IS IT A 'THREATENING COMPETITOR' TO IBM IN TRANSACTION PROCESSING?

by Clifford Barney

SUNNYVALE, CALIF.

Tandem Computers Inc. is a true original in a world of look-alikes. Though all computer makers strive mightily for product differentiation, they tend to come up with variations on a very few themes. Tandem has parlayed a unique computer architecture into an almost unmatchable position in the specialized world of transaction processing. The fault-tolerant design is now offering a new payoff: a powerful role in distributed computing and networking, two of the high-growth markets of the 1980s.

"The world is moving toward on-line processing," says Tandem president James G. Treybig. "Businesses are distributed everywhere: branch banks, retail stores, sales offices, point-of-sale operations. If they can understand what is happening instantaneously, they can keep inventories low and provide better services."

The company claims to have 60% of the automatic bank teller market—where it goes head to head with IBM Corp.—and a similar share of the electronic funds-transfer business between banks. Every major oil company uses Tandem equipment for credit-card transactions, Treybig says, and Tandem machines are used in 15 major stock exchanges, including the New York Stock Exchange. And the company is about to sign a contract for total automation of a major U. S. airline. Tandem hopes for even more market penetration with its new NonStop VLX, a cheaper and more reliable successor to its two-year-old NonStop TXP superminicomputer (see related story, p. 34).

Transaction processing will account for $1.8 billion in sales for U. S. computer manufacturers this year, according to a recent report by Frost & Sullivan Inc., the New York market research firm, and will grow to $4.7 billion by 1990. At present, two thirds of the market is from on-line processing, such as automatic teller machines. But office automation, now only 6%, will triple its market share by the end of the decade, and industrial process control will jump from 20% to 25%, the report forecasts. Tandem is even more bullish about the future of on-line processing. Dennis P. McEvoy, vice president of software development, says the market already runs well beyond $10 billion annually, the exact size depending on how the categories are chosen and who is doing the counting.

Last year, Tandem recorded $624.1 million in sales, a sum over 17% higher than fiscal 1984's $532.6 million and a reasonable figure in a miserable year for computer makers. The outlook is tougher this year: first-quarter sales increased only 6.5% over the comparable period in 1985.

"How well we do in 1986 depends on how well the computer market does in the U. S. If it doesn't pick up, we will be hard-pressed to have a better year than last year," Treybig says. International business—mostly to European countries—is strong, he adds, but domestic sales remain soft. "We did relatively well last year," Treybig says. "At least all of our people"—5,500 people at five manufacturing sites, 100 sales offices worldwide, and 19 subsidiary companies—"kept their jobs."

Tandem's architecture is a form of parallel computing. But instead of breaking down one large problem into many small ones, as in most parallel systems, the Tandem approach starts with many small problems and processes them very quickly. Hence its suitability for distributed computing.

TAILOR-MADE. The location of a data base or a peripheral is immaterial in a Tandem system, which makes it well-suited for networking. One process communicates with another through packet-switched messages without regard for physical location. The process of creating a network is therefore straightforward, requiring less input/output buffering than with conventional architectures.

Its ability to offer networks makes Tandem one of the first mainframe manufacturers to be able to challenge networking companies. Through product development, it is already beginning to stress value-added networks, and, with Rockwell International's Switching Division, it has developed an integrated communications and computer system for telemarketing.

Tandem was founded in 1974 to make computers for financial institutions, manufacturers, transportation companies, and others who needed the continuous processing of multiple events rather than batch processing of data. Instead of building hardware redundancy into its system, Tandem designed a message-based architecture, which allows all parts of the system to operate independently. Because the Tandem system can shut down gracefully, nodes can also be added easily. And because all this equipment must be continuously

TREYBIG: 'We are far ahead.'

available to its users, Tandem made it fault-tolerant. As a result, any given fault can be quickly isolated from the rest of the system.

