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R.A.M. COMPETITION

Stiff competition to establish market share in the incoming generation of dynamic random access memory chips, 256K DRAMs, has driven down prices to the point where few companies are making much of a profit on the high volume product. Though Japanese firms, as well as the new South Korean chip fabricators, are heavily committed to the new RAMs, most major U.S. merchant semiconductor firms do not plan to market standard 256K RAMs.

This flies in the face of conventional wisdom within the semiconductor industry, which has made state-of-the-art RAMs a high-priority commodity. Companies have seen RAMs as a source of cash for expansion. Furthermore, since RAMs are manufactured in very high volumes, they have used RAM production to improve their processing technology every time they moved to finer patterns and more intensely developed chips.

However, since overproduction has driven down the price of RAMs, they are as much a drain on cash as a source of funds. Independent American producers are looking to other products as "process-drivers," but few are abandoning the memory market entirely. Instead, they are focusing on specialized products which would allow them to jump back into the fray should market conditions permit.

V.H.S.I.C CRITICIZED

The Very High Speed Integrated Circuits (VHSIC) program, run by the Defense Advanced Projects Research Agency (DARPA), is under fire. The General Accounting Office has called on the Pentagon to withhold an additional \$62.2 million from VHSIC, the multi-year cost of which has jumped from \$339 million to \$781 million, if the latest addition is approved.

VHSIC is the Pentagon's attempt to regain hegemony over the semiconductor industry, but if GAO's analysis of project progress is accurate, then the military may be falling even further behind the civilian high-tech sector. As of December, 1984, only about half of the proposed 29 VHSIC chips had been produced, and few in large volume. Costs have more than doubled, while execution lags significantly. GAO says that the Defense Department should demonstrate first-generation VHSIC technology before expanding the program. (*Electronics News*, May 20, 1985)

THE DATAMATION 100

Datamation (June 1, 1985), one of the computer industry's oldest magazines, has published its latest "Top 100" Data Processing companies, based upon 1984 revenue figures. This year, for the first time, *Datamation* includes foreign and U.S.-based companies on one list. In ranking firms, it counts revenues from the sales of computers and work stations, peripheral equipment, software, and computer services, including maintenance and repair. It excludes several related fields, such as data transmission, cash registers, semiconductor and other components, including printed circuit boards, and most data processing supplies. However, it includes magnetic memory media. Thus AT&T, with total 1984 revenues of over \$33 billion, ranks only 18th on the list with \$1.3 billion in EDP income.

IBM not only heads the list, with \$44 billion of its \$46 billion total revenue in data processing, but it heads *Datamation's* rankings of mainframe sellers (\$13 billion), minicomputer marketers (\$3 billion), and microcomputer makers (\$4 billion). Automatic Data Processing, with \$958 million in gross income in 1984, squeezed out Control Data as the top computer service firm. Compaq Computer achieved the largest data processing revenue per employee, while Storage Technology (STC) lost the most money.

Overall, Digital Equipment (DEC), Burroughs, Control Data (CDC), and NCR (formerly National Cash Register) round out the top five, and number 6 Fujitsu is the top foreign concern on the list. Of the 28 foreign corporations ranked by *Datamation*, 7 are Japanese, 6 are based in the United Kingdom, and 5 are West German. In addition to ranking firms and providing essential financial data, *Datamation* provides one-column descriptions of all 100 firms.

MIL-SPEC CHIP TESTING

Science Digest (July, 1985) has printed an informative, easy-to-understand description of the controversy over the testing, by merchant semiconductor firms, of military-qualified chips. (See issue no. 51.) While manufacturers may have broken the law by cutting corners in chip-testing to save money, the root of the problem lies in differences over the philosophy of quality control. American chipmakers have adopted the approach taken by their Japanese competitors, emphasizing quality control throughout all steps of production. The Pentagon, on the other hand, chooses to ignore processing controls and insists instead on extensive post-production testing.

THE TANDEM WAY

Tandem Computer, the leading manufacturer of non-stop computer systems, continues to grow. Employment at the decade-old Silicon Valley firm has now reached 5,300. However, Tandem has postponed construction of a massive new industrial campus in southern San Jose's Coyote Valley. (*San Jose Mercury News*, June 4, 1985). The delay is ironic, since Tandem's demand for instant re-zoning action in 1982 pushed the San Jose City Council to open up the area for development, despite serious environmental and infrastructural problems.

Tandem, as the name indicates, builds computers which are essentially two machines in one. The machines overcome errors and breakdowns by shutting down a ged processor while the other one picks up the load. For many computer users - banks, hotel reservation systems, etc. - down time is costly, so Tandem's systems are in great demand.

Guided by company founder Jimmy Treybig, Tandem has developed a reputation as an enlightened employer, but the image is only partially deserved. Writing in *Ideas and Action* (Winter, 1985), an un-named former Tandem employee offers an inside look at Tandem's corporate culture. (The magazine is published by the Workers Solidarity Alliance, which appears to be anarchist in inclination.)

