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OFFSHORE THEFTS

As in previous periods when semiconductor demand exceeded supply, chip thefts are on the increase. Since companies are reluctant to disclose breaches in their security, there are no reliable totals. The **San Jose Mercury News** (February 5, 1984) reports that most recent losses appear to have occurred in the Far East, where most American merchant semiconductor firms assemble the bulk of their integrated circuits.

According to the **Mercury News** (p. 4B), "At least one recent multimillion-dollar theft has been reported to the FBI. The theft was discovered when packages that were supposed to contain chips arrived in San Francisco from Malaysia. The boxes held only wood. FBI tests determined that the wood came from Malaysia . . ."

Chip thefts cause three problems in addition to the obvious direct loss (which may mean higher insurance premiums). First, if the chips show up on the U.S. grey market, they could confuse the supply and demand situation. Second, since many chips are pilfered after they are assembled but before they are tested, faulty circuits could be making their way onto the market in large numbers. And third, the chips may be sold to communist nations, confounding the U.S. government's irrational export control policy.

AT&T

Now shorn of its network of local telephone operating companies, AT&T is lining up its team for the contest to dominate the informatics industry, the convergence of the formerly distinct industries of computers, components, and communications.

In December, AT&T reached an agreement to purchase 25% of Olivetti, Europe's largest producer of office automation equipment. The $260 million deal gives AT&T, which has never done much business outside the U.S., a European outlet for its products, while providing the American firm with a ready-made selection of workstations, word processors, etc., for the North American market. Though Olivetti is based in Italy, the transaction required the cooperation of the French government, since a major share of Olivetti is and was owned by both private and public French firms. (**San Jose Mercury News**, December 22, 1983, and **Electronics News**, December 26, 1983)

In addition, in early January, 1984, AT&T announced a joint venture with Convergent, a young Silicon Valley computer maker, to produce equipment to be marketed under AT&T's label. (**San Jose Mercury News**, January 4, 1984)

MACINTOSH

This January, Apple Computer introduced the Macintosh personal computer, which it hopes will join IBM's PC as an industry standard in the professional desktop computer market. The Mac is a light-weight transportable, with a single minifloppy disk drive and a high-resolution screen. Its "mouse" attachment allows users to move the cursor anywhere on the screen quickly. Macintosh software, built around the mouse, is designed to make the machine much easier to learn to operate and to use than other computers.

The Mac is being assembled in a new, automated, $20 million factory in Fremont, California, on the outskirts of Silicon Valley. The 160,000-square-foot factory incorporates advanced integrated computer control systems, automated storage and retrieval systems, remotely guided robots, "just-in-time" inventory management, and automatic component insertion. The machine itself was designed with production costs in mind. It contains only one printed circuit board, with less than 50 chips.

Apple says it automated primarily for quality control, but direct labor costs represent only one percent of the cost of producing a Macintosh, compared to seven percent for other Apple products. The Fremont plant is designed to manufacture 500,000 units each year, with only 300 employees. Presently there are 170 production workers and 100 engineering and administration employees at the facility.

Some observers have suggested that plants such as the Mac- maker presage the end of blue-collar work in the computer industry, but that conclusion is too rash. The electronics industry, like all other industries, is marked by a gradual increase in capital intensity for each product or product type. The growth in the employment of computer production workers may eventually slow, halt, or perhaps even decline, but other new products will absorb the excess workforce as long as high-tech companies continue to develop new kinds of products.

It is unlikely that many of the one or two hundred companies now building microcomputers will immediately follow Apple into automated assembly. Apple is betting that Macintosh sales will be great enough to defray the capital costs of the Fremont plant. Based on historical sales performance, IBM is the only other producer of microcomputers for the professional market which can affort such a bet.

Furthermore, computers incorporate subassemblies which are produced in plants more labor intensive than the Mac plant. Apple buys video display screens from Samsung, in South Korea, and microprocessors from Motorola, which still operates assembly plants in the Far East. Keyboards are still, in most cases, assembled manually.

The designers of the Mac factory appear to have a flair for science fiction. The Macintosh is partially self-reproducing. Rather than install older factory automation equipment, Apple uses Macintoshes to test the printed circuit boards and to control each of several test racks. ("Macintosh Manufactured at Apple's New Computer-Controlled Factory in Fremont," Apple Computer press release, January 24, 1984; **Fortune**, February 20, 1984, p. 94)

ATLAS

Atlas Industries, a Hong Kong-based electronics subcontractor controlled by a Silicon Valley entrepreneur, struck it rich recently when it signed a contract to supply IBM with magnetic recording heads and floppy disk drives. Over the next three or four years, reports the **New York Times** (December 29, 1983), that contract could mean sales of over $170 million. Atlas won the IBM business by supplying quality goods on time.