So well has Tandem succeeded in establishing a reputation for fault tolerance that the company's other big strength—expandability—tends to be overlooked in the industry, and Tandem is not generally seen as a leader in technology. Says McEvoy, "If we were a new company and announced the VLX [Tandem's new top-of-the-line product] . . . everyone would say that we had outstanding technology. But we didn't start three years ago with venture capital, we started 11 years ago, and people tend to say we have older technology."

EXPANDABLE TO 48 MIPS. The new machine is linearly expandable from 3 million instructions per second to 48 mips, all completely transparent to the user, with no special programming. It can be "put into a distributed network with the same programs, with alternate routing in case of failures," says McEvoy. It boasts state-of-the-art ECL gate arrays and a special disk architecture for parallel throughput, he says.

To compensate for its lack of visibility, Tandem is beginning to take the wraps off some of its technology. With its own semiconductor facility and computer-aided design tools, Tandem worked directly with Motorola Inc. on the design of the ECL gate array for the VLX, thus shaving weeks off turnaround time. This circuit is only the beginning. A CMOS processor is in the wings, and Al McBride, director of very large-scale integration, hints that a new generation of processors awaits only the development of triple-layer metalization for the fabrication of very dense "sea of gates" arrays.

McEvoy claims that Tandem's networking software is also years ahead of the competition. No other distributed data base can run asynchronously and concurrently in multiple memories, he says; Tandem got a jump because it already runs a distributed data base in a single system.

One criticism sometimes leveled at Tandem machines is that the message-based architecture means higher system overhead for users. But McEvoy says that it also results in the lowest cost per transaction and the cheapest route to modular expansion.

"If you stay with a single box," he says, "you are limited to the 20% to 30%

Tandem's success forced IBM to offer fault-tolerant systems

performance gain made each year by the technology." With the Tandem system, linking processors results in a near-linear increase in performance, the company maintains.

That's important, says McEvoy, because it gives customers a chance to start small. "You don't always know how successful an on-line application will be," he adds. "Automatic tellers have taken off, videotex hasn't. Modular expandability lets users invest more as demand grows."

McEvoy concedes that Tandem's message-based architecture rules out its participation in the engineering and scientific market and in real-time applications that require microsecond response time. "We are not compute intensive, we are I/O intensive," he says. "You can call it special-purpose computing, but it's applicable to a good third of the business."

On the business side, says Treybig, Tandem's major achievement is its performance against IBM. "We forced them to buy someone else's computer," he says proudly, referring to IBM's use of equipment made by Stratus Computer Ltd., Natick, Mass., in some of its transaction-processing applications. In addition, Treybig adds, AT&T had to come out with a hardware-redundant machine, the 3B20, to compete with Tandem in on-line computing.

'THREATENING.' Indeed, says Stephen K. Smith, an analyst at Paine Webber Inc., New York, Tandem is a "threatening competitor" to IBM in transaction processing, a market IBM has traditionally dominated. IBM has mounted a significant effort to stop Tandem from taking away business, Smith says.

But Tandem's networking ability will keep the company a jump ahead of Stratus, IBM's supplier, says Michael Murphy of the *California Technology Stock Letter*. "They are clearly the leader [in transaction processing] and they can sell a network, not just one or two machines," Murphy says.

To broaden its markets, Tandem is beginning to introduce message-handling software. It is beginning to offer a range of information-transfer programs, including electronic mail, data communications, facsimile, and microcomputer-to-mainframe communications. Its networking software supports both IBM's LU.6 Systems Network Architecture and the International Organization for Standardization's open-systems interconnection reference model.

Tandem also sees opportunities in factory automation and was one of the first companies to support the General Motors Corp.-sponsored Manufacturing Automation Protocol. Late last month, Tandem bought a small piece of Triplex, a Torrance, Calif., maker of fault-tolerant programmable logic controllers, and the two will jointly produce a MAP system. "We are far ahead of anyone on networking software and distributed data bases," Treybig says in summary. "Others build networks on top of individual processors. Our lowest-level operating system is a network. That is unique." □