

Talking Points for Rep. Fuqua

1. Anti-inventor, anti-patent legislation

CONTINUE TO

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 endorsement 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 consensus 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 resurrected 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 ~~patent~~ incentive of
The proposed legislation sets up another bureaucracy to ^{the patent} system
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.

H.R. 3773

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bureaucratic after-the-fact award systems has resulted in an
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directly to this problem by setting up an understandable before-
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H.R. 3773
is a change
attempt by
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patent attorneys
to establish
as a precedent

Visit a general
page

their company's policy of

Sadly

H.R. 3773 ~~is~~ sacrifices
the few to the many. It
by application requires ~~the~~ inventions
as a condition of their employment
to assign all their 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 transferred 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 minus royalty sharing for inventors at the insistence of IPO and NAM. 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 universities 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 inability 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.

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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 PII 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)

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GIT

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 reckless drive for wealth of some 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

avidity about success. "The son, as a grown man, harbors a deep fear that he, too, will fail," said Dr. Berglass. "He overcompensates, dimming 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 inexorable 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 falling."

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?

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

By Norman Gall

now a Brazilian.

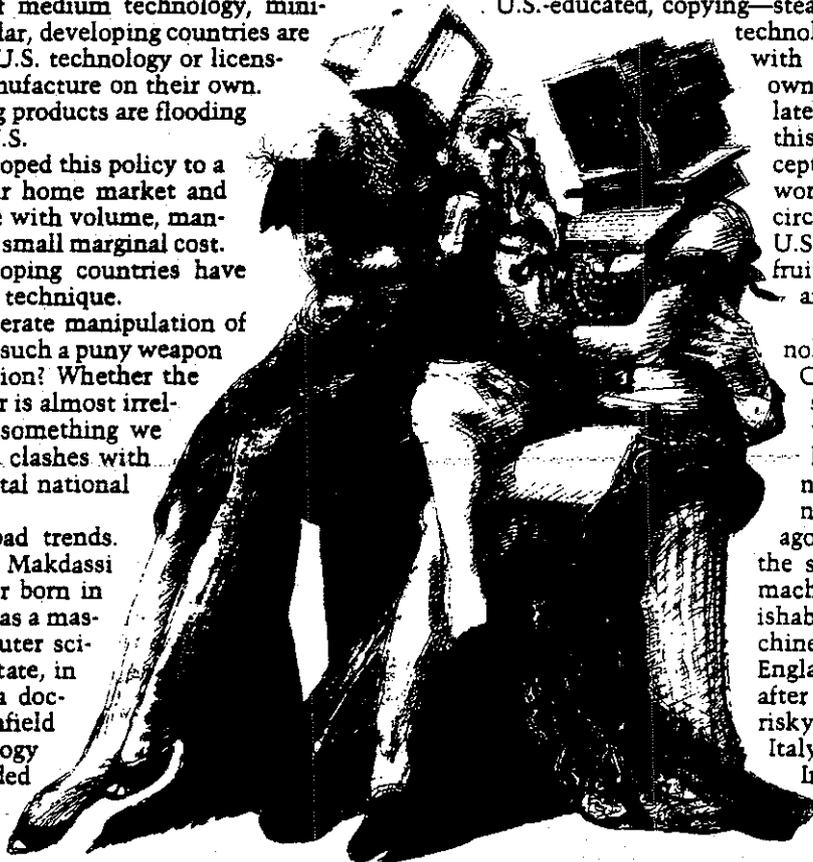
His company, Microtec, is Brazil's first and biggest producer of personal computers. Elias came to São Paulo eight years ago to teach night classes in engineering. In 1982 the Brazilian government banned imports of small computers. Seizing the opportunity, Elias started making the machines in the basement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

