
GLOBAL ELECTRONICS

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STRANGE BITFELLOWS

Competition between IBM, the Colossus of the computer industry, and Apple Computer, the unorthodox upstart from Silicon Valley, has long intrigued the mass media as well as the business press. Apple created the personal computer market, and IBM dominates it. IBM's stodgy blue-suited homogeneity contrasts sharply with the Apple's dynamic corporate culture, which descends in part from the counterculture of the 1960's.

So the July 3 announcement of a cooperative venture between the two firms hit the press with fireworks. The announcement had more news appeal than most corporate alliances, but it's no shocker. High-tech companies are constantly coming to terms with their competitors.

The Apple-IBM agreement, the details of which still must be negotiated, calls for technology sharing in at least four areas:

1. Apple's object-oriented operating system software.
2. IBM's reduced-instruction-set microprocessor.
3. Multi-media products, which integrate personal computers with video and sound.
4. Software for linking IBM and Apple computers.

In addition, shortly before the broad-based agreement, IBM began supplying 160-megabyte hard disk drives to Apple for Macintosh computers. (*San Jose Business Journal*, May 27, 1991)

The alliance with Apple is merely one of many IBM joint ventures. In June it established an alliance with Wang Laboratories, in which Wang will phase out its own minicomputer manufacturing. On July 5, IBM announced plans to join German electronics giant Siemens AG in building a \$700-million memory chip plant in France. Over the last year, IBM has also established alliances with several software firms, including Go, Metaphor, Novell, Borland, and Lotus.

Still a Dynamic Industry

Why does IBM, with its vast resources and dominance of most segments of the computer market, rely so heavily upon alliances with much smaller firms? The computer industry has been around for a few decades. Why hasn't it matured?

High technology is "young" because it is based upon dynamic technology. In particular, the physics of semiconductors still makes it possible for chipmakers to squeeze four times as many electronic valves, or "gates," on a flake of silicon every couple of years. Each generation of chip, used in both memory and logic, makes possible a new generation of computing machines. More important, the ever-increasing speed and memory of both chips and computers drives the creation of more complex, sophisticated, and powerful software.

It is possible for firms to use their dominance of the market for one generation of products—such as IBM with mainframes or Intel with microprocessors—to establish leadership in the next generation. Intellectual property laws help software firms like Microsoft or Lotus to stay in the lead as well.

However, the constant complexity of circuitry and software not only opens up niches for smaller, newer firms, it supports the creation of wholly new product categories, such as scientific workstations. Even the largest labs—in this case IBM's far-flung research operations—can't keep up.

Thus, to maintain their market position and technological leadership, major firms are constantly establishing new alliances with their competitors as well as start-up firms. High-technology industry is not merely a collection of independent powerhouses; nor is it the realm of well defined industrial groups. Rather, it is a tangled, constantly changing and growing web of interdependence.

The Apple-IBM agreement is just one of many high-tech alliances, but it could prove to be more. The two firms account for about thirty-eight percent (according to *Business Week*, July 22, 1991) of the global personal computer market, and IBM "clones" account for much more. If their partnership succeeds, therefore, it is likely to set future technical standards for the PC business. Personal computer users will probably welcome increased compatibility among the offerings of the various vendors of PC equipment, but they may not welcome the reduced choices and higher prices likely to accompany standardization, at least in the short run.

IBM STILL OUTSELLS JAPAN'S COMPUTER INDUSTRY

Every year it seems as if Japan, Inc., is about to propel itself into the leadership of high-technology electronics. In fact, many otherwise informed people think that U.S. firms are also-ran's in the strategically and economically vital computer race. Once again, however, the data shows otherwise. Not only do U.S.-owned computer firms dominate data processing sales, technology, services, and software, but one U.S.-based corporation, IBM, still sells more computers than the entire Japanese-owned computer industry.

Datamation, June 15, 1991, ranks the top 100 computer companies, worldwide, by their information systems (IS) revenues. IBM's computer-related sales totalled \$67,090.0 million, compared to \$61,298.3 million for all 14 Japanese companies listed. In 1989 18 Japanese-owned firms in the *Datamation* 100 sold US\$57,866.5 million worth of computers and computer services, against US\$60,084 million by IBM. (See *Global Electronics* No. 105.)