"The company produces ferrite material and conducts research and development through two subsidiaries in the Silicon Valley. But its main manufacturing operations are in Hong Kong, where labor costs are about $15 a day per worker compared with more than $15 an hour, benefits included, in the United States." Atlas plans to add 1,000 more workers to its 2,000 already on the payroll in Hong Kong. However, the biggest expansion will be in Penang, Malaysia, where six IBM engineers are overseeing the start-up of disk drive production.

SILICON VALLEY GROWTH

With cities and states across the U.S. working hard to grab a piece of the "wafer" of high-tech investment, it may appear that Silicon Valley's growth has come to an end. In fact, industrial and support development is continuing here at a breakneck pace. Hewlett-Packard has taken over one of the area's older shopping malls, converting it into a sales and demonstration center. The Marriott Corporation wanted to sell its popular Great America amusement park to a developer, but the city of Santa Clara has tentatively agreed to buy the park to save its chief tourist attraction from the bulldozer.

For several years, commissions including business leaders, representatives of community groups, and professional planners have warned that action is needed to stem the increasing congestion of area roadways and the skyrocketing cost of housing. While industry leaders could agree that growth needed to be controlled, they never spoke out against specific projects.

This February, however, semiconductor producer Intel filed suit in an attempt to reverse the city of Santa Clara's approval of a high-rise office tower planned to go in across the street from an Intel facility. The development is expected to generate 4,000 jobs, and it will add an estimated 12,000 auto trips per day to already congested streets and highways.

Intel spokesman Laurence Hootnick told the **San Jose Mercury News** (February 14, 1984, p. 10A), "Try hiring employees that have to commute 45 minutes to one hour. It would make it even more difficult for us as employers." When the Santa Clara City Council approved the project, not only Intel, but other industry representatives and developers testified against the plan.

City council member Eddie Souza, who voted to approve the project, told the **Mercury News** that the Intel suit was a "case of greed." He said, "They want theirs and they don't want anyone else to have it."

Instruments Trade

The U.S. maintains a strongly positive trade balance in analytical and scientific instruments. In 1982 exports reached $2,576 million, while imports totalled only $306 million. Total U.S. instrument production approximated $7.6 billion. There are 660 instrument-manufacturing companies in the U.S., employing 145,000 peoples.

Many analytical and scientific instruments are purchased by the electronics industry and supporting research labs, for research, production, or testing. A large portion of instruments now in production embody the latest in electronics technology.

The U.S. International Trade Commission provides a detailed description of the instruments trade in "Summary of Trade and Tariff Information: Analytical and Other Scientific Instruments." (USITC Publication 841, Control No. 7-2-30, September, 1983) The ITC list breaks out data on five major instruments categories: 1) machines and appliances for determining the strength of articles under compression, tension, torsion, or shearing strees; 2) instruments and systems for physical or chemical analysis; for measuring or checking viscosity, porosity, expansion, surface tension, or similar properties; or for measuring or checking quantities of heat, light, or sound; plus microtomes, which are devices for cutting sections or specimens of organic tissue; 3) counting devices, taxi meters, odometers, pedometers, speedometers, tachometers, and similar devices, and stroboscopes; 4) instruments and apparatus for measuring or detecting radiation; and 5) equipment for testing electrical, radio, and communications circuits, plus motors and instruments for measuring electricity.

CHEMICALS

The market for high purity electronic chemicals is booming. Strategic Analysis Inc. predicts that the American market for electronic chemicals will rise to from $2.24 billion in 1982 to $4.05 billion in 1987. In 1977 sales totalled only $1.16 billion.

The **Wall Street Journal** (January 27, 1984) cites an A.D. Little analyst: "I see electronics as one of the best markets for chemical companies – if you're already in it. . . . We have people coming to us all the time saying, 'Gee, we want to be in electronic chemicals.' But now isn't the time to jump in unless you have some technical or marketing advantage to bring to the party." There is one relatively easy path, however, which many firms are taking to get into the business: buying portions of, or entire electronic chemical companies.

NEW WAFER PROCESS

To fabricate chip features of one micron on silicon wafers for very large scale integrated (VLSI) circuits, a research group at Toshiba has developed an experimental etching process which skips the standard photolithographic process. Wafers are exposed to an excimer laser, through an aluminum mask, in the presence of chlorine gas. (**Electronics**, January 12, 1984, p. 90). Should it prove feasible to use this method in mass production, it could greatly reduce the use of toxic liquids in wafer production. On the other hand, it could create new hazards in the handling of chlorine and its compounds.

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