# GLOBAL ELECTRONICS

Issue No. 107 March-April, 1991

## HDTV ADVANCES—DO WE NEED IT?

Even in the absence of Federal subsidies, reports **Fortune**, "American technology should leapfrog Japan to create the world's best television system by 1995." But **Fortune** (April 8, 1991) warns that technological success will not revive the U.S.-owned consumer electronics industry. More important, the recent performance of the American broadcast industry suggests that other, decentralized technologies might better serve the public interest.

For about three years, leaders of U.S.-based high tech companies, backed by number of liberal ideologists, have promoted Federal subsidization of high definition television (HDTV) as a way to preserve the American electronics industry and slide the U.S. into a more conscious, commercially oriented industrial policy.

The electronics industry argues that the new television technology would not only allow the revitalization of the U.S. consumer electronics industry, but it would drive the development of new generations of semiconductors and other support technologies. They warn that Japanese firms have once again taken the lead, introducing a satellite-based HDTV system in Japan.

Despite the efforts of some of America's biggest companies, the Bush administration rejected HDTV subsidies as an affront to the "free market." Industry has been able to obtain only a handful of contracts from the Pentagon to research high definition displays.

### Digital Technology

It turns out that the Japanese, in their rush to adopt a new technology, settled on an inferior approach. The Japanese system is analog, like older television broadcasting standards. **Fortune** writes, "Happily for American consumers, the U.S. introduction of high-definition television may have been delayed just enough to take advantage of a major breakthrough." The Federal Communications Commission (FCC) is currently considering several proposals for an HDTV broadcast standard. Only one, entered by NHK, the operator of the Japanese system, is analog.

The American breakthrough is digital transmission, in which signals are converted into computer-like pulses. (Compact disc systems use digital technology to provide high-quality sound reproduction.) **Fortune** says, "General Instrument had experimented with digital transmission for satellite communication and found digital signals easier to send error-free than analog signals. Because digital signals are also easier to detect at a distance, broadcasters can use smaller, less powerful transmitters, not only saving money but also reducing the chance of interference with other channels."

Digital systems may mean land-office business for American manufacturers of microprocessors, but even with American-designed technology HDTV won't do much for the U.S.-owned electronics industry. In essence challenging the U.S. electronics lobby, **Fortune** points out that the FCC will require the firm or consortium that qualifies a new broadcasting standard to license it widely: "As for HDTV's reviving U.S. electronics manufacturing, forget it. No matter who wins the contest [for FCC approval] and cashes in on the patent rights, the big money will go to the companies that actually make the new TV sets and production equipment. They are mostly foreign owned.

"In any case, the color TV business, with annual U.S. sales of about $6 billion, is hardly big enough to drive the consumer electronics industry (1990 U.S. sales: $33 billion), let alone the electronics industry as a whole ($282 billion). Moreover, nearly half the color TV sets sold in the U.S. are already made in America, while Zenith, the only remaining American TV set company, produces most of them in Mexico."

### Flunking the Needs Test

In the long run, there is probably a market for high-definition programming, but it might be small. While advocates of government subsidization say that high-definition sets will eventually replace most standard color receivers,

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it's possible that the high cost and minimal advantages of high definition—particularly for small receivers—will limit the market.

More important, the introduction of high-definition broadcasting may actually be against the public interest, promoting the further centralization of news and other video programming. Broadcasting high-definition programs will be expensive; producing them may be prohibitive.

When HDTV first appeared on the horizon, estimates appeared projecting that it would cost each broadcast station $38 million to convert to HDTV formats. **Fortune** says that figure represents a start-from-scratch approach. Upgrading a broadcast outlet could cost as little as $1 to $2 million. Equipping a major station with HDTV studios, however, could take $10 to $15 million.

Today, a large chunk of the U.S. population has access to video technology, in the form of home video cameras and casette recorders. Independent producers and political organizations, with more sophisticated but still somewhat reasonably priced equipment, can produce quality programs. While the networks—now including Cable News Network—dominate the flow of news, independent groups, such as Deep Dish TV, can distribute information via satellite to local cable stations around the country.

The advent of HDTV will not prevent low-budget sources from distributing programs, but it will turn their broadcasts into visually inferior products. Only those thoroughly disgusted by the networks will seek alternatives. (How many people today would feel comfortable watching black-and-white newscasts?)