Japanese-Owned Firms	1990 IS Sales
Fujitsu	12,361.5
NEC (Nippon Electric)	12,350.3
Hitachi	9,590.9
Toshiba	4,764.5
Canon	4,669.2
Matsushita	3,731.0
Nihon Unisys	2,279.0
NTT (Nippon Telephone & Telegraph)	2,114.0
Mitsubishi	2,055.5
Oki	1,989.0
Ricoh	1,774.3
C. Itoh	1,595.1
Seiko Epson	1,590.7
Kyocera	433.3

JAPANESE CHIP TRADE

In early June, negotiators from the Japanese and U.S. governments announced a new trade agreement designed to resolve trade friction between U.S. and Japanese manufacturers of semiconductors. The agreement establishes a twenty-percent market share goal for U.S. chipmakers' sales in Japan, by 1993. In its enforcement of anti-dumping rules in the U.S., it transfers record-keeping responsibility from the U.S. government to Japanese exporters.

Don't expect the agreement to radically alter the chip business. Whether embodied in such a docu-

ment, or merely the subject of threats, government pressure slightly influences Japanese buyers. Overall, the price, quality, and suitability of U.S.-designed and produced chips are more important factors in the U.S.-Japan chip trade balance.

Those trade relations, however, are influenced by the growing number of alliances between U.S. and Japanese circuit manufacturers. *Business Week* (June 17, 1991) lists six such major manufacturing joint ventures and technology exchanges:

U.S.-Owned Firm	Japanese Partner
Motorola	Toshiba
Texas Instruments	Hitachi
AT&T	NEC
Advanced Micro Devices	Sony
LSI Logic	Kawasaki Steel
Intel	NMB Semiconductor

Since then, LSI Logic also established a joint venture with Sanyo to develop chip sets for the Japanese high-definition television market.

Business Week argues that a number of factors, including the new chip agreement, give U.S.-owned firms a stronger hand in negotiating partnerships: "Still, there are encouraging signs that America's best companies have learned to manage their partnerships better... the global environment for alliances has undergone sweeping changes, many of them working to America's advantage."

We think it's too early to tell. And *Business Week*, of course, continues to blindly link the fortunes of U.S.-owned chipmakers to the health of the U.S. trade balance, the economy at large, and even the body politic. Nevertheless, it's pretty clear that the peace pipe, not the sledgehammer, is the key factor in boosting U.S. sales in Japan.

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Meanwhile, Texas Instruments, after nearly three decades of pursuing basic chip patents in Japan, is attempting to force Fujitsu, the world's sixth-largest chipmaker and Japan's largest computer company, to pay royalties. Four other major Japanese firms have already agreed, but Fujitsu, despite a settlement with TI on other issues has refused. Both firms risk a great deal by taking the controversy to court, so it is likely that they'll eventually settle. If TI manages to enforce its patents in Japan, it could reap substantial profits just by charging royalties on sales by its more efficient Japanese competitors. From 1986 through 1990, TI reported \$700 in patent revenues. If it collects on every chip made and sold in Japan, that number would rise significantly. (*San Jose Mercury News*, July 19, 1991)

SCREEN RULING ISSUED

Commerce Department officials appeared to try to "cut the baby in half" when they issued their ruling, early in July, on a complaint by U.S. flat-panel display producers. The screen-makers, arguing that Japanese firms were selling displays in the U.S. below production costs, sought anti-dumping penalties against the imports, while the computer firms that buy the Japanese screens opposed the charges. (See *Global Electronics* No. 107)

Commerce clamped a 62.6% surcharge on screens made with active-matrix liquid crystal technology, a new technology which is expected to grow in importance as more color lap-top computers are made. But it decided that other flat-panel technologies represented distinct markets, thus exempting passive-matrix liquid crystal displays from the surcharge. Passive-matrix is the prevalent lap-top screen technology today. (*San Jose Mercury News*, July 9, 1991)

WISCONSIN INVESTS IN SILICON VALLEY

The State of Wisconsin Investment Board, which invests pension money for Wisconsin's state workers and public school teachers, is a major investor of Silicon Valley. The *San Jose Business Journal* (June 10, 1991) reports that the \$24 billion fund places about a tenth of its money in high-growth, high-risk companies. Of that, about \$360 million is currently invested in Silicon Valley.

SWIB typically buys stock when bad news drives down a firm's stock price, but its studies show the firm healthy. Then it holds on to the stock until it returns to its peak price. SWIB took a

loss on its investment in Businessland, but usually it fares well.

