Through gift, theft and license, our technology is leaking abroad almost as fast as we develop it. So scratch the long-term dream of a U.S. living off exports of high-technology goods and services.

Does anyone really believe in free trade?

By Norman Gall

NEVER MIND if the U.S. loses its manufacturing skills; we'll just import manufactured goods and pay for them by exporting high technology and knowledge-oriented products. Steel in, software out. Autos in, microchips out.

That's a comforting theory held by a lot of people. Is it workable? Increasingly it looks as if it is not workable. The whole concept is being seriously undermined as U.S. innovations in technology are adopted not only by Japan but also by such fast-developing countries as South Korea, Brazil, Taiwan, even India.

While these countries are more than happy to sell us manufactured goods, they closely control their own imports of technology goods they buy from us. Exports of computers and other high-technology products from the U.S. are still huge, but the long-term prospects are in question. In areas of medium technology, minicomputers in particular, developing countries are adapting or stealing U.S. technology or licensing it cheaply to manufacture on their own. Many of the resulting products are flooding right back into the U.S.

The Japanese developed this policy to a fine art: Protect your home market and then, as costs decline with volume, manufacture for export at small marginal cost. A good many developing countries have adopted the Japanese technique.

Against such deliberate manipulation of markets, what avails such a puny weapon as currency devaluation? Whether the dollar is cheap or dear is almost irrelevant. Free trade is something we all believe in until it clashes with what we regard as vital national economic interests.

These are the broad trends. Now meet Touma Makdassi Elias, 41, an engineer born in Aleppo, Syria. Elias has a master's degree in computer science from San Jose State, in Silicon Valley, and a doctorate from the Cranfield Institute of Technology in England. Grounded in European and U.S. technology, Elias is now a Brazilian.

His company, Microtec, is Brazil's first and biggest producer of personal computers. Elias came to São Paulo eight years ago to teach night classes in engineering. In 1982 the Brazilian government banned imports of small computers. Seizing the opportunity, Elias started making the machines in the basement of a supermarket in the industrial suburb of Diadema.

Technology? "We worked from IBM technical manuals," Elias told FORBES. "We had a product on the market by 1983. We started making 20 machines a month. Soon we'll be making 2,400. Now my brother may be joining our firm. He's a graduate of the Sloan School of Management at MIT. He's been managing an investment company in Dubai, in the Persian Gulf, but we need him here. Brazil is one of the world's fastest-growing computer markets."

There you have it in a nutshell: foreigners, some of them U.S.-educated, copying—stealing, to be blunt—U.S. technology and reproducing it with protection from their own governments. An isolated development? No, this is the rule, not the exception, in much of the world. How, under such circumstances, can the U.S. expect to reap the fruits of its own science and technology?

Time was when technology spread slowly. Communications were sluggish and nations went to great lengths to keep technological innovations secret. In northern Italy 300 years ago, stealing or disclosing the secrets of silk-spinning machinery was a crime punishable by death. The machines were reproduced in England by John Lombe only after he spent two years at risky industrial espionage in Italy. At the height of the Industrial Revolution, Britain protected its own supremacy in

textile manufacture through laws banning both exports of machines and emigration of men who knew how to build and run them.

These embargoes on the export of technology were eventually breached. France sent industrial spies to England and paid huge sums to get British mechanics to emigrate. By 1825 there were some 2,000 British technicians on the European continent, building machines and training a new generation of technicians. A young British apprentice, Samuel Slater, memorized the design of the spinning frame and migrated to the U.S. in 1789, later establishing a textile factory in Pawtucket, R.I. So, in the end, the technology became commonplace, but it took decades, and, in the meantime, England was profiting handsomely from its pioneering.

Not so today, when 30% of the students at MIT are foreigners, many destined to return to their native lands and apply what they learn of U.S. technology. What once was forbidden, today is encouraged. Come share our knowledge.

Consider the case of Lisiong Shu Lee, born in Canton, China in 1949, raised in Rio de Janeiro, now product planning manager for SID Informatica, one of Brazil's big three computer companies. Like many leading Brazilian computer technicians, Lee is an engineering graduate of the Brazilian air force's prestigious Aerospace Technical Institute near São Paulo. Born in China, raised in Brazil, educated in the U.S. "When I was only 24," Lee says, "I was sent to the U.S. to debug and officially approve the software for the Landsat satellite surveys devised by Bendix Aerospace." Lee later worked eight years with Digital Equipment's Brazilian subsidiary.

Like Microtec's Elias, Lee had learned most of what he knew from the Americans. In teaching this pair—and tens of thousands like them—U.S. industry and the U.S. academies created potential competitors who knew most of what the Americans had painfully and expensively learned. Theft? No. Technology transfer? Yes.

In Brazil over the past few years, the Syrian-born, U.S.-educated Elias played cat-and-mouse with lawyers representing IBM and Microsoft over complaints that Microtec and other Brazilian personal computer makers have been plagiarizing IBM's BIOS microcode and Microsoft's MS-DOS operational software used in the IBM PC. The case was settled out of court. Brazilian manufacturers claimed their products are different enough from the original to withstand accusations of copyright theft.

Where theft and copying are not directly involved in the process of technology transfer, developing countries find ways to get U.S. technology on terms that suit them. They get it cheaply. Before President José Sarney departed for his September visit to Washington, the Brazilian government tried to ease diplomatic tensions by announcing approval of IBM's plans to expand the product line of its assembly/test plant near São Paulo. IBM will invest $70 million to develop Brazilian capacity for producing the 5-gigabyte 3380 head disk assembly (HDA).

Ah, but there is a tradeoff involved in the seeming concession by the Brazilians. The tradeoff is that IBM's expansion will greatly improve the technical capabilities of local parts suppliers to make a wider range of more sophisticated products. About a third of the key components in IBM's HDA catalog will be imported, but Brazilian suppliers will get help in providing the rest, some involving fairly advanced technologies.

But does what happens in Brazil matter all that much? Brazil, after all, is a relatively poor country and accounts for a mere $3 billion in the U.S.' $160 billion negative trade balance. Brazil matters very much. For one thing,

Photos by Paulo Fridman/Sygma

Microtec's personal computer factory in São Paulo
Designs cribbed from IBM technical manuals, but different enough to withstand accusations of copyright theft.

Mictrotec founder Touma Makdassi Elias
From Syria to São Paulo via Silicon Valley.

Newsstand in São Paulo
Plenty of reading choices for computer hackers, too.

what happens there happens in similar ways in other developing countries—and some developed ones as well. Brazil, moreover, is fast adapting to the computer age. The Brazilian computer industry employs over 100,000 people. It includes everything from the gray market of São Paulo's Boca de Lixo district to the highly profitable overseas subsidiaries of IBM and Unisys. Both subsidiaries have been operating in Brazil for more than six decades and, for the time being, have been profiting from Brazil's closed-market policies. It includes many manufacturer/assemblers of micro- and minicomputers and of peripherals. Companies also are appearing that supply such parts as step motors for printers and disk drives, encoders, multilayer circuit boards, high-resolution monitors, plotters and digitizers. The Brazilian market is bristling with new computer publications: two weekly newspapers, ten magazines and special sections of daily newspapers.

Brazil is only a few years into the computer age. Its per capita consumption of microchips works out to only about $1.40 per capita among its 140 million inhabitants, vs. $100 in Japan, $43 in the U.S. and about $6 in South Korea. But given the potential size of the market and Brazil's rapid industrialization, it could one day absorb more personal computers than France or West Germany.

The point is simply this: In their natural zeal to make Brazil a modern nation rather than a drawer of water and hewer of wood, its leaders are determined to develop high-technology industry, whether they must beg, borrow or steal the means. Failing to develop high-technology industry would be to court disaster in a country where millions go hungry. But in doing what they must, the leaders of Brazil and other developing countries run strongly counter to the economic interests of the U.S.

Because of these nationalistic policies, foreign-owned firms are banned from competing in Brazil's personal computer and minicomputer market. Brazil's computer industry is not high tech, if that means being near the cutting edge of worldwide technological advance. But it does show the ability of Brazilian businessmen and technicians to shop for and absorb standard technology, without paying development costs. In computers, where knowledge is the most expensive component, it becomes cheap to manufacture if you get the knowledge free or almost free. The U.S. develops, Brazil copies and applies. There are perhaps a dozen Brazils today.

"We're a late entry and can pick the best technology," says Ronald Leal, 36, co-owner of Comicro, a CAD/CAM equipment and consulting firm. "We don't waste money on things that don't work. In 1983 we saw a market here for CAD/CAM done with microcomputers. We shopped around the States and made a deal with T&W Systems, a $10 million California company that has 18% of the U.S. micro CAD/CAM market. T&W helped us a lot. We sent people to train and they came to teach us."

Comicro learned fast. Says Leal: "We developed new software applications that we're now exporting to T&W."

Brazil exporting computer designs to the U.S.? Only five years after IBM began creating a mass market for the personal computer, the U.S. home market is being invaded by foreign products—of which Comicro's are only a tiny part. Technological secrets scarcely exist today.

Aren't the Brazilians and the others simply doing what

Lisiong Shu Lee of SID Informatica
Theft? No. Technology transfer? Yes.

the U.S. did a century and a half ago—protecting its infant industries?

If that were all, the situation might not be so serious for the U.S. But pick up any U.S. newspaper these days and count the advertisements for Asian-made personal computers claiming to be the equivalent of the IBM PC but selling at maybe two-thirds of IBM's price.