During the Persian Gulf War, the Pentagon and the Bush Administration used the centralized organization of television news to control coverage of the politics of the conflict, domestic reaction, and the fighting itself. While Deep Dish TV's programs reached a handful of viewers who demanded an alternative, those wishing to break the networks' hold relied more on radio and print media.

HDTV, by increasing the cost of filming, editing, and broadcasting news, will reinforce that centralization. It will be even harder for groups without immense financial resources to use television to get their messages across.

On the other hand, occasionally a low-quality, politically poignant videotape makes its way onto the airwaves. The home video of the beating of Rodney King by Los Angeles cops, for example, has been played over and over across the nation. It's hard to know why newscasters choose to display this tape, while they reject documentaries of U.S. bombing damage in Iraq, but it shows the potential educational and political impact of alternative video.

There is a need, and there may even be a lucrative market, for equipment that helps video hobbyists edit and distribute their "films." Perhaps multi-media computing, in which computer graphics, video, and compact disk storage are combined, will find a mass market.

In the mid-1970's computer hobbyists, dissatisfied with the centralized nature of that era's computer systems, developed and popularized personal computers. Though large corporations have taken over most of the PC business, decentralized computing has provided new creative tools and political channels—using techniques such as desktop publishing—to those without extensive resources.

If we want the Federal government to assist in the development of technologies that we as a society need, then low-cost video production, not HDTV, should be the technology of choice.

## ELECTRICAL ROOTS

*(This article also appears in the current issue of* ***Second Century,*** *the newsletter of Stanford University progressive alumni.* ***Second Century*** *is also published by PSC.)*

It is widely acknowledged that after World War II Stanford University, particularly Engineering Dean and later Provost Frederick Terman, laid the groundwork for the nearby high-tech industrial complex today known globally as Silicon Valley.


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Issue No. 107

published 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: $12.00
Canada and Mexico: US$14.00
Overseas: US$17.00

all back issues are available


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Mountain View, California

Some accounts trace the growth of the Stanford electronics complex to the formation of Varian Associates and Hewlett-Packard in the late 1930's. Occasionally someone notes Lee de Forest's invention of the vacuum tube in Palo Alto in 1912, but that is treated as a historical coincidence.

In fact, writes historian James Williams, Stanford's historical strength in electrical engineering was no accident, but a consequence of geography. California's experience in hydraulic engineering, combined with shortages of coal and wood, encourage the early growth of hydroelectric power near the end of the nineteenth century. Williams writes, "Between 1890 and 1920 the region pioneered in high-tension, long-distance electric power transmission..."

In response the that development, Stanford offered electrical engineering courses when it opened in 1891. Williams points out that the early relationship between the university and the electrical power industry foreshadowed its alliance with electronics, decades later:

"A clear working relationship between science and technology emerged through the [Pacific Coast Electric Transmission] Association. Field experience led to invention and innovation, university laboratory experiments, and cooperative experiments and testing. For example, John Martin, a self-taught engineer, developed a high potential oil switch in response to line regulation needs. In 1898 Professor [Frederick] Perrine, conducted a 30,000 volt test on a power company's 16,700-vole line.... Perrine's tests led directly to the construction of 30,000 and 40,000 volt lines." Perrine, foreshadowing the work of his successors, took leave from Stanford for two years to consult for Standard Electric Corporation.

In 1905, Stanford hired Harris Ryan from Cornell to head the Electrical Engineering Department. Ryan, a leading specialist in high-voltage transmission, led the construction of the west's first high-voltage lab in 1913 and a two million-volt facility in 1926.

In 1909, Cyril Elwell, a graduate of the Stanford EE program, set up a company in San Francisco, devoted to wireless communications. In 1912 employees at his Palo Alto branch, Federal Telegraph, invented the first vacuum tube. (Ironically, the transistor, which drove the tube from most markets, was not invented in Silicon Valley.)

Frederick Terman, son of a Stanford psychology professor, actually worked at Federal Telegraph after graduating from Stanford in 1920. He received a degree from the EE program in 1922, took his Doctorate at MIT, and in 1925 returned to Stanford's EE program to as a part-time lecturer.

