THE WHITE HOUSE

WASHINGTON

November 15, 1988

Dear Bill:

As you may know, the Omnibus Trade Bill that the President recently signed into law establishes a National Advisory Committee on Semiconductors (NACS) composed of five ex officio and eight private sector members. I have enclosed information concerning the particulars of the legislation. In conjunction with Presidential Personnel and after consultation with your office, I have advanced the names of eight nongovernmental members of the NACS, and the President has given his preliminary approval, pending clearance, for their nomination to the Senate.

Bill, this is an extremely important commission. As we strive to enhance both American competitiveness and American national security through advanced technology, the semiconductor industry must receive priority attention. To demonstrate the importance that Congress and the President attach to this commitment, I plan to serve on the NACS panel myself and would urge you to do the same.

The law specifies that you or your designee fill one of the five ex officio positions on the NACS. The purpose of this letter is to expedite that process. The response from our advanced technology industries has been overwhelming. The Chairman and Chief Executive Officers (CEO) of several of our nation's largest and most significant high technology industries have agreed to serve. These include:

John A. Armstrong, Vice President for Research,
IBM Corporation

Norman Augustine, Vice President and CEO, Martin
Marietta Corporation

Robert W. Galvin, Chairman of the Board,
Motorola, Incorporated

Jerry R. Junkins, President and CEO,
Texas Instruments

James C. Morgan, Chairman and CEO,
Applied Materials, Incorporated

Ian M. Ross, President,
AT&T Bell Laboratories

Charles Sporck, President and CEO,
National Semiconductor Corporation

James G. Treybig, President and CEO,
Tandem Computers, Incorporated

Clearly, U.S. industry has done its part by making several of its most senior executives available for this commission. Now we must assure that all relevant parties--including Congress, industry, and the public--recognize that the Administration is equally committed to the resurgence of this vital sector of the American technological base.

Should you not be able to participate in this commission yourself, your representative should be the highest level senior executive in your Department who is confortable with the Commission's subject matter. Please let me know who you will have carry out this responsibility for the Department of Commerce.

The law requires that we conduct the first meeting of the NACS by November 21. Even if we must do this by teleconference, I am striving diligently to comply with that deadline. Thus, I would appreciate having your answer by the end of business Friday, November 18. I will be pleased to discuss this with you further if you wish.

Your office may telefax (395-3261) or telephone (456-6272) your choice as to who will represent your Department.

Sincerely,

Bill

William R. Graham
Science Adviser to the President

Enclosure
NACS Information Sheet

The Honorable C. William Verity
Secretary
Department of Commerce
15th and Constitution Avenue, N.W.
Washington, D.C. 20230

THE WHITE HOUSE

WASHINGTON

December 1, 1988

MEMORANDUM FOR R. JOSEPH DESUTTER
MILITARY ASSISTANT TO THE DIRECTOR
OFFICE OF SCIENCE AND TECHNOLOGY POLICY

FROM: KATHLEEN D. KOCH KDKoch
ASSOCIATE COUNSEL TO THE PRESIDENT

SUBJECT: Recommendation on National Advisory Committee on Semiconductors

This will confirm our telephone conversation of this date during which we discussed the National Advisory Committee on Semiconductors.

The members being appointed by the President to this Committee are to be eminent in the semiconductor industry or the fields of technology, defense, and economic development. At least some of the persons in clearance for these appointments, who are in private sector positions, are employed by or have financial interests in companies which could be affected by the decisions and recommendations of the Committee. This could result in a difficulty with 18 U.S.C. § 208, a provision of the criminal laws of the United States.

Since your office is charged with providing administrative support to the Committee, through an arrangement with an appropriate agency, I recommend you direct that your administrative support staff analyze the potential for conflicts problems under section 208, and, if any exists, determine whether recusals or waivers are necessary. This should be done before the Committee undertakes substantive deliberations.

Attached for your reference is a copy of 18 U.S.C. § 208.

Thank you for your attention to this matter.

Attachment

§ 208. Acts affecting a personal financial interest

(a) Except as permitted by subsection (b) hereof, whoever, being an officer or employee of the executive branch of the United States Government, of any independent agency of the United States, a Federal Reserve bank director, officer, or employee, or of the District of Columbia, including a special Government employee, participates personally and substantially as a Government officer or employee, through decision, approval, disapproval, recommendation, the rendering of advice, investigation, or otherwise, in a judicial or other proceeding, application, request for a ruling or other determination, contract, claim, controversy, charge, accusation, arrest, or other particular matter in which, to his knowledge, he, his spouse, minor child, partner, organization in which he is serving as officer, director, trustee, partner or employee, or any person or organization with whom he is negotiating or has any arrangement concerning prospective employment, has a financial interest—

Shall be fined not more than $10,000, or imprisoned not more than two years, or both.

(b) Subsection (a) hereof shall not apply (1) if the officer or employee first advises the Government official responsible for appointment to his position of the nature and circumstances of the judicial or other proceeding, application, request for a ruling or other determination, contract, claim, controversy, charge, accusation, arrest, or other particular matter and makes full disclosure of the financial interest and receives in advance a written determination made by such official that the interest is not so substantial as to be deemed likely to affect the integrity of the services which the Government may expect from such officer or employee, or (2) if, by general rule or regulation published in the Federal Register, the financial interest has been exempted from the requirements of clause (1) hereof as being too remote or too inconsequential to affect the integrity of Government officers' or employees' services. In the case of class A and B directors of Federal Reserve banks, the Board of Governors of the Federal Reserve System shall be the Government official responsible for appointment.