According to Dataquest, a market research firm, Asian suppliers will produce nearly 4.5 million personal computers this year. At that rate, they should capture one-third of the world market by next year. Taiwan now is exporting 60,000 personal computer motherboards and systems monthly, 90% of which are IBM-compatible. Of these, 70% go to the U.S. and most of the rest to Europe. Korea, Hong Kong and Singapore together ship another 20,000 each month.

Dataquest says it takes only three weeks after a new U.S.-made product is introduced before it is copied, manufactured and shipped back to the U.S. from Asia.

Thus the U.S. bears the development costs while foreigners try to cream off the market before the development costs can be recouped. That is the big danger. The days when a person could be executed for industrial espionage are gone.

President Reagan recently warned that the U.S. is being victimized by the international theft of American creativity. Too many countries turn a blind eye when their citizens violate patent and copyright laws. In 1985-86 U.S. diplomats successfully pressured Korea, Singapore, Malaysia, Taiwan, Hong Kong and Thailand to pass or at least to draft legislation enforcing patents and copyrights more strictly. Brazil is a major holdout.

The difficulties between Brazil and the U.S. over computers crystallized in the 1984 Informatica law, which Brazil's Congress passed overwhelmingly near the end of two decades of military rule. The law, in effect, legalizes stealing—so long as the victims are U.S. technology exporters. Complains the head of a leading multinational whose business has been curtailed under the new law: "They want our technology but want to kill our operations. This whole show is sponsored by a handful of sharp businessmen with connections in Brasília who are making piles of money from their nationalism."

The new law formally reserved the Brazilian micro- and minicomputer market for wholly owned Brazilian firms. It allowed wholly owned subsidiaries of foreign companies—IBM and Unisys—to continue importing, assembling and selling mainframes, but not out of any sense of fairness. It was simply that Brazilian companies were unable to take over that end of the business.

Under the law, joint ventures with foreign firms were allowed only if Brazilians owned 70% of the stock and had "technological control" and "decision control."

The main instruments for implementing this policy were tax incentives and licensing of imports of foreign hardware and knowhow, all to be approved by the secretariat of information science (SEI).

In 1981 Brazil's then-military government decreed that SEI would control the computer and semiconductor industries and imports of any and all equipment containing chips. The implications are especially ominous for U.S. interests: Brazil's SEI is modeled, quite openly, on Japan's

notorious Ministry of International Trade & Industry (MITI). Brazil's computer policy today follows the line of a mid-Fifties report by MITI's Research Committee on the Computer.

In the 1950s and 1960s MITI used Japan's tight foreign exchange controls to ward off what its nationalist superbureaucrat of the day, Shigeru Sahashi, called "the invasion of American capital." In long and bitter negotiations in the late Fifties, Sahashi told IBM executives: "We will take every measure to obstruct the success of your business unless you license IBM patents to Japanese firms and charge them no more than 5% royalty." In the end, IBM agreed to sell its patents and accept MITI's administrative guidance on how many computers it could market in Japan. How many Japanese products would be sold in the U.S. today if this country had imposed similar demands on the Japanese?

Some U.S. economists are describing the result of the Japanese policy as the "home market effect." They mean that protectionism in the home market tends to create an export capability at low marginal cost.

"Home market protection by one country sharply raises its firms' market share abroad," says MIT's Paul Krugman, reporting the results of computer simulations of international competition in high technology. "Perhaps even more surprising, this export success is not purchased at the expense of domestic consumers. Home market protection lowers the price at home while raising it abroad."

Brazil surely has similar intentions. IBM and other U.S. computer companies are transferring technology to Brazil as never before.

The Brazilians may have grasped a reality that the U.S. has been unable politically to address: that while there is no way to check the fast dissemination of technology today, the real prize in the world economy is a large and viable national market—a market big enough to support economies of scale and economies of specialization. In short, while a country can no longer protect its technology effectively, it can still put a price on access to its market. As owner of the world's largest and most versatile market, the U.S. has unused power.

Taiwan, Korea, Hong Kong and Singapore, lacking large internal markets, could develop only because they had easy and cheap access to the rich U.S. market.

Why doesn't the U.S. reciprocate? The Reagan Administration has threatened to restrict imports of Brazilian exports to the U.S. by Dec. 31 if Brazil doesn't 1) protect software with new copyright legislation, 2) allow more joint ventures with foreign firms, and 3) publish explicit rules curtailing SEI's arbitrary behavior.

But the Brazilians are hardly trembling in their boots. Brazilian officials hint that if Brazilian exports to the U.S. are curbed, Brazil won't be able to earn enough dollars to service its crushing external debt. Diplomats of both countries want to avoid a showdown, so they keep talking. And while they talk, the Brazilians do what they please.

U.S. Customs has responded to manufacturers' complaints by stopping pirated products at the border. But the Taiwanese now have such cost advantages that they can easily afford to license technology that they have already copied. The Koreans are more scrupulous, but pirated technology not reexported to the U.S. is very hard to control.

More than three years ago Edson de Castro, president of Data General, told a Commerce Department panel that foreign nations' computer policies "threaten the structure and future of the U.S. computer industry." De Castro explained why: "U.S. computer companies are reliant on international business and derive a substantial portion of revenues from exports. Because of the rapid pace of technological development, the industry is capital intensive. Growth and development rely heavily on an expanding revenue base. This can only come from full participation in established and developing global markets. Reliance upon domestic markets is not enough."

Yet after resisting the Brazilian government's demands for a decade, de Castro's Data General is selling technology for its Eclipse supermini to Cobra, the ailing government computer company. Other U.S. computer manufacturers are following suit.

Hewlett-Packard, in Brazil since 1967 with a wholly owned subsidiary to import and service the company's products, has just shifted its business into partnership with Iochpe, a Brazilian industrial and finance group. A new firm, Tesis, 100% Brazilian-owned, will make HP calculators and minicomputers under its own brand name.

"Only a few years ago HP refused to enter joint ventures, but now we have ones going in Mexico, China, Brazil and Korea," says a company executive. "In the past we felt, since we owned the technology, why share the profits? Then we found we couldn't get into those foreign markets any other way."

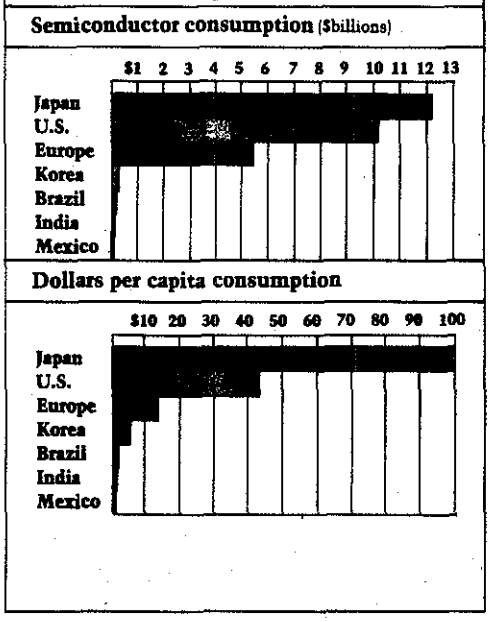
Harvard Professor Emeritus Raymond Vernon, a veteran analyst of international business, says of world technology markets: "Except for highly monopolistic situations, the buyer has a big advantage over the seller. Countries like Brazil and India can control the flow of technology across their borders and then systematically gain by buying technology cheaply."

Vernon draws an ominous parallel: "A century ago the multinationals were in plantation agriculture and electric power. Now they're all gone because their technology and management skills were absorbed by local peoples. The same thing is happening in other fields today, including computers."

This is why it makes little difference whether the dollar is cheap or dear. In this mighty clash between nationalism and free trade, nationalism seems to be winning. Where does this leave the U.S. dream of becoming high-technology supplier to the world? Rudely shattered. ■

Where the chips fall

No matter how you slice it, per capita or by dollar volume, most of the world's semiconductors go to the U.S., Japan and Europe. Don't be misled, though. The smaller markets matter, especially to the governments that work so hard to protect them.



On December 12, 1980, President Carter signed into law a piece of legislation which most of us refer to as the University and Small Business Patent Act of 1980.

News of this event reached me in Detroit within an hour of its occurrence. And suddenly, it was all over. A victory which at one time had seemed hopelessly beyond our grasp, which had eluded our most determined efforts for years, had now become an incredible reality. It was a time for celebration, and also for reflection. Were we together then, we would have recounted, laughingly, the hours of our despair, while toasting the heroes and roasting the villains of a truly epic struggle.

I am sure there were parties somewhere, in Washington perhaps, where a few of our number could add the warmth of comraderie to the joy of victory. Yet most of us, being removed from one another by a considerable distance, were obliged to rejoice in solitude, if not also in silence.

Today, for the first time since that happy event, we have an opportunity to rejoice together. I have not come here today to explore with you the problems which lie ahead, nor to discuss the proper distribution among ourselves of specific assignments. I have come, rather, to celebrate what has already been accomplished. It is time to luxuriate in the knowledge not merely that we have won, but that, by all that is holy, we deserved to win.

What was the darkest hour of the campaign? It was not, as some might conjecture, when we were farthest from victory. Indeed, our progress was remarkably steady, albeit agonizingly slow, so that we inched closer to victory each day. The darkest hour was marked instead by the severity of our casualities. The nadir was reached on December 12, 1978, exactly two years prior to the date of enactment. If only we had known!

