GLOBAL ELECTRONICS

Issue No. 65 | formerly the *Global Electronics Information Newsletter* | May, 1986

SINGLE-SOURCING

Historically, semiconductor producers have licensed chip designs to one or more "second sources," or alternate suppliers. Customers, particularly military contractors, have insisted on the availability of alternate sources should the original suppliers become unable to supply components.

Today, however, a number of chip suppliers are attempting to minimize the number of licensees, actually single-sourcing products in several instances. If they can convince customers to use components available from such a narrow production base, they benefit in two ways. First, there is no direct competition. Second, multiple sourcing contributes to the semiconductor industry's sharp cyclical swings by permitting customers to double- and triple-book parts during boom periods, creating inventory gluts when demand falls. Furthermore, reports **Electronics** (April 28, 1986), "The push to customer-specific integrated circuits, the growing interest in just-in-time manufacturing, and the costs of vendor qualification all are combining to change the shape of emerging arrangements in procurement."

Suppliers are seeking alternative mechanisms to guarantee supplies, including dedicated production lines, supply contracts, and the licensing of designs and production technology to customers for partial captive production. There is a danger, however, that chip users will actually increase their stockpiles of chips to overcome the risk that their single source of a component will be unable to meet production schedules. Thus, single-sourcing may have little impact on the industry boom-and-bust cycles.

O.E.C.D. REPORT

The Paris-based OECD (Organisation for Economic Cooperation and Development), a joint effort of the world's major capitalist industrial powers, issued in 1985 a report, **The Semiconductor Industry: Trade Related Issues**. The study contains nothing dramatically new, but it provides a solid, internationally balanced view of international competition in high-tech production.

OECD reviews the varied industrial policies that governments are using to promote their own semiconductor industries, warning of "a spiralling increase in intervention." It finds, however, that the growing trend in international cooperation among high-tech companies may reduce frictions: "This change is leading to a greater internationalisation of the industry which may tend to blur the importance placed, principally by governments, on domestic ownership and overdependence considerations in the industry . . ."

IMMIGRANT ENGINEERS

Immigrant professionals continue to play an important role in the U.S. electronics and computer industries. In 1982 through 1984, 32,248 foreign scientists and engineers entered the U.S., including 20,781 engineers and 4,564 computer specialists. (We exclude here data on the natural science category, which includes specialties, such as agricultural science and geology, far removed from high-tech, as well as social science.)

Of the 8,013 engineers, mathematicians, and computer specialists that immigrated in 1984, over half (4098) came from six countries:

United Kingdom	865
India	816
Taiwan	770
Philippines	636
Iran	528
Canada	483

The above data is based upon the country of last permanent residence, which generally corresponds to the country of birth data. Not surprisingly, however, the number of Iranian born rises by the latter measure to 682; the difference presumably consists of exiles from one regime or another. It also appears that engineers born in British Commonwealth countries sometimes have an easier time entering the U.S. from the United Kingdom or Canada. For example, more than one quarter of the all scientists and engineers from the U.K. that immigrated to the U.S. in 1984 were born elsewhere, and 57% of those who entered from Canada were born elsewhere.

California attracted many more high-tech immigrants than any other state in 1984, with 2,526 engineers and math/computer specialists taking up resident in the state. New York, with 813, ranked a distant second.

Of all scientists and engineers who entered the U.S. in 1984, 89% were men. Of the engineers, 94% were men. Significantly, of those who came directly from Eastern Europe, only 71% of all scientists and engineers and 81% of the engineers were men. ("Immigrant Scientists and Engineers: 1982-84," **Surveys of Science Resources Series**, National Science Foundation, NSF85-326)

OCCUPATIONAL HAZARDS

At last there is a medically authoritative text focused on the health risks associated with semiconductor production. Joseph LaDou, Acting Chief of the Division of Occupational and Environmental Medicine at the University of California School of Medicine in San Francisco - as well as a physician with extensive experience treating Silicon Valley workers - has collected a series of detailed essays by medical experts. ("The Microelectronics Industry," **State of the Art Reviews: Occupational Medicine**, January-March, 1986, Volume 1, Number 1, Hanley & Belfus, 210 S. 13th St., Philadelphia, PA, 19107. Single copies: $22.00; US$26 outside the U.S.)

