

U.S., Japan Reach Truce in Chips War

U.S. silicon chip companies will benefit in the short run, but experts say the long-term structural problems remain unsolved

THE trade war over silicon chips reached a truce at midnight on 31 July, the last possible moment before a deadline set by the United States.

This marked the end of hostilities between U.S. and Japanese makers of semiconductors, carriers of the minute circuits that lie at the heart of modern electronics. The struggle raged in the courts and conference rooms for a year, sparked by complaints that Japan was breaking fair-trade laws.

Had the deadline passed without agreement, the United States intended to put back into effect some stiff fees levied on importers of Japanese chips earlier this year. The fines, covering several advanced memory chips, were suspended while the government awaited the outcome of these talks.

The carrot-and-stick approach seems to have worked. U.S. officials say that the volume of U.S. chip sales in Japan may double in the next 5 years, increasing from around \$800 million to \$2 billion.

The U.S. companies accused the Japanese of two trade violations: limiting the sale of U.S. chips in Japan and promoting the sale of Japanese chips in the United States through unfair price competition. The American companies asked the government for help on the ground that the United States must have a healthy chip industry if it wants a healthy electronics industry. National security was invoked as well, in that the effectiveness of U.S. weapons rests on the quality of their electronic parts. Government officials found the case persuasive. In winning this agreement, they claim to have saved a vital high-technology industry.

The text of the agreement has not been published. However, it seems to be one-sided, consisting mainly of Japanese promises to buy more U.S. chips and to avoid extreme price-cutting. The Americans simply agreed not to impose the threatened duties, provided Japan keeps its end of the bargain. There are no numerical goals or timetables, but secret "side letters" apparently call for U.S. chip sales in Japan to grow steadily through 1991. The measure of Japanese cooperation, a Commerce Department official said, will be "the sound of cash registers ringing."

The Japanese Ministry of International Trade and Industry (MITI) pledged to help change the pattern of trade in several ways. It will create a new organization to act as a liaison between U.S. sellers and Japanese buyers. This outfit will collect and publish data on foreign products, hold seminars, and organize research fellowships for foreigners in Japan. MITI also will invite American companies into joint ventures with Japanese manufacturers to develop new products. Finally, the Japanese government

Announcing the truce.

Trade representative Clayton Yeutter (left) and Commerce Secretary Malcolm Baldrige: "An historic agreement." Meanwhile, researchers find that U.S. chip merchants are threatened by the growth of big "captive" factories within the United States. The small firms are being squeezed more by U.S. manufacturers than by foreigners, according to the National Science Foundation. If so, the trade agreement may penalize Japan for problems not entirely of its making.



has pledged to collect data on domestic chip manufacturing, exporting, and pricing, and to share the data quickly with U.S. officials if and when new trade complaints arise.

President Reagan praised Commerce Secretary Malcolm Baldrige and Special Trade Representative Clayton Yeutter for hammering out "an historic agreement." George Scalise, head of the public policy committee for the Semiconductor Industry Association, spoke with no great modesty of his own industry as the "most important basic industry for the rest of this century," saying the pact opened "a new era in trade relations" with Japan.

Behind the scenes, however, experts remained skeptical about the long-term value of the agreement. For industry, the main concern is that the pact may not be enforced. "We've been burned before," said SIA econ-

omist Steven Benz, speaking of Japan's promises in the 1970's to open its market to U.S. electronic products. The immediate effect will be to boost the U.S. companies' stocks and raise the prices of some chips. The Japanese were accused of "dumping" certain products. (To dump is to sell below the cost of manufacture plus profit. Cost and profit are defined by the U.S. International Trade Commission.) The Japanese denied that they engaged in dumping, but nevertheless agreed to stop, and so prices will

go up. "It is a decent agreement," Benz said, "But given past history, we will have to wait" to see whether it provides substantial help.

Nonindustry observers had other doubts. For example, one federal official at work on a study of chip manufacturing said, "This isn't going to transform the American semiconductor industry; it won't end the internal problems." He argues that the Japanese are successful because they have developed better manufacturing technologies, not because they violate trade rules. "What is dumping?" he asks. "It's just an emotional term." In his view, Japan leads the world in the quality of semiconductor fabrication and production processes. "It's no longer 1971. The managers who are screaming about the Japanese are the ones who built up these companies in the 1970's. They don't realize that things have changed."

A new study of the semiconductor market at the National Science Foundation supports the view that domestic problems may afflict the industry more than competition from Japan. This came to light as researchers worked on a two-part review of the threat to national security posed by imported silicon chips (*Science*, 4 April, p. 12). The President's National Security Council is coordinating one part and the Defense Science Board (DSB) at the Pentagon is running the other. NSF has taken a hand in drafting the security council study.