In that period, he developed the vision and the following that later made him the "father of Silicon Valley." California's need for research in high-voltage electricity set the stage for the development, decades later, of its central role in electronics.

(For more information, see James C. Williams, "The Rise of Silicon Valley," *Invention & Technology*, Spring/Summer, 1990, and James C. Williams, "Regional Development in the Technical Sciences in California's Electric Power Industry, 1890-1920," *Technology and Technical Sciences in History*, Proceedings of the ICOHTEC-Symposium, Dresden, August, 1986 [Berlin: DVW, 1987]. Williams is Executive Director of the California History Center at De Anza College in Cupertino, California.)

## FLAT PANEL DUMPING CASE

In February, officials of the U.S. Commerce Department issued a preliminary ruling that Japanese producers of flat-panel displays for laptop computers were selling their products in the U.S. at prices 2.3% below their manufacturing cost. If this ruling is upheld, the Japanese companies will have to pay "anti-dumping" duties of up to 4.6% on their flat-panel exports to the U.S.

The American Display Manufacturers Association, a group of eight small U.S.-based firms, not only brought the complaint, but they sought much higher duties. The 4.6% is probably not substantial enough to improve their competitive position.

The display-makers received no backing from elsewhere in the U.S. electronics industry, however, since major computer manufacturers don't want to pay more for the Japanese screens. In fact, Compaq Computer Corp. reportedly led a lobbying campaign to undermine the dumping charges. Even the Semiconductor Industry Association, known for its aggressive challenges to Japanese trade practices, refused to get involved, reportedly because it feared that computer-makers would retaliate by withdrawing support for the U.S.-Japan Semiconductor Trade Agreement.

As usual, determining a fair market price for imports is no easy matter. The production of active matrix liquid crystal displays, such as that used on Apple Computers' portable Macintosh computers is near the beginning of the learning curve. That is, Hosiden, their Japanese manufacturer, has trouble producing flaw-free screens. Only one of each five made passes muster. Thus, concludes former State Department economist Kevin Kearns, "The price that Apple is paying for the screens bears no

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relation whatsoever to Hosiden's price of manufacture." (**San Jose Mercury News**, February 25, 1992; see also February 13 and 15.)

It is likely, however, that production yields will improve over time, lowering the cost of manufacture. In that case, today's prices may turn out to be reasonable, as a long-term average.

In the meantime, small, innovative U.S. flat-panel producers are having a hard time competing with their deep-pocketed Japanese counterparts.

## SEMI-GAS SALE APPROVED

In March a U.S. District Court judge in Philadelphia refused to grant a preliminary anti-trust injunction requested by the Justice Department. Judge Clifford Green thus apparently cleared the way for the finalization of the sale by Hercules Inc. of Semi-Gas, the world's top supplier of gas handling systems for chip production, to Nippon Sanso, of Japan. (See **Global Electronics** No. 105 for background.)

Last year, the interagency Committee on Foreign Investment in the United States reviewed the national security implications of the sale, and it recommended that it be approved. President Bush cleared the transaction in July. However, Sematech, the Pentagon-backed chip technology consortium, asked the Justice Department to investigate the anti-trust implications, and on December 28 the Justice Department filed against the case.

Ironically, Judge Green's rejection of Justice's flimsy case strikes a blow against Sematech and its efforts to monopolize, or at least control, domestic developments in semiconductor manufacturing technology.

## INFORMATION RICH VS. POOR

A new Bureau of the Census study (reported in the **San Jose Mercury News**, March 27, 1991), documents that home computers are found primarily in the homes of affluent white people. Two-fifths of American households with incomes of $50,000 or more owned personal computers in 1989, but only five percent of households earning less than $15,000 had PC's. White children are 2.5 times as likely to have home computers as blacks; Anglos 2.5 times as likely as Hispanic children.

The number of home computers doubled in the 1980's, but at fifteen percent market penetration they remain more a luxury than an appliance. Most homes with personal computers either have children, or adults who use them in their work. The newspaper report did not say how many home computer users own and use modems for digital communications.

Robert Kominski, who wrote the report, said, "We all expected computers to grow, but I'm surprised at the level of economic differentiation that we saw."

Unless our society takes steps to overcome income, ethnic, educational, and age obstacles to home computer use, the much vaunted "electronic cottage" will remain a high-tech castle.

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