GLOBAL ELECTRONICS

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STRATEGIC COMMAND

The American mass media gives extensive coverage to issues surrounding U.S. preparations for strategic (that is, global nuclear) warfare, but broadcasters and publishers tend to ignore electronic systems for strategic command, control, communications and intelligence. These high-tech systems are apparently considered too technical, too complex, or too arcane to cover.

A notable exception is **The New Yorker**, which published "The Button," by Daniel Ford in two parts, on April 1 and April 8, 1985. Ford's lengthy study is both informative and comprehensive. He describes present and planned systems for detecting a Soviet attack on the United States and for ordering a U.S. counterattack. He concludes that the American strategic command apparatus, even if Pentagon upgrades are completed, is unreliable.

Ford argues that U.S. military leaders, for practical purposes, anticipate a U.S. first strike, not necessarily as a "bolt from the blue," but to pre-empt a Soviet attack. Since a first strike does not require the construction of a complex, survivable warning and communications system, they have deliberately ignored that aspect of strategic weaponry. Top-level uncertainty over the U.S. ability to retaliate against a Soviet attack is dangerous, he points out, because it leads to the institution of hair-trigger launch policies and, in an escalating crisis, to a pre-emptive strike.

Unfortunately, Ford's solution is for the Pentagon to create a much more reliable strategic command and control network, a policy backed by the White House since the last year of the Carter administration. He acknowledges that the U.S. sees command and control modernization as a crucial part of the doctrine of flexible response, which posits the possibility of a protracted nuclear conflict, but he quite rightly considers the notion of a staged holocaust unrealistic. He fails to recognize, however, that a survivable warning and communications networks reinforces the illusion, amongst policy-makers, that flexible response is a workable policy. That is, it makes nuclear war thinkable. In fact, despite its failings, the present U.S. apparatus for warning of a Soviet strategic attack and launching a massive retaliation is sufficient to deter an attack. A simpler system would do the job. All that is required is to have a network powerful enough to convince the Soviets that there is a strong chance of the U.S. landing a few dozen large warheads on the Soviet Union if the Soviets launch first. One hundred percent reliability is not necessary. Nor is it necessary to count warheads, time their descent, or guess their targets. It not necessary to plan a complex counterattack, or to determine which U.S. warheads have reached their target.

The real problem with American strategic preparedness lies in the creation of war-fighting doctrines which necessitate complex command systems. The more complex the system, the greater the risk is of failure. Until a reliable peace breaks out, the best way to build certainty into the U.S. deterrent posture is to return to a simple doctrine. Building fancier systems for command, control, communications and intelligence is no solution.

IBM'S GLOBAL P.C.

Not too long ago Ford Motor pitched its Escort as a "world car." Though IBM's PC is perhaps a better candidate for a world product, the computer giant has refrained from making such a claim. Most buyers assume that the PC is American-made.

However, **Business Week** (March 11, 1985, citing Future Computing, Businessland Inc.) contends that $625 of the typical PC's $860 manufacturing cost is spent abroad, including $230 at U.S.–owned plants. The keyboard, power supply, and graphics printer are made in Japan. Of the floppy disk drives' $190 cost, $165 is done in Singapore. The monochrome monitor is built in Korea. The semiconductors, valued at $210, are listed as half from the U.S. and half from Japan, but a more realistic assessment of chip production would allocate 40% or more of the "U.S." semiconductors to Far Eastern assembly plants.

GERMAN LOOK AT SILICON VALLEY

West German journalist Werner Rugemer has published a German-language study of America's high-tech industrial center, **Neue Technik – alte Gesellschaft: Silicon Valley.** Rugemer offers an overview of the Valley's working conditions, environmental problems, social relations, capital concentration, and military impact, as well as a review of the history of microelectronics and the role of elite science. Rugemer provides an analysis of the post-World War II development of both the quantity and quality of jobs in the Valley, and he describes labor and environmentalist organizing to establish alternatives. The 247–page paperback is available for US$10 (shipping included, but please send a check or money order) from Dr. Werner Rugemer, Siebengerbirgsallee 23, 5000 Koln 41, Federal Republic of Germany.

"THE GLOBAL FACTORY"

The Global Factory: Foreign Assembly in International Trade is a systematic study of the internationalization of manufacturing in today's global economy. Written primarily by Joseph Grunwald and Kenneth Flamm for the Brookings Institution, **The Global Factory** includes case studies of export-oriented assembly in Mexico, Haiti, and Colombia. As one of a handful of studies thus far to seriously review the impact of international co-production, it is must reading for anyone following the "new international division of labor."

The authors conclude that foreign assembly, in its present form, is a temporary, natural, and somewhat desirable result of existing wage differentials. If countries which host U.S. assembly operations integrate such manufacturing into their national economies, they can use it to stimulate industrial development. The U.S. response to increased offshore sourcing, they suggest, should be massive investment in workforce retraining. Unskilled domestic labor, they argue, has little future, due to automation as well as foreign assembly.