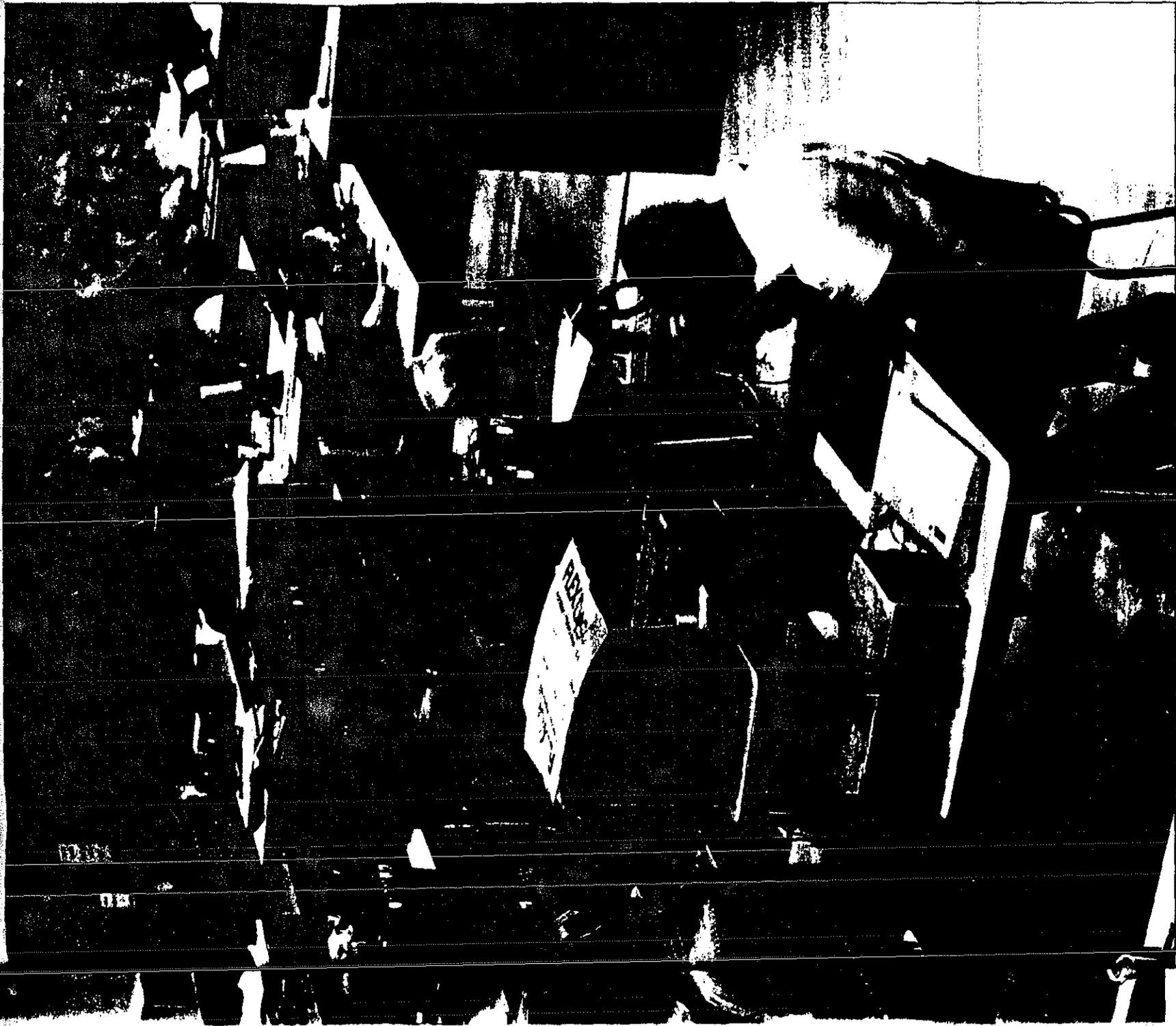
Where theft and copying are not directly involved in the process of technology transfer, developing countries find ways to get U.S. technology on terms that suit them. They get it cheaply. Before President José Sarney departed for his September visit to Washington, the Brazilian government tried to ease 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/Sigma



*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.*

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, multi-layer 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



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

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



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Theft? No. Technology transfer? Yes.

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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."

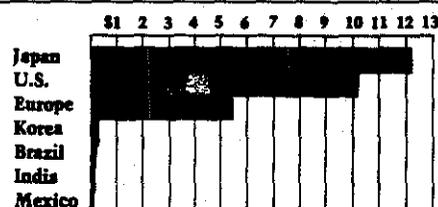
Vernon draws an ominous parallel: "A century ago the multinationals were in plantation agriculture and electric power. Now they're all gone because their technology and management skills were absorbed by local peoples. The same thing is happening in other fields today, including computers."

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.

Semiconductor consumption (\$billions)



Dollars per capita consumption