It is a tradition among employes everywhere, and among federal employes especially, for a departing worker to be escorted to lunch on his final day by a coterie of his friends and office mates. Such occasions can range from the simply bittersweet to the hilarious. And sometimes, very rarely, they can be poignant beyond description. Norm Latker had been fired by Joe Califano and December 12, 1978 was his last day on the job. After 22 plus years of federal service he was being terminated without separation pay for alleged departures from official DHEW policy. I was working at Argonne Laboratories during this period but arranged to be in Washington on that final day. There were just three of us for lunch, Norm, myself, and Dave Eden, my former special assistant at Commerce who was then with the Department of Energy. Our purpose, Dave's and mine, was to assure Norm of our continuing commitment to the joint undertaking, and more especially to one another. It was not a sad meeting, though the situation itself was grim. We were sustained by the conviction that the Civil Service Commission would ultimately set aside Norm's dismissal as illegal, restoring him to his post with full back pay. This eventually transpired, except that Norm got no back pay since his income as a private patent attorney during the layoff period far exceeded what he would have earned as a civil servant.

It would have helped had we known then that Califano himself would soon be dismissed by the President and that the President would prove willing to sign into law a policy which Califano had dismissed Norm Latker for espousing.

Califano was indeed the arch villain of the entire affair, yet his excesses helped our cause tremendously, turning otherwise neutral parties to our side. Yet, he was not around at the beginning.

The very first battle took place in late 1974, immediately prior to the establishment of the Energy Research and Development Administration (ERDA). At issue was the patent policy which would guide the contract and grant activities of this new agency. President Ford was anxious to get started with his energy initiatives of which ERDA was to be the cornerstone. His eagerness, however, left him vulnerable to a handful in Congress who saw an opportunity to impose rigid patent policies upon the fledgling organization. We fought this opposition to a standstill, then turned the tide so that, in the end, ERDA's patent policy was a lot better than that found in many federal programs. We were aided in this endeavor by an extraordinary communication from the Executive to the Legislature. It may well be without parallel in our history. It said, in effect, that the administration had carved out a compromise with Senator Hart, the leader of the opposition, and that the President would veto any bill which departed from the text of that compromise in the slightest particular. The battle ended with a minor victory for our side: we had averted disaster and had actually gained a little ground.

We were beginning to recognize our friends and win new ones. These included Congressmen Craig Hosner, Don Fuqua, Mike McCormack, and Barry Goldwater, Jr. On the other side were the rest of the House and the whole of the Senate, or so it appeared. Our leading foes were Kastenmeier, Seiberling and Udall in the House, and Hart and Long in the Senate. We should also remember Bernie Nash, Senator Hart's aide, who was both tenacious and indefatigable in his opposition. He was a worthy adversary and fully deserving of our respect, and perhaps even some grudging admiration. Unlike Joe Califano, Bernie Nash made few mistakes and he pushed no one into our camp.

And what about the good guys. The inner circle consisted of about six members of the Executive Subcommittee of the Committee on Government Patent Policy. These six were charged with the task of organizing an active constituency from among those who shared our philosophy. Their efforts produced strong support and write-in campaigns from the American Bar Association, the National Small Business Association, the National Patent Council, the Chamber of Commerce, the National Association of Manufacturers, Aerospace Industries Association, and like groups. Norm Latker was chairman of a subcommittee dealing with university patent policy. It was his job to organize the university sector and he did so magnificently, extracting immediate pronouncements of support from the American Council on Education, and NACUBO (National Association of College and University Business Officers), from which organization your own has sprung. SUPA came later, but we soon found ourselves with a team of dedicated supporters at the cutting edge of technological advancement. There is always a first, even among equals, and the first one on my list must be Howard Bremer of

the Wisconsin Alumni Research Foundation. With him were:

Neils Reimers of Stanford

Larry Gilbert then of MIT, now of Boston University

Ray Woodrow of Princeton and later the first President of SUPA

Ray Snyder of Missouri

Al Gold then of Rockfeller University and more recently of NY Polytech

Bob Johnson of the University of Florida

Earl Freise then of Northwestern and now of N. Dakota

Clark McCartney of the University of Southern Cal

Tom Martin of Utah

Will Farnell of Minnesota

Ralph Davis of Purdue

Ed McCordy of Washington University (St. Louis)

Alan Moore of Case Western

Mark Owens of the University of California

Rodger Ditzel then of Iowa State, now of University of Cal

Ed Yates of Johns Hopkins

Dennis Barnes then of the University of Virginia, now science aide to Senator Schmidt

Bill Burke of Georgia

Tom Evans of Michigan Tech

Joe Warner of Yale

With the first battle over, we were stronger - far stronger - than we had ever been. Rather than dismantle our army, we decided to take the offensive. Together we wrote a patent policy that was as perfect as we could make it, one totally devoid of the shortcomings associated with political expediency. In short, we set out to educate the misinformed, the untutored and the suspicious, rather than mollify them. The bill that we wrote is known today as Thornton - not the Thornton Bill or the Thornton Act - just plain Thornton. The University and Small Business Patent Act is Thornton applied to universities and small businesses. The name Thornton comes, of course, from Ray Thornton who introduced our bill to a reluctant if not hostile House of Representatives. Ray is now President of Arkansas State University, from which vantage point he must certainly look back with pride upon what he has wrought. He must also be surprised, given the fact that the bill was never reported out of committee, nor indeed were hearings ever scheduled.

We learned during these years that, of all the persuasive arts, education is the slowest. And the education of politicians is slower yet. From a purely personal point of view, I was keenly aware that time was running out. As the inauguration of President Carter approached, there remained two unfinished peices of business.

First - to prevent the imposition of federal control on Recombinant DNA experimentation, and

Second - to legislate Thornton.

The completion of these projects would depend upon the organization I left behind. In fact, more was accomplished after I left than when I was present. My successor, Jordan Baruch, pulled a Joe Califano. He repudiated Thornton absolutely and irrevocably which made everybody work twice as hard for Thornton as they might have otherwise.

Almost a year after the Carter Administration had begun, Senator Gaylord Nelson announced that his Monopoly Subcommittee would begin a truly extraordinary set of hearings:

> "These hearings," Nelson said, "would examine efforts by a highly placed group of Commerce Department employees - most of them holdovers from the two previous administrations - who are trying to persuade Congress to repeal laws that now require certain agencies to take title to the benefits of research paid for by the public."
>
> "The Commerce Department group, known as the Government Patent Policy Committee, has been circulating a draft report among government agencies aimed at drumming up Congressional support for repeal of laws that prohibit granting exclusive marketing rights to companies which developed inventions with government financed research."
>
> "If this group of Commerce Department employees has its way, the government would end up giving away to a small number of companies the rights to every invention produced through government financed research."

In truth and in fact, this set of hearings was intended to be a pre-emptive strike against Thornton - to prevent a Thornton-type bill from being introduced in the Senate, and to send a message to members of the House.

The witness list included a lot of my old sparring partners, including Admiral Rickover, Representative Seiberling and Senator Long, together with some new players.

By some incredible coincidence, my name popped up a couple of dozen times during these hearings, even though I've been gone for almost a year.

Representative Seiberling observes at one point that "Assistant Secretary Ancker-Johnson was almost fanatic in opposition; she was the leading protagonist in doing everything she could to stymie compulsory licensing."

Senator Long accuses me of making the same old, tired, discredited claims to justify the giving away of government owned rights. Then he gets to the heart of the problem. He says:

> "In April, 1977, a bill was introduced in the other body (H.R.6249) and, I must confess, it is a beaut. This is what a real giveaway should be like. It gives everything away; it doesn't leave even a sliver of meat on the bone."

> "This proposed legislation is one of the most radical, far-reaching and blatant giveaways that I have seen in the many years that I have been a member of the United States Senate."

Coming from Senator oil-depletion-allowance Long, this is high praise indeed.

Rickover then reveals how the ERDA patent lawyers have actually invited contractors to request waivers, all of which goes to show how right he was in denouncing our perfidy the first time around.

An economist I never heard of compares my views to "stale wine in old bottles." Both the Chairman of the Federal Trade Commission and the Assistant Attorney General for Antitrust conclude with dire predictions for the future of our economy, absent their careful scrutiny of the patent system in general, and government patent policy in particular.

Somehow, after listening to all these testimony, Senator Nelson changes his mind and decides that Thornton is perfect for universities and small businesses.

Meanwhile, back at DHEW, Joe Califano was working his magic. Not a single patent waiver was granted by HEW from the summer of 1977 until the fall of 1978.

Mounting pressures from the university community, among others, forced the breaking of the log-jam in late '78. The firing of Norm Latker was effected in retaliation.

One Waiver had actually occurred in the spring of 1977, shortly after Califano took office, but was cancelled illegally, only a month later. The invention in this case involved a CAT scanner. The contractor/assignee was a small business concern known as American Science and Engineering, Inc., or AS&E for short.

Three months ago, AS&E finally got its day in court. I should say the Receivor of what is left of AS&E got his day in court.

The government was found liable and the matter remanded for the assessment of damages, among other things. I don't know how much the damages will be, but every penny will come out of the taxpayers' pocket for conduct which Mr. Califano, a lawyer, should certainly have known to be unlawful. If you think that I have had difficulty in rationalizing Mr. Califano's conduct, listen to what the court has to say.

> "Dr. Richmond's decision may also have been prompted by a memorandum from Joseph Califano, then serving as Secretary of HEW, in which Califano notified Dr. Richmond that he had asked the HEW Inspector General to review the decision process which led to the grant of the AS&E exclusive license. Califano's memorandum was dated July 21, 1977, the same date that Dr. Richmond wrote his letter to AS&E purporting to cancel the license agreement. In his memorandum, Califano stated, "In view of my general concern with respect to the contract procurement process within the Department, I am interested in knowing how this decision was made." This language is difficult to reconcile with that which appeared in a letter Califano had written to the Speaker of the House, Thomas (Tip) O'Neill, less than one month earlier. In his letter to the Speaker, Califano stated, "I am pleased to report that the Department has now granted and returned a limited exclusive license under these inventions to AS&E as an incentive toward their commercial development." His letter to the Speaker concluded that "this matter has now been resolved in a manner which is fair and equitable to AS&E, the Department, the public and other manufacturers of CT Scanners."