Researchers scoured the data banks for the latest and best information and were surprised by what they found. If the numbers prove correct, Japanese competition is not the only—or the primary—cause of distress. The turmoil may be due to a general market shuffle in which big companies are pushing out small ones. Thus, under the new trade pact, Japan may be penalized for problems not entirely of its making.

Market analysts divide the chip business into three categories: (i) the importers, (ii) the relatively small companies that specialize in making chips, called “merchants,” and (iii) the chip-making subdivisions of much bigger corporations, known as the “captives.” Typical merchants are Intel, National Semiconductor, and Advanced Micro Devices. Two major captives are the semiconductor divisions of AT&T and IBM.

According to one NSF expert, “The quality and consistency of the data we’ve seen are not good, but a significant point has come out. It looks as though the U.S. merchants have lost more to U.S. captives than to the Japanese.” The captives have been growing slowly but steadily over the last decade, while the merchants have moved in irregular ups and downs. These smaller merchant companies are severely affected by the peaks and dips in demand, living a marginal kind of existence that makes it difficult to invest adequately in new R&D. The captives now appear to control 45 to 50 percent of the U.S. market. However, the researcher warned that the numbers are weak, because it is nearly as hard to get information on the secretive U.S. captive companies as to learn about the Soviet chip market.

A similarly bleak analysis appeared in a recent paper by MIT political scientist Charles Ferguson, titled “American Microelectronics in Decline.” He wrote that the U.S. industry is “substantially inferior to Japan’s in most product and process technologies” because it has never reorganized to meet the new global competition. Instead, it remains “highly vulnerable, fragmented, and poorly suited to intense competition. . . .” Protectionist measures will not help, Ferguson claims, unless they are ac-

companied by a campaign to restructure the industry.

Ferguson spoke before the Defense Science Board’s Task Force on Semiconductor Dependency earlier this year, and the group may have taken his comments to heart. In any case, it has decided to look into the industry’s structural problems as well as the military’s particular concern for a secure source of supply. Both this DSB report and the National Security Council study are being thoroughly rewritten to take account of new data and provide a broader perspective on industry problems. Along with a third report on semiconductors at the National Academy of Engineering, they are scheduled for release in September.

One controversial proposal the DSB may offer in the line of structural reform is that the Pentagon invest in a new “chip foundry.” The idea may follow the Japanese model, calling for a large federal subsidy (perhaps \$200 million a year for 5 years), but leaving management strictly in private hands. The exact purpose of the foundry has not been settled. In one scheme it would serve as an R&D center for testing new approaches to manufacturing; in another, it would be a shared factory to produce chips

designed elsewhere; and in a third, it would serve as a mass production center for advanced memory chips. There are problems with each suggestion, not the least of them political. The Pentagon may not have room in its budget for anything so grandiose.

Meanwhile, Charles Sporck, president of the National Semiconductor Corporation, is trying to interest his peers in another joint manufacturing idea. Interviewed in July by *Electronic News*, he said his efforts were just in the “early stages” and that he was trying to learn if there was any consensus for a joint venture in the industry. He spoke of the need for “an overall integrated development plan” that would enable U.S. companies to compete with Japan by coordinating their manufacturing investments. In the past, he said, the chip makers had been too “fragmented” in their demands on companies that design production machinery. He mentioned no definite proposal but said, “There will have to be government funding in some way.”

On 31 July, the government won at least the promise of respite from Japanese competition in the silicon chip trade. It remains to be seen how the U.S. industry will use the breathing spell. ■ **ELIOT MARSHALL**

Computers in Class At the Awkward Age

Advances in artificial intelligence and cognitive research spur hope of new era for teaching, but question is when

SINCE the first big wave of enthusiasm for the use of advanced technology in education crested 20 years ago, computers have reigned as the brightest hope among all the technologies. The computerized classroom has taken longer to materialize than its advocates foresaw, but advances in artificial intelligence (AI) and cognitive research in recent years have raised expectations that computer-assisted instruction will soon achieve the potential its proponents claim. For applications of such research in the schools, however, it seems to be a case of so near and yet so far away.

In contrast to business and the military, where AI ideas are already being put to use, AI applications in education are still confined almost exclusively to research laboratories. Two practical questions for the

schools are whether AI ideas can be translated into software that will make a real difference in the classroom in the near future and whether computer hardware capable of running such software will be available at costs the schools can afford. School organization and operating attitudes will also affect the transfer.

The main issue is whether computers can be made to teach in the sense of guiding the student through subject matter the way a capable teacher can. From the beginning of work on computer learning, a main aim has been to create a fully interactive relationship between student and machine that will put the computer at the center of instruction.

A clear perspective on when AI will move from the lab to the classroom is hard to establish. AI researchers working on educa-