Since keeping machines functioning is the core of Tandem's business, hardware maintenance and repair is as important to the company as manufacturing. "Customer engineers," therefore, are a critical part of Tandem, and the author describes the evolution of the work of such high-tech technicians. He (or she) notes, "In the early days of the computer business, the field technician needed to understand the internal circuitry of a piece of equipment." Technicians frequently fixed problems by replacing components on the spot.

Today at Tandem, repair work is fragmented. The customer engineer goes to the customer's machine and replaces an entire printed circuit board or other assembly. Back at Tandem, board repair specialists troubleshoot the boards and replace individual components. The company saves by paying the de-skilled customer engineers, who spend a great deal of time in transit, less than the small number of specialists. The downgrading of repair personnel does not show up in government labor statistics, since customer engineers are still considered technicians, but the skill level and pay (in relative terms) are lower than that of traditional field techs.

The author points out that Tandem's style of participatory management has clear limits. Originally, workers at the company's Austin, Texas VDT plant were given the choice of assembling terminals individually, from beginning to end, or working on an assembly line. The workers chose the former method, and they attach their own names to each machine. "On the other hand," he writes, "management imposed a nine-month hiring and wage freeze at Thanksgiving,

1982 . . . as an edict from the top." In protest of that freeze, one technician posted a protest on the firm's internal electronic mail system, which is open to about three-quarters of Tandem's employees.

Use of the mail system tested Treybig's managerial principles in July, 1983, when a Tandem employee belonging to High Tech Gays "advertised the formation of employees mail users group and social club." The message prompted a series of anti-gay and anti-bigot responses. The interchange illustrated the potential of electronic mail as an accessible arena for public debate, but top management apparently felt that such free "speech" was bad for business. Tandem soon prohibited the use of the system for "political, religious, or other causes."

Linking computer terminals into one system offers more than electronic mail, however. It gives those with access to the central machine's operating system the ability to monitor the work of anyone hooked into the system. While in many cases this merely means checking the efficiency of typists - itself undesirable - at Tandem one supervisor regularly perused the personal and business computer files of virtually everyone in his department. When this practice came out into the open, a controversy erupted. Employees, including senior professionals, criticized the surveillance, and Tandem's top management backed the critics, demoting the offender and urging him to seek employment elsewhere.

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VENTURE CAPITAL

The Reagan administration, in revising the tax overhaul plan developed under the guidance of former Treasury Secretary Donald Regan, has bowed to high-tech and venture capital lobbyists who argued for lower capital gains tax rates. (*San Jose Mercury News*, May 9, 1985)

One of the weapons in the lobbying effort was a study, "Venture Capital and Innovation," prepared for the Congressional Joint Economic Committee (December 28, 1984), which found that the lowering of capital gains tax rates in 1978 and 1981 was the primary source of new venture capital for investment in recent years. The study, based upon a survey of 277 venture capital firms, concluded that there is no glut of venture capital. Rather, it argued that the increased volume of risk capital encouraged more entrepreneurial activity. It warned only that the "venture capital community" did not have the surge capacity to handle the increased number of deals. The study also found that an increased supply of venture capital was the most efficient way to channel investment to businesses too small to attract funds or located in areas without a local or regional venture capital market.

Of course, the study was based upon a survey of venture capitalists, a body of investors with rather narrow interests. Venture capitalists are not generally concerned about the human cost of lay-offs and failure when the rise of too many firms in a segment of the market leads to a shake-out. Nor are they concerned with fairness, the notion that a penny earned through the investment of savings should receive the same tax treatment as a penny earned through labor.

Despite its policy shortcomings, the report contains valuable data on the venture capital industry. For example, in 1983 four states - California, Massachusetts, Texas, and New York - accounted for 65% of the U.S. companies financed by venture capital companies (at least those participating in the survey) and 69% of the dollar volume. California alone got 38% of the deals and 47% of the money.

TOXICS UPDATE

According to a report released by six California environmental organizations, eight approved hazardous materials "disposal" sites in the state are releasing toxic substances into adjacent groundwater. The eight dumps include all sites to which toxic wastes - liquids, solids, and even soil contaminated by chemicals from leaking storage tanks - from Silicon Valley are normally trucked. The problem is serious, since many of the hazardous chemicals are expected to remain in present form, at the Class I dumps, indefinitely.

Meanwhile, the Environmental Protection Agency has announced that it intends to leave the regulation of most toxic gases up to the fifty states. Despite a heightened public consciousness of toxic air pollution following the Bhopal tragedy, toxic gases are virtually

un-regulated in the U.S. Some states may enact programs, but few have the resources to do so, and polluting firms may play job-seeking states off against each other to win lax regulations.