Returning to the events which were occurring in the Senate around the time of Senator Nelson's Damascus-Road conversion, you will recall that Senators Bayh and Dole introduced the University and Small Business Patent Act, and began hearings thereon. At this set of hearings our side got a chance to testify and we did so with a vengeance. Our opponents began looking for opportunities to be out of the country rather than face public cross-examination - all except Rickover who never answers questions anyway. He deserves high marks for persistence if not for perspicacity.

The remainder of the story is well known to all of you. What you may not know are the names of the heroes whose roles were played behind the scenes.

I will not reveal the identities of the remaining members of the Executive Subcommittee, since I don't want anybody to get fired the next time we have a change of administration. You already know that Norm is one of these. Nor is there time for me to tell you the exact contributionsof those individuals whose names I feel compelled to mention today. It would take hours to do everyone justice. Instead, I will merely indicate the capacity in which each one came to be of significant service to our cause.

Joe Keyes - Association of American Medical Colleges

Shelly Steinback - American Council on Education

Eric Schellin - National Patent Council and National Small Business Assn.

Tom Arnold - Patent Attorney, Officer of Texas Bar Assn., the American Bar Assn., the Licensing Executive Society and the American Patent Law Society. Each of these groups supported our legislation.

Barry Leshowitz and Brenda Levenson - Aides to Senator Dole. Barry is now on the faculty of the University of Arizona. I'm not sure where Brenda is at the moment.

Ed Brenner - Former patent commissioner and President of the Association for the Advancement of Invention and Innovation.

Francis Browne - Patent Attorney and officer of ABA

Frank Cacciapaglia and Barry Grossman - Patent Office officials with responsibilities for Congressional liaison.

Dr. Gail Pesyna - House Science and Technology Committee staffer - now with DuPont.

Mike Superata - House Science and Technology Committee staffer - later with House Ways and Means.

Joe Allen - Aide to Senator Bayh - now Executive Director of Intellectual Property Owners, Inc., a non-profit association.

Darcia Bracken - Congressional Staffer to Ray Thornton. I believe that Darcia is now with NASA.

Julie McDonald - Administrative Assistant to Ray Thornton. Present whereabouts not known to my staff - though probably back in Arkansas from which she is fully expected to return as a Congresswoman in her own right. Let's hope so.

Lester Fettig - Headed up the Office of Federal Procurement Policy in the Carter Administration. Gave us more assistance than any other Carter appointee.

Julius Tabin - Patent Attorney to Salk Institute.

Rudy Vignone - Director of Governmental Relations, Goodyear Tire and Rubber Company.

Brendan Somerville - National Association of Manufacturers.

How's that for an impressive array of talent! Kind of makes you wonder sometimes why it took us so long. Could we have made it without them? Probably not, and even if we could, we wouldn't be there yet. So we really do owe them a debt of gratitude. And yet, having said that, let us not overlook one incontrovertible truth:

THEY could NEVER have made it without US!

You know, and I know, that it is we who did it, and I for one am damn proud of it!

3-8 years to be good. Competes w/ other investments

1. Morrill Act
2. Hatch Act } agricultural tech. transfer

retention

Those turn-offs
1. To far from market
2. No proprietary position
3. No entrepreneur

Many new means of T.T. of Univ. Research.
They do not conflict University's present structure

Management focus for T.T. is being enhanced at universities to include the new means of T.T.

In order for Univ.-Ind R&D collaboration to be success,
1. Recognition of unique roles of each partner be known.
2. Advance understanding of partners responsibilities.
3. How are rights to the results to be protected.
3. (Right of Univ. investigator to publish is unchallengeable)
4. Royalties.
5. Peer Review of project on periodic basis.

Creating capital formation T.T.
1. 60-40 split of revenue source
"Teaming Agreement"

"Leveraged buyout"

NON-TRADITIONAL T.T.
- Venture Capital
- RDLP
- Start-Up joint venture
- Add sharing for gov't.
- Public Offering

Not a Fed Fed business

Two guys in balloon - lost
Ask guy on ground where they are?
Up in a balloon
Obviously lawyer - why? told us exactly what we wanted to know but we're no better off than before.

RDLP -
1974 - 'U.S v. Snow
1979-80 People started to use.

Abandoning white rats in medical testing
Going to Attorneys
a) multiple tasks
b) don't get as attached to them.

INNOVATION SPEECH -- PRELIMINARY NOTES -- JULY 16

- John Locke -- "Man hath a right to what he hath mixed his labors with." Further, the work that he did in order to justify constitutional monarchy ultimately became the foundation of our Constitution.

As far as I can determine, the essence of his protection of constitutional monarchy was that in order for it to survive, individuals had to have the right to Life, Liberty, and Property. (I don't know where that Pursuit of Happiness stuff came from.)

Insert the letter from Madison to Jefferson here. It justified the special treatment for inventors in the Constitution.

The next step is that the Constitution itself gave Congress discretionary authority to take care of inventors by giving them exclusive right to their inventions for a limited period of time.

The Congress actually acted on that and created the Patent System.

Notwithstanding the Constitution, U.S. Common Law provides for assignment rights as a condition of employment.

The next step is the gradual growth of institutions and the capital content of research or invention. The Constitutional presumption of inventor ownership has been blurred and as a result, employed inventors have lost their identity in society.

(Belief) During the 1960's, the public perception of corporations became increasingly negative for a variety of reasons. One of them is that they became faceless institutions rather that the organizations built around key people that the public can recognize.

Enter statistics on the decrease of inventions per Research dollar, with a corresponding increase of U.S. patents going to foreign firms.

People count.
Bottom-up
Innovation/inventor
Management--provide the resources to creative people and get out of the way.

Paul A. Blanchard and Frank B. McDonald's article "Reviewing the Spirit of Enterprise: Role of the Federal Labs," is a timely, well done, and useful chronology and discussion of current issues confronting Federal laboratories. I am grateful for the author's acknowledgement of the Department of Commerce's contribution to the OSTP working group's recommendations on strengthening technology transfer from the Federal laboratories to the private sector. I believe it is important, however, to amplify on part of these recommendations in light of the Irwin Goodwin's editorial note describing the guarantee of at least 15% of any royalty to Government inventor(s) on any development licensed by the laboratory for commercial use as being "controversial."

While the specifics of this recommendation are clearly open to discussion and modification, the following analysis of the principles involved should help to conclude that the recommendation is more "necessary" than "controversial."

1) John Locke, the British philosopher who masterfully built the consensus for western constitutional government established as one of its principles that "a man has a right to what he hath mixed his labor with." Certainly there can be no argument against extending that right to a person's own ideas and inventions.

2) The United States Constitution builds on Locke's thesis by giving Congress the power to reserve to inventors the exclusive right to their respective inventions as

progress of science and useful

an encouragement to the arts ~~and sciences.~~ (2)

3) Public Laws 96-517 and 98-620, which guarantees ~~the~~ universities and small businesses the right to own~~ership of~~ inventions made by ~~the~~ THEIR inventors in the performance of Federally funded research, qualified university ownership and made it consistent with the constitutional mandate by requiring that royalties be shared with ~~its~~ THEIR inventors. (3)

This was done with university urging as they feared ~~management would funnel~~ WOULD BE FUNNELED these returns away for other purposes, ~~and would~~ thereby destroying the inventor's incentive to participate.

4) The explosion of industry-university collaboration accompanied by the transfer of technology triggered in part by P. L. 96-517 (4) suggested the need to establish similar incentives for technology transfer in the Federal laboratories since they, like universities, ~~were~~ are isolated from the private sector with no compelling need to bridge the gap.

5) The university-industry collaborative experience has not ~~evidenced~~ either a desire or an ability ~~by~~ of industry to bias unversities away from basic research to any great extent. In fact, the relationship has no doubt given universities new frontiers to explore which would not have been otherwise addressed.

6) Public Laws 96-517 and 98-620 do not require royalty-sharing between small business and its inventors since

the goal of ~~such~~ THE business is ~~already~~ to make a profit through the delivery of new products, processes and services to the marketplace. This ~~primary~~ goal seemed to assure a need to share the fruits of commercialization with its inventors through whatever incentive system ~~was~~ IS deemed most appropriate, or face the prospect of ~~their possible loss~~ LOOSING KEY PEOPLE to competitors. New incentive systems to motivate industry employees are one of the key elements fueling the entrepreneurial revolution spreading through the country. It is clear that this kind of flexibility ~~should not be interferred with~~ FEDERAL LAW SHOULD NOT INTERFERE WITH but ~~will not~~ be developed in nonprofit or public institutions as their goals are not primarily aimed at delivering new products, processes or services to the marketplace ~~nor will present~~ UNLESS law permit them to do so. ~~It~~ The Administration's commitment to strengthening third world intellectual property laws through negotiation is best centered on how they and their inventors can benefit. A failure to address the interests of Federally employed inventors is a dismissal of our heritage and could make our motives suspect in the context of these negotiations.

THIS SORT OF FLEXIBILITY CANNOT

The need to address the incentives that are necessary to motivate Federally employed inventors to participate in the innovative process is one of the important issues of our day. Dismissing royalty-sharing which is an established policy in unversities as being "controversial" or presuming that government

boards that randomly and insufficiently, if ever, reward inventors ~~is a rejection of our great heritage and an effront to our creative people.~~ does not respond to the problem.