SWIB's Silicon Valley portfolio contains large, established, high-tech firms as well as relatively recent start-ups, including National Semiconductor, Raychem, Ask Computers, Silicon Valley Group, Integrated Device Technology, Xicor, Measurex, Caere, The Failure Group, Maxtor, Cadence Design Systems, Applied Materials, LSI Logic, Adaptec, Chips & Technologies, Network Equipment Technologies, Sierra Semiconductor, Lattice Semiconductor, Applied Magnetics, Brooktree, and Teradata.

ELECTRONIC CHEMICALS

The Freedonia Group, a market research firm, projects that the U.S. market for electronic chemicals, calculated at \$3.7 billion in 1990, will rise by nearly nine percent per year to \$5.7 billion in 1995. Major segments of the market include the printed circuit board industry, with purchases of \$1.8 billion in 1990, the semiconductor industry (\$1.3 billion), and passive components (\$.6 billion). Major chemical products bought by the electronics industry include plating chemicals, silicon wafers, and packaging materials.

Environmental considerations are being felt by the suppliers of electronic chemicals. Freedonia says, "Solvents and cleaners will exhibit below-average growth due to conservation measures and improved processing techniques and equipment. The increased cost of regulatory compliance will also impact demand as chlorofluorocarbons are phased out and more expensive substitutes replace them."

Meanwhile, the Bush Administration recently restricted the export of numerous chemicals used by the electronics industry. Of the 39 compounds thought to be useful in chemical weapons production, several are used in chip production. The restrictions do not apply to exports to Japan or Europe, but they do apply to Singapore, Malaysia, Taiwan, and South Korea. (*San Jose Mercury News*, May 29, 1991)

MISUSE TOXICS: GO TO JAIL

The president of Amtronics, a Silicon Valley printed circuit board maker shut down for hazardous waste law violations (see *Global Electronics* No. 108) has been sentenced to six months of a jail-based work furlough program as well as 400 hours of community service. (*San Jose Business Journal*, July 22, 1991)

TOXIC RECHARGE

Rechargeable nickel-cadmium batteries are becoming commonplace. Built into high-tech appliances such as portable phones and laptop computers, they have also won favor among some environmentalists because they can be used over and over again.

Still, NiCad batteries account for a reported 54% of the cadmium in the U.S. waste stream. Cadmium, a heavy metal, is highly toxic. "It's carcinogenic when inhaled and causes kidney damage when ingested—for example, by eating fish taken from a stream that's contaminated by tainted groundwater."

State and Federal environmental regulators are beginning to crack down on cadmium so electronics and computer companies are attempting to develop reliable, long-lasting alternatives. The two major candidates now are nickel-metal hydride and lithium batteries. (*Electronics*, July, 1991)

MEXICAN TRADE

The preferential trading pact with Mexico, now being negotiated, may have a major impact on the U.S. economy. Manufacturers in many industries will consider shifting production to Mexico, to take advantage of cheap labor and lax environmental regulation.

The impact on U.S. electronics production, however, is likely to be less pronounced. Electronics companies have already formed global assembly lines, in which each activity takes place in the cheapest locale. U.S. firms carry out most of

their labor-intensive electronics production the Far East.

It is possible, however, that Japanese firms will locate additional plants in Mexico to penetrate the U.S. market, or that U.S. firms will relocate some Far Eastern work in Mexico. *Business Week* (July 1, 1991) expects this to be a major trend, and it cites plans by AT&T. "Rather than expanding an existing plant in Singapore, American Telephone & Telegraph Co., long established in Mexico, is scheduled to open a 1,500-employee answering-machine factory in Guadalajara in July. AT&T is also moving its cordless-phone-repair operation to Mexico from Singapore, thinking that the shorter distance will speed up customer service."

However, semiconductor assembly, the biggest U.S. employer in several East Asian countries, is not likely to move to Mexico. Asian countries have the experience, skills, suppliers and infrastructure to assemble chips; shipping costs are minor; and there is no tariff.

TOO DIRECT ACTION

A San Diego electronics technician, apparently unrepresented by any form of organized labor, took individualized direct action against an official at Elgar Corp. responsible for laying him off. Carrying guns and homemade bombs, the worker, laid off about three months earlier, invaded Elgar offices and sought out the firm's vice-president and General Manager. He shot the VP and another man. Elgar, a producer of computer components, employs about 300 people. (*San Jose Mercury News*, June 6, 1991)

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