Kenneth Flamm's 99-page study of the semiconductor industry should be particularly useful to anyone who reads this newsletter. Drawing upon statistics from a variety of sources, he analyzes the uniquely developed system of global production which is the present and historic standard of semiconductor manufacture. We found the chapter illuminating and agreed with most of Flamm's analysis, but we questioned some of his findings. **Global Electronics** editor Lenny Siegel sent his comments on **The Global Factory** to Flamm this April. Flamm wrote a quick response, so we offer excerpts from both letters. **Global Electronics** readers are invited to contribute their thoughts, as well. Siegel wrote:

"First, you contend that American semiconductor manufacturers established their overseas assembly plants to compete with Japanese transistor manufacturers. I have always argued that they went offshore to compete amongst themselves. Do you have any data suggesting that the bult of the early production at offshore plants - other than Fairchild's original Hong Kong venture - was transistor assembly? The table showing the growing significance of Japanese transistor production is valuable, but I think the reason Japan 'caught up' was that American firms had moved into integrated circuits. And IC's, with more leads, require more labor-intensive assembly per device than transistors do, so most companies began serious offshore assembly - particularly in Asia - when IC's became their commodity products."

"Second, though I am not technically capable of evaluating the formulas through which you determine price elasticity, I am skeptical that the cost of assembly labor has much impact on the size of the chip market. For example, the explosion in demand for personal computers is the result of the phenomenal decrease in cost per chip function - a result of advances in design and wafer fabrication. Increasing the cost of chip assembly tenfold would not affect the price of a personal computer significantly. Such a price difference would matter less than brand recognition and availability in customer decisions to buy. In fact, the increasing number of functions per circuit is holding back the increase in demand for devices. The Macintosh, for instance, uses only about 50 chips, much fewer than the comparable IBM PC."

"Of course, assembly costs are important to individual chip producers, who are anxious to cut even a tenth of a cent per device from packaging costs. But establishing competitive position is different than enlarging the market.

"Third, I found the concluding chapter on public policy to miss part of the problem, perhaps because you deliberately limited your scope. The shortcomings of semiconductor assembly and other forms of export-oriented industrialization are not so much a result of trade as a concept or the particular industries, but the prevailing political economies in export-oriented nations. In suggesting policies designed to promote more balanced development, you seem to assume that ruling parties, groups, cliques, or classes - depending upon one's analysis - have the same interests as the country as a whole.

"Finally, also in the concluding chapter, I cannot oppose your recommendation for additional investments in human capital, but that is clearly insufficient. Re-training a few workers will improve their lot, but retraining everyone will create a huge labor-pool of highly skilled unemployed. Where, in the absence of

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other policies to shape the economy, will the new jobs come from?"

Flamm responded, "I agree that when U.S. IC-makers first went offshore in a big way, they were essentialy the members of an exclusive club with no significant foreign members. Ergo, any competition was among themselves for at least this early period. Still, the reason they were already offshore was because of early Japanese competition in discrete devices. The economic logic of moving assembly operations to low-wage areas was established by Japanese penetration of the cheap transistor market. Fairchild's response (and it is perhaps important to remember that Fairchild was the Intel of the early 1960's, the avant-garde of commercial high-tech) therefore established the future pattern, a pattern based on the realities of competition in a low transport-cost, high labor-input good – realities that are fundamentally international in nature.'

"Since finishing the **Global Factory** manuscript, I have learned from Emerson Pugh's **Memories that Shaped an Industry** that IBM went offshore shortly after Fairchild, to string ferrite core memories for its computers. In 1955–1956, while it was developing manufacturing methods for the core memories required under government contract (for the SAGE computer), IBM people had invented an automatic core-threading machine that reduced the time to produce a 64 X 64 plane from 25 hours to 12 minutes. In the early 1960's, IBM was used these automated methods to manufacturer is core memories in the United States. Faced with an unforeseen explosion in the demand for its System 360, it experimented with hand-wiring cores in Japan, and then (a familiar pattern) in lower cost Taiwan. Core-stringing was actually cheaper using manual methods in Asia, and the U.S. core plant moved most of its core-stringing work abroad. Other competitors in the core memory business also established Asian operations, but Pugh claims that superior automation in other phases of manufacture, and unique designs to reduce component count and take advantage of automation, gave IBM an overall cost advantage (a hint, perhaps, of contemporary interest)."

"My point is that the realities of low-wage assembly in East Asia were become increasingly obvious to all in the electronics business in the early 1960's. Through an irony of history, it was Japanese competition in transistors – a maturing technology at the time – that goaded U.S. producers to first move offshore. Through another irony of history, it is again Japanese competition that is goading them to automate."

"Also, while IC's do use more labor per finished device than transistors, individual transistors are much more labor-intensive than integrated circuits when the smaller cost to which the labor is being applied is considered. The assembly costs as a portion of the total value of a chip with 20,000 transistors on it are much, much lower than the assembly costs' share of the value of 20,000 transistors. Because of the increased value of the chip to be assembled, assembly costs are generally much *less* important in the value of a complex integrated circuit than in a simpler or discrete device."