TP - MOREOVER, (A)

1)

2)

3)

4)

Talking Points for Rep. Fuqua

1. Anti-inventor, anti-patent legislation

a. By implication the bill requires that inventors assign all rights to Government as a condition of employment without any guarantee of compensation for assistance in commercializing his inventions

b. Decouples inventor from any part of the incentive system contemplated by the patent system

c. Inconsistent with Fuqua's own committee endorsment of inventor royalty sharing in PL 96-517 (university inventors) and PL 98-620 (inventors at university managed federal labs). That success is the model for the Lundine- Michel Federal laboratory bills.

d. Fuqua bill breaks the concensus in Federal agencies in support of the Lundine-Michel bills. The award system now in HR 3773 (Fuqua) has been rejected by the agencies as not an incentive to involve inventors in the difficult process of innovation. The Federal Lab Consortium voted unanimously that royalty sharing with inventors is critical to successful technology transfer.

2. Bill ~~require~~ each agency to issue 2 sets of regulations: one to spell out conditions for collaborative R&D arrangements, and the other to set up an after the fact award system. Without clear legislative authorities, royalty sharing cannot be resurected on the Executive side.

3. Rejection of compensation by S&T Committee makes it hard for Senate to clarify the need for compensating without bureaucracy ~~for~~ federal inventors.

4. Mandates the worst private sector model for treatment of inventors to the Government .

5. All of the agency comments we have received are opposed to the bill on 2 points: FLC , and the failure to guarantee an award to inventors.

6. While Commerce was willing to sell the FLC provision to the Executive branch on the basis of clear authorities and incentives to the labs and inventors, we can no longer do so on the basis of the anti-inventor principles that have emerged in your bill, HR 3773.

As a substitute for the incentive of the patent system H.R. 3773

~~The proposed legislation~~ sets up another bureaucracy to determine whether inventors should benefit from the commercialization of their discoveries. This is inconsistent with the Constitutional intent to award inventors through a guarantee of a proprietary position in those inventions they choose to bring into public light.

While it is correct that the common law permits employers to take the prospect of such a proprietary position from its employees as a condition of employment, there has been sufficient latitude in the private sector to devise incentive systems that assure continued involvement of inventors in the innovation process. This has not been true in public funded research projects conducted at federal laboratories. The taking of the inventor's rights as a condition of employment coupled with bureaucratic after-the-fact award systems has resulted in an invention delivery system that does not work. S. 65 speaks directly to this problem by setting up an understandable before-the-fact award system. The proposed bill merely

H.R. 3773 is a clever attempt by a small group of industry patent attorneys to establish their company's policy of

Sadly

H.R. 3773 ~~[illegible]~~ sacrifices the few to the many. It by implication requires inventors who are federal employees, as a condition of their employment to assign all such rights with no guarantee of any further reward for inventions that benefit the economy. It wipes out any possibility of the award promised by the patent system

The proposed legislation sets up another bureaucracy to determine whether inventors should benefit from the commercialization of their discoveries. This is inconsistent with the Constitutional intent to award inventors through a guarantee of a proprietary position in those inventions they choose to bring into public light.

While it is correct that the common law permits employers to take the prospect of such a proprietary position from its employees as a condition of employment, there has been sufficient latitude in the private sector to devise incentive systems that assure continued involvement of inventors in the innovation process. This has not been true in public funded research projects conducted at federal laboratories. The taking of the inventor's rights as a condition of employment coupled with bureaucratic after-the-fact award systems has resulted in an invention delivery system that does not work. S. 65 speaks directly to this problem by setting up an understandable before-the-fact award system. The proposed bill merely

Congress is seeking to stimulate American innovation by creating greater commercialization of Federally-supported R&D. Presently the Government funds 50%-- or $55 billion annually-- of our R&D effort. Attention is focusing on the Federal laboratory system which now contributes little to our economic growth. Unfortunately, two trade associations are jeopardizing this effort to deflect attention from a few companies' internal management problems.

The object of this debate is legislation introduced in the House and Senate allowing federal laboratories to manage their inventions by licensing them and retaining royalty income. Because one-sixth of the U.S. scientists and engineers work in our federal laboratory system performing more than $17 billion of R&D annually it is important that this technology be successfully transfered to the economy. Universities have found that sharing royalties with their inventors is the catalyst making this technology transfer possible.

Intellectual Property Owners, Inc. and the National Association of Manufacturers, reflecting fears by a small segment of their big business constituents, are objecting to royalty sharing by federally employed inventors in legislation now under consideration by the Congress. These associations say that requiring royalty sharing for federal inventors (paralleling current law for university inventors) sets a precedent which will be applied to the private sector. Rather than a simple mechanism such as royalty sharing, these associations advocate a complex, bureaucratic "award system" under which federal inventors would meekly petition Washington for some compensation for their discoveries commercialized by the private sector. Experience has shown that agencies trying to implement award schemes create only more bureaucracy with meager rewards to inventors and great expense to the taxpayer.

Ironically, the handful of companies driving NAM and IPO objecting to royalty sharing are not even interested in working with the federal laboratories and have little, if any, experience collaborating with universities sharing royalties! Rather, these companies reflect a 1950's top-down management style that feels threatened by employee incentives. These middle level corporate managers fear that the university success sharing royalties will be duplicated in the federal laboratories creating unrest within their own companies. Companies who have revitalized their corporate structure to reward productive employed inventors, or who have entered into collaboration with universities are not afraid of incentive systems in public research.

The House Science and Technology Committee will soon take up this legislation which has been successfully reported from Subcommittee <u>minus royalty sharing for inventors at the insistence of IPO and NAM</u>. Unless changed, this could be a serious barrier to the federal laboratory system.

The Senate Commerce Committee will soon begin deliberations on a companion bill based on S. 65 introduced by Senate Majority Leader Robert Dole.

The Dole bill and similar legislation introduced by House Minority Leader Robert Michel (H.R. 695), provide federal inventors a share of royalties returned to the laboratory from patent licensing. The bills are modeled on a 1980 law (Public Law 96-517) giving universities and small businesses ownership of inventions made under federal grants and contracts. This Act requires universities to share royalties earned with university inventors. Congress enacted this provision because willing participation of inventors is the core of successful technology transfer. This requirement was not placed on small businesses because Congress recognized that nonprofit institutions have special needs not applicable to the private sector.

Congress recognized that nonprofit inventors are hired to expand the frontiers of knowledge and that technology transfer is an addition to their primary mission. This is not the case in the private sector. Prior to the enactment of the 1980 law many universties feared losing some of the best basic research scientists because academic salary structures are not intended to reward commercializing inventions. This is still true at Federally-operated laboratories. Royalty sharing has enabled many of the most creative minds to remain on campus performing basic research while being rewarded for their discoveries.

Losing the best researchers is still a problem at the federal labs according to the 1983 Report of the White House Science Council headed by David Packard. In the report to President Reagan the Council found that "almost all of the Federal laboratories, both government-operated and contractor-operated, suffer serious disadvantages in their inabilities to attract, retain, and motivate scientific and technical personnel required to fulfill their missions. The principal disadvantage is the inability of the Federal laboratories, particularly those under the Civil Service system, to provide scientists and engineers with competitive compensation at entry and top senior level (emphasis added). Royalty sharing is designed to meet this problem. With one-sixth of all of the research scientists and engineers employed at federally-operated labs, the U.S. simply cannot afford to waste these creative people.

Congress also recognizes that the needs of the nonprofit sector are unique. University and federal laboratory inventors are under great pressure to immediately publish the results of their research for professional recognition. Such pressures do not exist in the private sector. It was to counterbalance this need-- which can destroy proprietary rights needed for commercialization by the private sector-- that royalty sharing was devised. Thus, university and federal employee royalty sharing actually protects the interests of industry!

Universities are now able to persuade many inventors to file patent applications at the same time as publishing research results so that patent rights, especially abroad, are not destroyed. This happy balance not only fully protects academic freedom, and encourages the free exchange of information so important on campus; it also protects the interests of the private sector and discourages foreign competitors from freely pirating U.S. taxpayer sponsored R&D. The result is that more jobs and important discoveries are developed here.

Rather than setting a precedent for private industry, these differences were again recognized in 1984 when the law was amended to include university operated government laboratories. During the lengthy Senate and House debates over this measure no one suggested that the success of the university royalty sharing requirement was a precedent for the private sector. Indeed, legislation supported by the Administration sought to include big business government contractors under the provisions of the 1980 law and again no one, not even opponents of broadening the law saw university royalty sharing as a precedent for private industry!

After 5 years experience universities overwhelmingly cite royalty sharing as one of the cornerstones of their successes in working with the private sector. Because of this interaction the United States holds a commanding lead in the development of biotechnology which originated at the universities. Countries such as Japan are seeking to duplicate our success in linking universities and the private sector.

Schools such as the University of California and the University of Maryland are so convinced of the success of royalty sharing that they have raised the inventor's percentage to 50% of the receipts of licensing income! Many schools working on long range projects with big businesses, like that between Washington University in St. Louis and Monsanto, say that royalty sharing provisions have never been a problem in interactions with the private sector.

Experts in technology transfer from publically funded R&D to the private sector say that for this interaction to be successful certain incentives must be present. Every player involved in the interaction must benefit, the inventing organization, the government, and the private sector. But central to any success must be the individual whose creativity is the basis for the exchange. Indeed, rewarding individual inventors was the reason that the patent system was authorized in the Consitution under Article I, Section 8.