Most of the essays describe the use of chemicals in semiconductor production and the associated workplace hazards, but there are also reports on radio frequency exposure and musculoskeletal problems due to repetitive motion. In addition, the final chapter describes the environmental health problems – that is, outside the plant – of high-tech production.

Most of the book is highly technical, but LaDou places the hazards of high-tech production into perspective in his introduction. He says, "Despite the overall record of occupational safety, the semiconductor industry has been troubled by an unusally high incidence of occupational illness," particularly systemic poisoning. *In fact, the incidence of systemic poisoning in semi*conductor production is consistently more than three times as high as in manufacturing as a whole. He also points out that high employee turnover and the large proportion of non-production workers found in the semiconductor industry hold down the reported frequency of health and safety problems.

LaDou argues that there is a need to involve health and safety staff in the design of production processes. For example, he says that many firms now use phosphine, a highly toxic gas used as a dopant in wafer fabrication, in 100% concentrations. The high concentration is convenient, but not necessary, and it increases the risk of worker exposure. Industrial engineers are not trained, however, to review process technology for health and safety considerations.

OFFSHORE WORK

Seagate Technology, which manufacturers hard-disk drives for microcomputers, laid off more than 800 people in Scotts Valley, California (just over the summit of the Santa Cruz Mountains from Silicon Valley) in July 1984, and shifted most of its production to Singapore. The **San Jose Mercury News** (May 12, 1986) reports, "Analysts estimate that the company, sporting the lowest prices in the industry – thanks to its new Singapore plant – controls 40 percent of the market for low-end rigid-disk drives.

Meanwhile, Xebec, a Silicon Valley builder of controllers for disk drives, has established a joint venture in Mexico to serve the Latin American market. The company plans to move a mothballed automated production line from Lehigh Valley, Pennsylvania, to Mexico. (**San Jose Mercury News**, May 14, 1986)

And National Semiconductor, which has recently cut its workforce in other Asian countries, has announced plans to invest $23 million more in its Singapore facility over the next three years. National plans to add 40 engineers and 150 production workers to its 1,500-strong payroll. (**San Jose Mercury News**, May 6, 1986)

SILICON VALLEY EMPLOYMENT

Total employment in Santa Clara County, the statistical area most closely matching the boundaries of Silicon Valley, remains at 788.6 thousand (as of March, 1986), 1.2% below its all-time high of 797.9 thousand, reached in December, 1984. Employment in the County's major high-tech manufacturing categories (including components, computers, instruments, communications equipment, missiles and space vehicles, and other electronic equipment) totalled 226.8 thousand in March, 1986, down only 12.0 thousand (5.0%) from the peak of 238.8 thousand, reached in September, 1984. (Most of the data in this article come from reports of the State of California's Employment Development Department.)

Over the long term, therefore, the high-tech employment decline of 1984-85 may appear as a mere perturbation in a strong upward curve. High-tech manufacturing employment in Santa Clara County has skyrocketed from an annual average of 82.7 thousand in

GLOBAL ELECTRONICS

edited by Lenny Siegel

Issue No. 65

published monthly by the

Pacific Studies Center
222B View Street
Mountain View, CA
94041 - USA
415/969-1545

US ISSN 0739-0416

subscription rates (12 issues)

United States: $10.00
Canada and Mexico: US$12.00
Overseas (airmail): US$15.00

all back issues are available

1972 to 232.8 in 1985.

While there are strong signs that the electronics industry is emerging from its two-year slump, employment gains are likely to be uneven. Military contractors, clustered in guided missiles/space vehicles and communications equipment categories, are likely to continue their relatively strong growth unless Federal budget priorities change. Milititary work, however, is unlikely to regain its pre-1970's share of Valley high-tech employment. Missiles and space, for instance, fell from a high of 12.7 percent of the high-tech workforce in 1972 to 7.6 percent in 1979, before returning to 8.7% in 1985.