"I don't believe I claim anywhere that lower assembly costs account for much of the growth in semiconductor demand. Technological change clearly dominates the amazing decline in circuit element cost, and hence the enormous growth in semiconductor demand. However, a by-product of the apparently large price elasticity of demand for semiconductors is that small increases in cost can have larger impacts on demand. If you accept as reasonable my judgement that a number in the 7 to 13 percent range is a reasonable stab at the cost advantage due to offshore assembly for all U.S. semiconductors, on average, then an elasticity of -1 implies a decline of 7 to 13 percent in demand when offshore assembly is ended, all else being equal. With elasticities of -2 to -3, double or triple those figures are implied. Thus, at a constant level of technology, a highly elastic, volatile demand, as seems to be the case in semiconductors, implies that small cost differentials can have larger impacts on price-sensitive markets."

"I'm not sure whose interests are being served and injured in the various Asian export economies. Some of the Asian countries, particularly Korea, but to a lesser extend Taiwan and Singapore, seem to be growing at a fast enough rate that most folks, no matter how uneven the 'trickle-down,' seem to be getting some improvement out of the deal. This is a recipe for political survival that has worked in a lot of places – the downside is, what happens when growth slows down and a small improvement turns to a net loss for many, as in Mexico and Brazil, today? All apologetics aside, offshore assembly remains an important foreign exchange source, but it is no long the major focus for technological development in these countries, anyway, as they set their sights on juicier targets.

"As to where the new jobs for highly-skilled U.S. workers will all come from, or if there will be enough, this remains, it seems to me, an important and not well-answered question. Clearly as technology to amplify human labor into productive goods and services improves, the labor required to support a given standard of living will decline. A net decline in hours worked, on average, may well occur. But so what? The problem will occur if certain types of labor are in much greater demand than others, leading to gross inequalities in the distribution of all that increasing productivity. And one thing seems to be very clear: Those folks whose work is basically the same as those working at a fractions of their wages in much poorer countries, in industries not sheltered by high transport costs (and many services, it should be remembered, have very low transport costs in this age of telecommunications), are going to be on the losing end of the income distribution. Unfortunately, not much effort seems to be devoted to thinking about their future, and our tub-thumping for retraining was an attempt to point this out."

Or course, it makes sense to read **The Global Factory** before debating the issues that it raises. The book is published by the Brookings Institution, 1775 Massachusetts Ave., NW, Washington, DC, 20036, and it retails for $10.95 paper and $29.95 cloth.

HIGH-TECH SLUMP

Daily newspapers in the U.S. are punctuated with reports of very large-scale lay-offs in high-tech industry. Within microcomputer production, there is a shake-out underway. Though there is no evidence that there is a decline in the production in personal computers, peripheral equipment, or software, so many players have joined the game that some had to fail. In other market segments, such as telecommunications hardware and industrial equipment, sales and employment appear to be expanding.

The U.S.-based semiconductor industry, however, appears to be suffering its worst slump in at least a decade. Merchant chip producers, including Texas Instruments, Fairchild, Intel, American Microsystems, Signetics, and others, have laid off thousands of workers. Small companies, such as Zytrex and Semi Processes have declared bankruptcy. Mostek, whose lay-offs were described in the April, 1985 **Global Electronics**, has furloughed an additional 2,000 workers in the U.S.

The present downturn does not indicate any significant structural problems for the industry. Rather, it is the necessary flip side of last year's unprecedented boom. Chip production is a competitive industry, subject to the sharp ups and downs which once characterized most capitalist production.

In Silicon Valley, reports the **Peninsula Times Tribune** (April 21, 1985), 48 high-tech firms laid off a total of more than 10,000 employees from January, 1983 through March, 1985. Yet electronics employment in Santa Clara County rose from 187,000 in December, 1983 to 206,000 a year later, before dipping slightly early this year. Most analysts expect employment to regain its growth pattern later this year.

Part of the problem lies in the reporting practices of companies and the press. Major lay-offs are usually reported, but hiring, which is frequently more gradual, is not covered. If the stock market were covered in this fashion, the Dow-Jones industrial average would appear to be near zero.

The application of high-tech products to other industries, such as auto production, financial recordkeeping, and phone service is likely to increase the level of structural unemployment in most of the industrial world, but high-tech industry, despites its slumps and failures, is growing. The social problems of high-tech centers like Silicon Valley are primarily the result of rapid growth, not economic decline.

XEROX MOVES

Though some electronics companies are moving production facilities, or even headquarters, out of Silicon Valley, the area is still the number one address in high technology. Xerox Corp., for example, announced early in May that it planned to move the offices of its Information Products Division, as well as two other units, to Silicon Valley. Xerox plans to reduce its Dallas area workforce by 1,100 while hiring at least 200 in Santa Clara.

FRENCH MICROS

The French government has chosen a domestic machine, manufactured by Thomson International's Alcatel Micro Informatique Professionelle, for its national computer literacy program. Few observers were surprised, since France has repeatedly used its government procurement programs to prop up an industry that is less than competitive internationally. However, Jean-Jacques Servan-Schreiber, writer of **The American Challenge** and head of the institute running the computer training program, resigned in protest. Servan-Schreiber favored the easy-to-learn Macintosh, designed and built by Apple in Silicon Valley. (**InfoWorld**, April 22,1985)