As the law now stands, inventors at universities and university operated Government labs share royalties while their counterparts in Federally run labs do not. Legislation must address this inequity or the flow of talented researchers at the Federal

laboratories will increase.

By excluding the inventor from federal lab legislation, a few big business patent counsels seek to turn the patent system on its head. The patent system thus becomes a bludgeon keeping inventors down rather than a stimulus lifting them up. This perversion must not be allowed to succeed. Indeed, individual creativity is the keystone of American creativity. Misguided special interests like Intellectual Property Owners and NAM are seeking to impose a Soviet management style on federal inventors.

We are on the brink of tapping into a tremendous source of basic and applied research unequalled in the world. The economic benefits will be staggering. Royalty sharing is the key for unlocking this tremendous resource or of frittering away a priceless asset. The choice is clear.

Norm - a quick kiss -

Benefits to Patent License Program

1. Expands significantly the Program's responsibilities

   - o adds Government Inventions Program
   - o Expands downstream functional activities to include
     - training of federal laboratories in technology management
     - provision of information, assistance to licensees in venture funding
     - provision of assistance in funding overseas partners (e.g. through BIRD arrangements)
   - o Thus extends coverage from pure patent licensing (a single 'blip' in the process of commercializing Federal technology) (a) upstream (via the Government Invention Program) and (b) downstream.

2. Substantially expands professional opportunities and growth for present NTIS personnel working on the Patent Licensing Program, e.g. not only from the wider upstream and downstream activities but also via the policy perspective.

3. Gives program higher visibility in DOC

Benefits to DOC Management

- o Provides a major addition to the 'critical mass' needed for PTI operation in the important area (stimulating the commercialization of $55b of Federally funded technology).
- o Integrates the licensing program with other OPTI 'process of innovation functions thereby ensuring consistency of approach in all aspects of this PTI agenda item.
- o Leverages the existing OPTI policy and programmatic functions considerably through the many contacts maintained by the licensing program in other Federal agencies (e.g. instituting a unified approach to evaluating inventions in the labs)
- o Gives the PTI program more credibility as viewed by other agencies and organizations (via program 'wholeness' and continuity)

Call
1. Weaver's
2. Goodwill
3. John Ryan - Hardware City.

GUT

Character Takes on Personality

A Victorian Virtue Is Trying to 'Find Itself' in the '80s

By Henry Allen

"CHARACTER" IS one of those horrible Victorian virtues that makes you think of cold baths, savings accounts, the Protestant work ethic, self-sacrifice, manhood, duty and so on in a list of everything we thought we'd ripped out of American culture like a weed.

Now it's back. It's just a few tendrils poking up through the hardpan, but it's back. Sen. Gary Hart attacks "economic man" and urges on us "the desire for goodness, the search for truth." Secretary of Education William Bennett calls for public schools to teach values such as patriotism and reverence. In a new book, "The Moral Life of Children," psychiatrist Robert Coles has a chapter entitled "On Character."

One way or another, we find ourselves talking about character.

We're not supposed to be. The 19th century was the age of character and the 20th is the age of personality, according to the late cultural historian Warren Susman, who explains that it was around the turn of the century that we began trading in self-sacrifice for self-expression, the work ethic for the leisure ethic and integrity for charm.

Nevertheless, anachronism or no, the notion of character has been sliding back into our vocabulary. Witness "The Rediscovery of Character: Private Virtue and Public Policy," as Harvard government professor James Q. Wilson entitled his lead piece in the 20th anniversary issue of "The Public Interest."

Wilson concludes: "But for most social problems that deeply trouble us, the need is to explore, carefully and experimentally, ways of strengthening the formation of character among the very young. In the long run, the public interest depends on private virtue."

Even in 1985, after five years of conservative rule in Washington, this statement shocks. It shocks because it rejects the conventional wisdom that it is backward and unfair to blame the problems of society and its discontents on lapses of perseverance, patience, honesty

barons and Social Darwinists. As Daniel Boorstin writes, "The rise of Protestantism and modern capitalism had somehow made a virtue of the personal qualities required to become rich."

The corollary to this was that if you were poor, you must lack character, except for those few paupers known as "the deserving poor." This view, says Boorstin, "would not long survive the American condition," being "alien to the rising American concern for a standard of living."

So what took its place?

Susman, author of "Culture as History," says it was personality.

Character, he wrote after a study of American culture high and low at the turn of the century, was associated with words such as "citizenship, duty, democracy, work, building, golden deeds, outdoor life, conquest, honor, reputation, morals, manners, integrity, and above all manhood."

"Personality," on the other hand, didn't even surface as a word in common usage until the end of the

a country that valued production to a country valuing consumption. We didn't need character any more to produce things. All we needed was managers to "rationalize" factories, and consumers to send the profits soaring. A rising middle-management class stressed not character, but fitting-in, adjustment, charm — personality. It valued leisure and self-fulfillment. People wanted to be "somebody."

The problem, as James Wilson points out, is that the age of personality "involves, at least in elite opinion, replacing the ethic of self-control with that of self-expression. Some great benefits have flowed from this change, including the liberation of youthful energies to pursue new ideas in art, music, literature, politics and economic enterprise. But the costs are just as real, at least for those young persons who have not already acquired a decent degree of self-restraint and other-regardingness."

Nowadays we have no shortage of personalities expressing themselves, finding themselves, being famous for 15 minutes (or however long it takes to read People magazine) and otherwise charming and magnetizing their way through the cultural landscape.

We do have a shortage of people willing to do things like get to work every day, or pay child support or keep a marriage together even though they have a mediocre sex life or "need to find out who they are."

And there are positions open for rich people who believe they should pay taxes rather than spend the money on accountants. Couldn't we also use a few 19th-century types who believe indebtedness is a disgrace and bankruptcy a sin? Who are ashamed of being on welfare? Who look at guilt as a sign they've done something wrong, rather than a symptom of mental illness?

Wilson mentions that we lack what the 19th century had to help give it character. "A variety of enterprises — Sunday schools, public schools, temperance movements, religious revivals, the Children's

EXPLAINING THE GREED

The insider trading scandal prompts psychologists to attempt an explanation of the relentless drive for wealth on Wall Street.

Why would prominent investment bankers and lawyers risk jail and the destruction of exemplary careers by flouting the rules of the financial game? Is the amassing of ever-greater wealth enough to justify illegally taking advantage of insider information?

While no one can pretend to analyze the deep inner motives of the dozen or so businessmen against whom the S.E.C. has brought charges, psychologists draw on their familiarity with similar clinical cases to offer some insights.

"In people with a maniacal acquisitive drive, the money itself is just a way of keeping score in a psychological game," said Steven Berglass, a clinical psychologist at Boston University, who wrote "The Success Syndrome." According to Mr. Berglass and other psychologists, many of those who are driven to success at any cost have had experiences in childhood that led them to a deep fear of failure, a fear that underlies their struggles to succeed. Sometimes a feeling of having been unloved or rejected in childhood leaves an emotional hunger in which money becomes a concrete symbol of personal worth, and the accumulation of vast sums a proof to themselves that they are lovable.

Often it is a failed father, or one who was once successful but then faltered, that causes the gnawing about success: "The son as a grown man, harbors a deep fear that he, too, will fail," said Dr. Berglass. "He overcompensates, pinning his emotional well-being and self-esteem on his ability to sustain ever-greater successes."

But success, by its very nature, makes that an almost impossible goal to sustain, Dr. Berglass points out. "Each success sets a new, higher mark in an insidious process that pushes you, finally, to gain the edge that only bending the rules will give you," said Dr. Berglass. "It is not criminal intent so much as the dread of failing."

Success, too, both requires and breeds a sense of specialness, a feeling of capability greater than most. That, psychologists say, is healthy, even essential, to a point. But the sense of being special can shade over into what psychoanalysts call "narcissistic entitlement," the feeling that one is so special that the rules and laws do not apply to oneself.

Apart from personal motives, being part of a group of people who are all involved in the same endeavors can also make one more likely to take risks. Social psychologists have long known about a phenomenon called the "risky shift," in which people who would normally be conservative in their actions are cajoled into taking risks when they become part of a group. And an atmosphere such as that of Wall Street, where risk is in the air, can make the actions of an investment banker all the bolder.

DANIEL GOLEMAN

Through gift, theft and license, our technology is leaking abroad almost as fast as we develop it. So scratch the long-term dream of a U.S. living off exports of high-technology goods and services.

Does anyone really believe in free trade?

By Norman Gall

NEVER MIND if the U.S. loses its manufacturing skills; we'll just import manufactured goods and pay for them by exporting high technology and knowledge-oriented products. Steel in, software out. Autos in, microchips out.

That's a comforting theory held by a lot of people. Is it workable? Increasingly it looks as if it is not workable. The whole concept is being seriously undermined as U.S. innovations in technology are adopted not only by Japan but also by such fast-developing countries as South Korea, Brazil, Taiwan, even India.

While these countries are more than happy to sell us manufactured goods, they closely control their own imports of technology goods they buy from us. Exports of computers and other high-technology products from the U.S. are still huge, but the long-term prospects are in question. In areas of medium technology, mini-computers in particular, developing countries are adapting or stealing U.S. technology or licensing it cheaply to manufacture on their own. Many of the resulting products are flooding right back into the U.S.

The Japanese developed this policy to a fine art: Protect your home market and then, as costs decline with volume, manufacture for export at small marginal cost. A good many developing countries have adopted the Japanese technique.