While the job market for most high-tech professionals is improving, many laid-off production workers are still having a difficult time finding permanent work in high-tech industry. Other data shows that the percentage of production workers in the Valley high-tech workforce is declining, but when business picks up the absolute number may increase again.

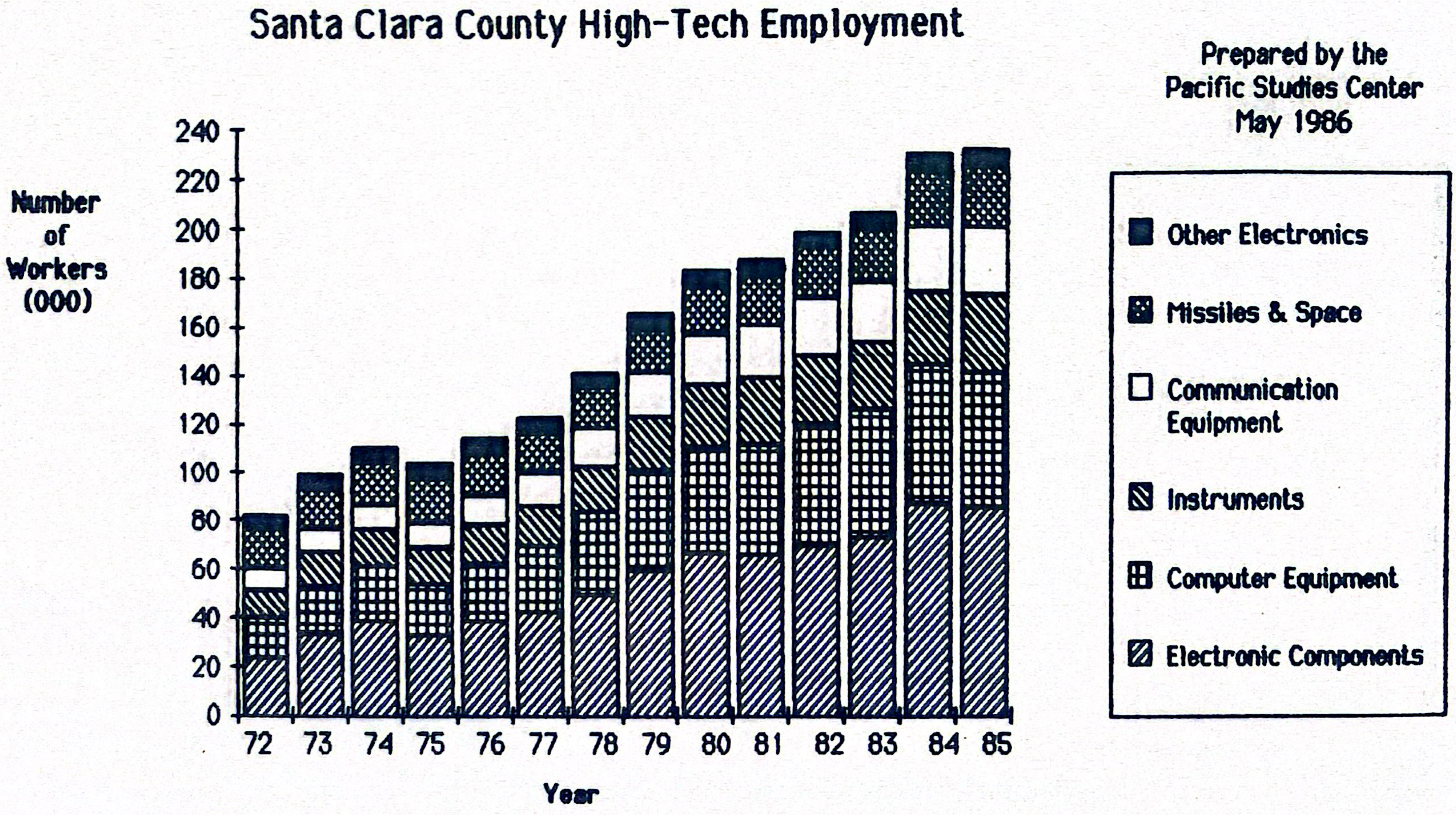
Silicon Valley's problem with lay-offs is not that industry is in decline. Rather, it must be asked, *why does such a healthy sector of the economy offer such poor job security?*

The **Peninsula Times-Tribune** checked its files in 1985, and it found that 48 Silicon Valley high-tech firms laid off a total of 10,000 workers between January, 1983, and March, 1985, even as employment grew by 36,000! (Some of those lay-offs, such as those at game-maker Atari, were allocated to other industrial categories, but durable goods manufacturing – which included Atari – still grew by nearly 31,000 during that period.)