Even without a major industrial accident, which could turn a part of Silicon Valley into an affluent Bhopal, toxic atmospheric emissions threaten public health and the environment in American high-tech centers. Semiconductor production, for instance, relies upon extremely toxic dopants such as Arsine, Phosphine, and Diborane.

Companies ill-prepared for environmental disaster in the past may have a more difficult time in the future. Massive losses due to unexpected groundwater pollution - clean-up costs, legal fees, and potential liability awards - have caused carriers to refuse coverage to firms in polluting industries, including electronics. It is possible to insure against sudden or accidental pollution, but it is particularly difficult to insure against long-term environmental impairment. *Fortune* (June 10, 1985) says the the insurance industry considers such risks "unmeasurable and therefore uninsurable."

NAVIGATION

Man-made satellites are usually considered artificial moons, but the U.S. military's NAVSTAR Global Positioning System, a constellation of satellites being placed into near geo-stationary orbit, is designed to play the historical function of stars. When fully operational, GPS will give vehicles equipped with NAVSTAR receivers the ability to fix their positions precisely in three dimensions.

GPS spacecraft also contain special equipment for detecting and locating surface and atmospheric nuclear explosions, in real time. In addition to detecting nuclear tests, the system is designed to feed detonation data to the U.S. National Command Authority during a nuclear war, on the assumption that there will be time to re-target successive waves of missiles and bombers based upon an evaluation of previous strikes.

For several years, the Pentagon and other Federal agencies have considered whether civilian vehicles - airliners, tanker ships, etc. - would be permitted to use NAVSTAR receivers capable of determining exact positioning. Since potential adversaries of the U.S. could use whatever equipment is released to the civilian market, the Pentagon has decided not to open up GPS use. Air Force Col. Phil J. Baker says, "The highest GPS accuracy we could provide without jeopardizing national security is 100 meters of true geodetic position." Military versions are designed to provide 10-meter accuracy. Thus, while planes in flight and ships will be able to make use of NAVSTAR signals, satellite-aided automobile navigation is for now out of the question. (*Electronics Week*, May 27, 1985)

INSURANCE AUTOMATION

In the United States, employers use high technology to do more than make individual operations more efficient. They use computers and associated equipment to resign the work process, whether it be in the office, the factory, or the store. In general, employers follow the principles of "scientific management," breaking labor into its component tasks and assigning most workers low-skill, low-pay positions. In general, this means that some workers are moving up the occupational ladder while most are being de-skilled.

Within individual industries, the process is more complex. The insurance industry, for example, had used earlier technologies to create a clerical workforce with minimal skills, so the latest round of automation did not lead to de-skilling. Instead, many of those positions - routine keyboarding, mailsorting, etc. - were eliminated. Employers are creating skilled, multi-activity clerical positions, but to a large degree these office workers are taking over the work of low-level professionals, such as underwriters.

With the elimination of low-ranking professional occupations, the career path from clerical to professional work has broken down. Just as in high technology production, the middle of the workforce is shrinking. The only route to the top is a college education, particularly with mathematical training.

Furthermore, it is likely that the rapid increase in insurance office-work productivity will overcome the growing market for insurance services and lead to an absolute decline in employment in the industry. (See Eileen Appelbaum, "Technology and the Redesign of Work in the Insurance Industry," Institute for Research on Educational Finance and Governance, Project Report No. 84-A22, Stanford University, November, 1984.)

SOFTWARE PIRACY

The piracy, or unauthorized duplication, of micro-computer software in the U.S. has reached epidemic proportions. In the U.S., however, the practice is informal, as computer users pass disks to friends, business associates, and fellow teachers without charge.

In Taiwan and Singapore, however, piracy is big business. American computer companies are pushing for legal protection in both countries. In Singapore, where tiny computer shops churn out copies of expensive personal computer programs - Lotus' 1-2-3 goes for US\$15 - companies such as Hewlett-Packard, IBM, and Lotus are pushing the government to include software in its copyright code.

They are likely to succeed, since the Singapore government has decided to make the small island nation a regional or even global software center. **Business Week** (June 17, 1985) reports that the piracy stigma is discouraging U.S. companies, including Lotus, from setting up shop there. It cites a spokesman for Portland, Oregon's Mentor Graphics, "Eventually we'd like to use Singapore to design products for the international market. . . . But we'll take a hard look first at how the products will be protected."

DYNETICS SEIZED

The Philippine government has seized control of Dynetics, the Manila semiconductor assembly subcontractor caught in a three-way dispute between former company Chairman Vincente Chuidian, the Marcos clique, and foreign banks. (**San Jose Mercury News**. See also issues no. 50 and 51.) The Marcos administration may end up holding an empty shell however, since Chuidian still controls Interlek, the Silicon Valley arm of Dynetics that has arranged most of its business.

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