Against such deliberate manipulation of markets, what avails such a puny weapon as currency devaluation? Whether the dollar is cheap or dear is almost irrelevant. Free trade is something we all believe in until it clashes with what we regard as vital national economic interests.

These are the broad trends. Now meet Touma Makdassi Elias, 41, an engineer born in Aleppo, Syria. Elias has a master's degree in computer science from San Jose State, in Silicon Valley, and a doctorate from the Cranfield Institute of Technology in England. Grounded in European and U.S. technology, Elias is now a Brazilian.

His company, Microtec, is Brazil's first and biggest producer of personal computers. Elias came to São Paulo eight years ago to teach night classes in engineering. In 1982 the Brazilian government banned imports of small computers. Seizing the opportunity, Elias started making the machines in the basement of a supermarket in the industrial suburb of Diadema.

Technology? "We worked from IBM technical manuals," Elias told FORBES. "We had a product on the market by 1983. We started making 20 machines a month. Soon we'll be making 2,400. Now my brother may be joining our firm. He's a graduate of the Sloan School of Management at MIT. He's been managing an investment company in Dubai, in the Persian Gulf, but we need him here. Brazil is one of the world's fastest-growing computer markets."

There you have it in a nutshell: foreigners, some of them U.S.-educated, copying—stealing, to be blunt—U.S. technology and reproducing it with protection from their own governments. An isolated development? No, this is the rule, not the exception, in much of the world. How, under such circumstances, can the U.S. expect to reap the fruits of its own science and technology?

Time was when technology spread slowly. Communications were sluggish and nations went to great lengths to keep technological innovations secret. In northern Italy 300 years ago, stealing or disclosing the secrets of silk-spinning machinery was a crime punishable by death. The machines were reproduced in England by John Lombe only after he spent two years at risky industrial espionage in Italy. At the height of the Industrial Revolution, Britain protected its own supremacy in

textile manufacture through laws banning both exports of machines and emigration of men who knew how to build and run them.

These embargoes on the export of technology were eventually breached. France sent industrial spies to England and paid huge sums to get British mechanics to emigrate. By 1825 there were some 2,000 British technicians on the European continent, building machines and training a new generation of technicians. A young British apprentice, Samuel Slater, memorized the design of the spinning frame and migrated to the U.S. in 1789, later establishing a textile factory in Pawtucket, R.I. So, in the end, the technology became commonplace, but it took decades, and, in the meantime, England was profiting handsomely from its pioneering.

Not so today, when 30% of the students at MIT are foreigners, many destined to return to their native lands and apply what they learn of U.S. technology. What once was forbidden, today is encouraged. Come share our knowledge.

Consider the case of Lisiong Shu Lee, born in Canton, China in 1949, raised in Rio de Janeiro, now product planning manager for SID Informatica, one of Brazil's big three computer companies. Like many leading Brazilian computer technicians, Lee is an engineering graduate of the Brazilian air force's prestigious Aerospace Technical Institute near São Paulo. Born in China, raised in Brazil, educated in the U.S. "When I was only 24," Lee says, "I was sent to the U.S. to debug and officially approve the software for the Landsat satellite surveys devised by Bendix Aerospace." Lee later worked eight years with Digital Equipment's Brazilian subsidiary.

Like Microtec's Elias, Lee had learned most of what he knew from the Americans. In teaching this pair—and tens of thousands like them—U.S. industry and the U.S. academies created potential competitors who knew most of what the Americans had painfully and expensively learned. Theft? No. Technology transfer? Yes.

In Brazil over the past few years, the Syrian-born, U.S.-educated Elias played cat-and-mouse with lawyers representing IBM and Microsoft over complaints that Microtec and other Brazilian personal computer makers have been plagiarizing IBM's BIOS microcode and Microsoft's MS-DOS operational software used in the IBM PC. The case was settled out of court. Brazilian manufacturers claimed their products are different enough from the original to withstand accusations of copyright theft.

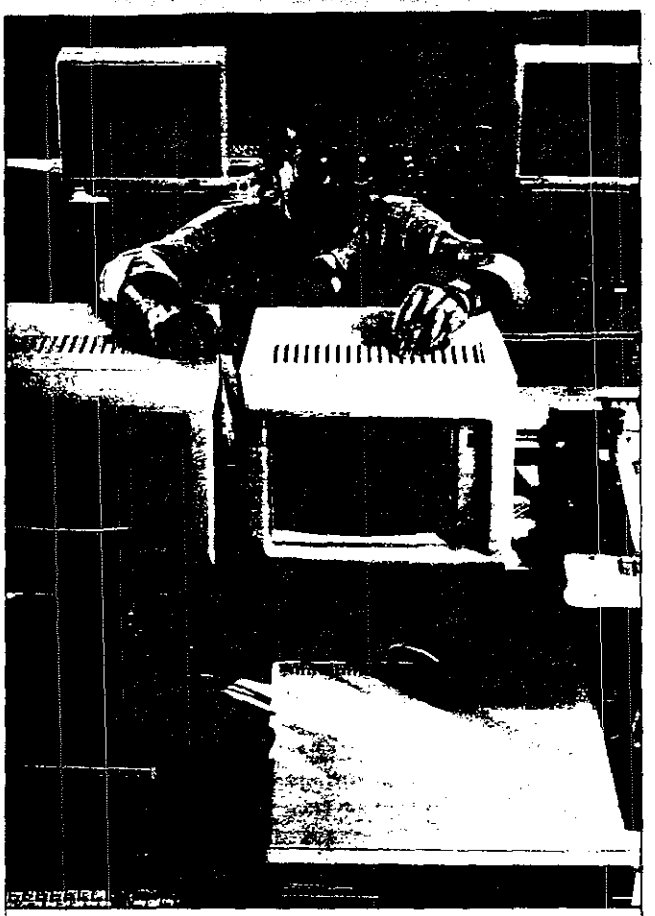
Where theft and copying are not directly involved in the process of technology transfer, developing countries find ways to get U.S. technology on terms that suit them. They get it cheaply. Before President José Sarney departed for his September visit to Washington, the Brazilian government tried to ease diplomatic tensions by announcing approval of IBM's plans to expand the product line of its assembly/test plant near São Paulo. IBM will invest $70 million to develop Brazilian capacity for producing the 5-gigabyte 3380 head disk assembly (HDA).

Ah, but there is a tradeoff involved in the seeming concession by the Brazilians. The tradeoff is that IBM's expansion will greatly improve the technical capabilities of local parts suppliers to make a wider range of more sophisticated products. About a third of the key components in IBM's HDA catalog will be imported, but Brazilian suppliers will get help in providing the rest, some involving fairly advanced technologies.

But does what happens in Brazil matter all that much? Brazil, after all, is a relatively poor country and accounts for a mere $3 billion in the U.S.' $160 billion negative trade balance. Brazil matters very much. For one thing,

Photos by Paulo Fridman/Sygma

Microtec's personal computer factory in São Paulo
Designs cribbed from IBM technical manuals, but different enough to withstand accusations of copyright theft.



Microtec founder Touma Makdassi Elias
From Syria to São Paulo via Silicon Valley.

Newsstand in São Paulo
Plenty of reading choices for computer hackers, too.

what happens there happens in similar ways in other developing countries—and some developed ones as well. Brazil, moreover, is fast adapting to the computer age. The Brazilian computer industry employs over 100,000 people. It includes everything from the gray market of São Paulo's Boca de Lixo district to the highly profitable overseas subsidiaries of IBM and Unisys. Both subsidiaries have been operating in Brazil for more than six decades and, for the time being, have been profiting from Brazil's closed-market policies. It includes many manufacturer/assemblers of micro- and minicomputers and of peripherals. Companies also are appearing that supply such parts as step motors for printers and disk drives, encoders, multilayer circuit boards, high-resolution monitors, plotters and digitizers. The Brazilian market is bristling with new computer publications: two weekly newspapers, ten magazines and special sections of daily newspapers.

Brazil is only a few years into the computer age. Its per capita consumption of microchips works out to only about $1.40 per capita among its 140 million inhabitants, vs. $100 in Japan, $43 in the U.S. and about $6 in South Korea. But given the potential size of the market and Brazil's rapid industrialization, it could one day absorb more personal computers than France or West Germany.

The point is simply this: In their natural zeal to make Brazil a modern nation rather than a drawer of water and hewer of wood, its leaders are determined to develop high-technology industry, whether they must beg, borrow or steal the means. Failing to develop high-technology industry would be to court disaster in a country where millions go hungry. But in doing what they must, the leaders of Brazil and other developing countries run strongly counter to the economic interests of the U.S.