Silicon Valley is particularly vulnerable to lay-offs because most of the electronics industry is cost-competitive. Furthermore, the proliferation of start-ups means that the area has more than its share of shut-downs. The constant emergence of new, unpredictable markets make boom-bust cycles partic- ularly severe. Without unions or protective legislation, Valley workers, professional as well as production, are extremely vulnerable to changes wrought by both the fortunes and the strategies of their employers.

Note: Many more Silicon Valley workers depend upon high-tech for their income than those included here in the high-tech manufacturing category. Some high-tech production, such as video game manufacturing, has been assigned to other industrial codes. Many aspects of high-tech, such as computer services, software houses, and research and development firms (and government agencies) are not even included in manufacturing. Silicon Valley has as many as 12 thousand workers at temporary employment agencies, and most of them work in high-tech, including production jobs. But they are not counted in manufacturing. In addition, high-tech so dominates the Valley that other business services (such as accounting), other manufacturing (such as printing), trade, and construction work overlap significantly with high-tech.

Finally, State statistics on employment confirm the decline of Santa Clara County's traditional manufacturing base. Cannery employment (averaged annually) fell from 8.3 thousand in 1972 to 3.7 thousand in 1985, and motor vehicle manufacturing (primarily Ford's Milpitas assembly plant) dropped from 3.4 thousand in 1972 to four hundred in 1985.



OFFICE AUTOMATION

Though computers of all sizes seem ubiquitous in America's offices, their long-term impact upon employment is not yet entirely clear. **Automation of America's Offices**, a study by the Congressioanl Office of Technology Assessment (summary available as OTA-CIT-288, December, 1985), concludes: "It is likely that growth in office employment . . . will slow over the next few years; it is possible that sometime in the 1990's the level of office employment will begin to decline."

OTA points out that emerging technologies such as optical scanning, speech recognition, and automated data entry (such as automated tellers) should reduce the demand for data entry clerks. Transition problems and institutional lag – such as reliance on attrition for reducing employment – have delayed the impact of office automation thus far. OTA questions the past projections of the Bureau of Labor Statistics, which anticipates strong office employment growth, arguing that BLS has largely ignored impending technological developments.

OTA finds, "Many tasks that were traditionally at the cross-over point between clerical jobs and management or professional jobs have been automated. This truncates some job ladders that were important paths of career development." But evaluating the overall impact of new office technologies upon clerical workers remains difficult, for in many cases job classifications and titles fail to keep pace with new skill requirements.

PRIVACY TECHNOLOGY

The same technology which has in many ways made human privacy obsolete can be used to protect individual activity against snooping. David Chaum ("Security Without Identification: Transaction Systems to Make Big Brother Obsolete," **Communications of the ACM**, October, 1985) suggests a way to prevent the government, credit bureaus, and other operators of data banks from matching data from more than one file.

Matching depends upon the use of identifiers, such as names or social security numbers, common to two or more systems. Presently, investigators need only program a computer to search out an identifier in two filing systems or even run an automatic comparison. Once two files are found, the information can be combined.

Chaum proposes to do away with common identifiers and replace them with random, electronically generated digital pseudonyms. Each individual would have his/her own card-size computer, responsible for generating and recalling such pseudonyms. In much more detail, he proposes a system designed to provide security to customers as well as vendors.

It is unlikely that Chaum's approach will prove politically acceptable to the powers-that-be. It has not yet been evaluated technically. But for a computer scientist to attempt to turn the technology around to support individual freedom is still a major step forward.