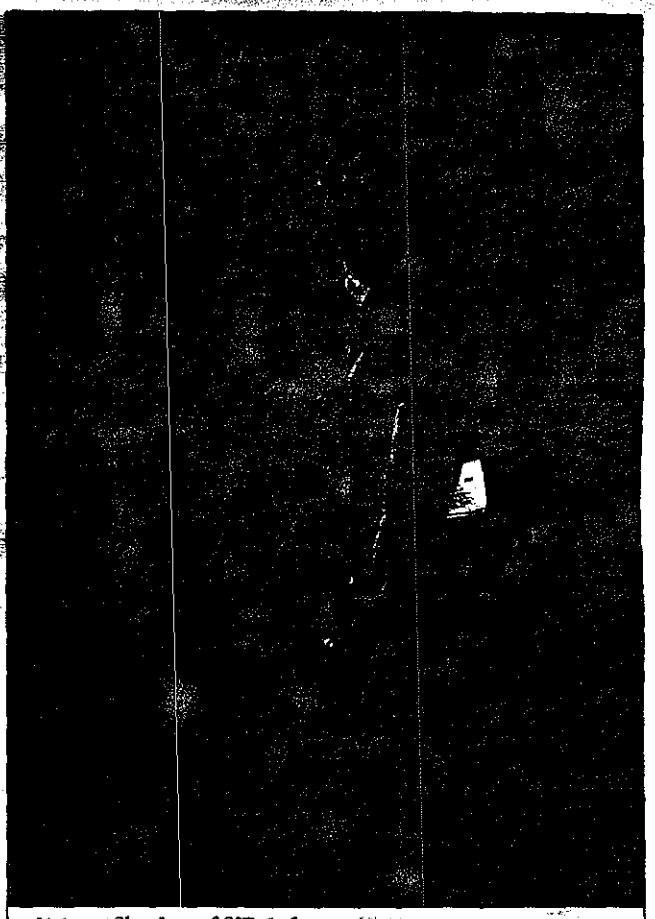
Because of these nationalistic policies, foreign-owned firms are banned from competing in Brazil's personal computer and minicomputer market. Brazil's computer industry is not high tech, if that means being near the cutting edge of worldwide technological advance. But it does show the ability of Brazilian businessmen and technicians to shop for and absorb standard technology, without paying development costs. In computers, where knowledge is the most expensive component, it becomes cheap to manufacture if you get the knowledge free or almost free. The U.S. develops, Brazil copies and applies. There are perhaps a dozen Brazils today.

"We're a late entry and can pick the best technology," says Ronald Leal, 36, co-owner of Comicro, a CAD/CAM equipment and consulting firm. "We don't waste money on things that don't work. In 1983 we saw a market here for CAD/CAM done with microcomputers. We shopped around the States and made a deal with T&W Systems, a $10 million California company that has 18% of the U.S. micro CAD/CAM market. T&W helped us a lot. We sent people to train and they came to teach us."

Comicro learned fast. Says Leal: "We developed new software applications that we're now exporting to T&W."

Brazil exporting computer designs to the U.S.? Only five years after IBM began creating a mass market for the personal computer, the U.S. home market is being invaded by foreign products—of which Comicro's are only a tiny part. Technological secrets scarcely exist today.

Aren't the Brazilians and the others simply doing what



Lisiong Shu Lee of SID Informatica
Theft? No. Technology transfer? Yes.

the U.S. did a century and a half ago—protecting its infant industries?

If that were all, the situation might not be so serious for the U.S. But pick up any U.S. newspaper these days and count the advertisements for Asian-made personal computers claiming to be the equivalent of the IBM PC but selling at maybe two-thirds of IBM's price.

According to Dataquest, a market research firm, Asian suppliers will produce nearly 4.5 million personal computers this year. At that rate, they should capture one-third of the world market by next year. Taiwan now is exporting 60,000 personal computer motherboards and systems monthly, 90% of which are IBM-compatible. Of these, 70% go to the U.S. and most of the rest to Europe. Korea, Hong Kong and Singapore together ship another 20,000 each month.

Dataquest says it takes only three weeks after a new U.S.-made product is introduced before it is copied, manufactured and shipped back to the U.S. from Asia.

Thus the U.S. bears the development costs while foreigners try to cream off the market before the development costs can be recouped. That is the big danger. The days when a person could be executed for industrial espionage are gone.

President Reagan recently warned that the U.S. is being victimized by the international theft of American creativity. Too many countries turn a blind eye when their citizens violate patent and copyright laws. In 1985-86 U.S. diplomats successfully pressured Korea, Singapore, Malaysia, Taiwan, Hong Kong and Thailand to pass or at least to draft legislation enforcing patents and copyrights more strictly. Brazil is a major holdout.

The difficulties between Brazil and the U.S. over computers crystallized in the 1984 Informatica law, which Brazil's Congress passed overwhelmingly near the end of two decades of military rule. The law, in effect, legalizes stealing—so long as the victims are U.S. technology exporters. Complains the head of a leading multinational whose business has been curtailed under the new law: "They want our technology but want to kill our operations. This whole show is sponsored by a handful of sharp businessmen with connections in Brasilia who are making piles of money from their nationalism."

The new law formally reserved the Brazilian micro- and minicomputer market for wholly owned Brazilian firms. It allowed wholly owned subsidiaries of foreign companies—IBM and Unisys—to continue importing, assembling and selling mainframes, but not out of any sense of fairness. It was simply that Brazilian companies were unable to take over that end of the business.

Under the law, joint ventures with foreign firms were allowed only if Brazilians owned 70% of the stock and had "technological control" and "decision control."

The main instruments for implementing this policy were tax incentives and licensing of imports of foreign hardware and knowhow, all to be approved by the secretariat of information science (SEI).

In 1981 Brazil's then-military government decreed that SEI would control the computer and semiconductor industries and imports of any and all equipment containing chips. The implications are especially ominous for U.S. interests: Brazil's SEI is modeled, quite openly, on Japan's

notorious Ministry of International Trade & Industry (MITI). Brazil's computer policy today follows the line of a mid-Fifties report by MITI's Research Committee on the Computer.

In the 1950s and 1960s MITI used Japan's tight foreign exchange controls to ward off what its nationalist superbureaucrat of the day, Shigeru Sahashi, called "the invasion of American capital." In long and bitter negotiations in the late Fifties, Sahashi told IBM executives: "We will take every measure to obstruct the success of your business unless you license IBM patents to Japanese firms and charge them no more than 5% royalty." In the end, IBM agreed to sell its patents and accept MITI's administrative guidance on how many computers it could market in Japan. How many Japanese products would be sold in the U.S. today if this country had imposed similar demands on the Japanese?

Some U.S. economists are describing the result of the Japanese policy as the "home market effect." They mean that protectionism in the home market tends to create an export capability at low marginal cost.

"Home market protection by one country sharply raises its firms' market share abroad," says MIT's Paul Krugman, reporting the results of computer simulations of international competition in high technology. "Perhaps even more surprising, this export success is not purchased at the expense of domestic consumers. Home market protection lowers the price at home while raising it abroad."

Brazil surely has similar intentions. IBM and other U.S. computer companies are transferring technology to Brazil as never before.

The Brazilians may have grasped a reality that the U.S. has been unable politically to address: that while there is no way to check the fast dissemination of technology today, the real prize in the world economy is a large and viable national market—a market big enough to support economies of scale and economies of specialization. In short, while a country can no longer protect its technology effectively, it can still put a price on access to its market. As owner of the world's largest and most versatile market, the U.S. has unused power.

Taiwan, Korea, Hong Kong and Singapore, lacking large internal markets, could develop only because they had easy and cheap access to the rich U.S. market.

Why doesn't the U.S. reciprocate? The Reagan Administration has threatened to restrict imports of Brazilian exports to the U.S. by Dec. 31 if Brazil doesn't 1) protect software with new copyright legislation, 2) allow more joint ventures with foreign firms, and 3) publish explicit rules curtailing SEI's arbitrary behavior.

But the Brazilians are hardly trembling in their boots. Brazilian officials hint that if Brazilian exports to the U.S. are curbed, Brazil won't be able to earn enough dollars to service its crushing external debt. Diplomats of both countries want to avoid a showdown, so they keep talking. And while they talk, the Brazilians do what they please.

U.S. Customs has responded to manufacturers' complaints by stopping pirated products at the border. But the Taiwanese now have such cost advantages that they can easily afford to license technology that they have already copied. The Koreans are more scrupulous, but pirated technology not reexported to the U.S. is very hard to control.

More than three years ago Edson de Castro, president of Data General, told a Commerce Department panel that foreign nations' computer policies "threaten the structure and future of the U.S. computer industry." De Castro explained why: "U.S. computer companies are reliant on international business and derive a substantial portion of revenues from exports. Because of the rapid pace of technological development, the industry is capital intensive. Growth and development rely heavily on an expanding revenue base. This can only come from full participation in established and developing global markets. Reliance upon domestic markets is not enough."

Yet after resisting the Brazilian government's demands for a decade, de Castro's Data General is selling technology for its Eclipse supermini to Cobra, the ailing government computer company. Other U.S. computer manufacturers are following suit.

Hewlett-Packard, in Brazil since 1967 with a wholly owned subsidiary to import and service the company's products, has just shifted its business into partnership with Iochpe, a Brazilian industrial and finance group. A new firm, Tesis, 100% Brazilian-owned, will make HP calculators and minicomputers under its own brand name.

"Only a few years ago HP refused to enter joint ventures, but now we have ones going in Mexico, China, Brazil and Korea," says a company executive. "In the past we felt, since we owned the technology, why share the profits? Then we found we couldn't get into those foreign markets any other way."

Harvard Professor Emeritus Raymond Vernon, a veteran analyst of international business, says of world technology markets: "Except for highly monopolistic situations, the buyer has a big advantage over the seller. Countries like Brazil and India can control the flow of technology across their borders and then systematically gain by buying technology cheaply."

Vernon draws an ominous parallel: "A century ago the multinationals were in plantation agriculture and electric power. Now they're all gone because their technology and management skills were absorbed by local peoples. The same thing is happening in other fields today, including computers."

This is why it makes little difference whether the dollar is cheap or dear. In this mighty clash between nationalism and free trade, nationalism seems to be winning. Where does this leave the U.S. dream of becoming high-technology supplier to the world? Rudely shattered. ■

Where the chips fall

No matter how you slice it, per capita or by dollar volume, most of the world's semiconductors go to the U.S., Japan and Europe. Don't be misled, though. The smaller markets matter, especially to the governments that work so hard to protect them.