(Added Pub. L. 87-849, § 1(a), Oct. 23, 1962, 76 Stat. 1124, and amended Pub. L. 95-188, title II, § 205, Nov. 16, 1977, 91 Stat. 1388.)

PRIOR PROVISIONS

A prior section 208, act June 25, 1948, ch. 645, 62 Stat. 693, which related to the acceptance of solicitation of a bribe by a judicial officer, was eliminated in the general amendment of this chapter by Pub. L. 87-849 and is substantially covered by revised section 201.

Provisions similar to those comprising this section were contained in section 434 of this title prior to the repeal of such section and the general amendment of this chapter by Pub. L. 87-849.

AMENDMENTS

1977—Subsec. (a). Pub. L. 95-188, § 205(a), extended the conflicts of interest prohibition to a Federal Reserve bank director, officer, or employee.

Subsec. (b). Pub. L. 95-188, § 205(b), added sentence "In the case of class A and B directors of Federal Reserve banks, the Board of Governors of the Federal Reserve System shall be the Government official responsible for appointment."

EFFECTIVE DATE

Section effective 90 days after Oct. 23, 1962, see section 4 of Pub. L. 87-849, set out as an Effective Date note under section 201 of this title.

DELEGATION OF AUTHORITY

Authority of the President under subsec. (b) of this section delegated to department or agency heads, see Part V of Ex. Ord. No. 11222, May 8, 1965, 30 F.R. 6469, set out as a note under section 201 of this title.

CANAL ZONE

Applicability of section to Canal Zone, see section 14 of this title.

CROSS REFERENCES

Definitions, see section 202 of this title.

Mail contracts, conflict of interest, see section 440 of this title.

Memorandum of Attorney General regarding conflict of interest provisions, see note under section 201 of this title.

Purchase of certain claims against United States forbidden, see section 291 of this title.

Salary of Government officials and employees payable only by the United States, see section 209 of this title.

SECTION REFERRED TO IN OTHER SECTIONS

This section is referred to in sections 14, 202 of this title; title 2 section 702; title 5 section 3374; title 12 section 1457; title 22 sections 3507, 3508, 3622; title 28 App. section 302; title 40 App. section 108; title 42 sections 1396a, 1975d, 7218.

EXECUTIVE OFFICE OF THE PRESIDENT
OFFICE OF SCIENCE AND TECHNOLOGY POLICY
WASHINGTON, D.C. 20506

November 14, 1988

MEMORANDUM FOR ARTHUR B. CULVAHOUSE, JR.

FROM: WILLIAM R. GRAHAM WRG

SUBJECT: NATIONAL ADVISORY COMMITTEE ON SEMICONDUCTORS (NACS)

Section 5142 of HR 4848 (now Public Law 100-418) calls for the establishment of a National Advisory Committee on Semiconductors (NACS) and designates OSTP to provide administrative oversight and support. Therefore, I would appreciate your legal counsel on the following:

1. Is the NACS subject to the Federal Advisory Committee Act, or any other acts?

2. Because much of the discussions will be concerned with matters with national security and commercial proprietary considerations, must any or all meetings be open to the public? What procedures must be followed by NACS to fulfill the "Sunshine Law?"

3. The legislation (PL 100-418) calls for the first meeting to be held within 90 days after the legislation is signed, i.e., before or on November 21, 1988. Would a telephone organizational meeting fulfill the legislative requirement? If so, how would "Sunshine Law" considerations apply?

4. Are there any other legal considerations of which the Office of Science and Technology Policy should be aware?

Because the first meeting of NACS is required before November 21, 1988, we would appreciate a reply at your earliest convenience.

2 Attachments
HR 4848
Information Sheet on NACS

THE WHITE HOUSE
WASHINGTON

November 3, 1989

MEMORANDUM FOR JAMES W. CICCONI

FROM: D. ALLAN BROMLEY

SUBJECT: THE REPORT OF THE NATIONAL ADVISORY COMMITTEE ON SEMICONDUCTORS RESEARCH AND DEVELOPMENT

Enclosed herewith is a copy of the aforementioned report, a copy of the relevant Section 5142 of the Omnibus Trade Act of 1988, a draft memorandum transmitting this report to the President, and a draft letter from me to Ian Ross, Chairman of the Committee. Although I am, by statute, a member of the Committee, I attend only a small part of the Committee's final meeting before finalizing the report.

* I circulated the report for comment to Michael Boskin, Andy Card, Roger Porter, Boyden Gray, Steve Danzansky, Bob Grady and Lehmann Li.

I suggest that the press release, if one is normal with the release of this report, might include some statement such as "the views expressed are those of the NACS Committee and do not necessarily represent those of the Bush Administration or the Federal Government." You know better than I the approved wording.

As we discussed earlier, there is time pressure generated by the fact that an early version of this report was leaked to the New York Times, (resulting in the enclosed article) and Congressman Valentine has scheduled a hearing for November 8 at which Dr. Ross will testify. I hope that we can get the report to the Hill by Tuesday November 7.

As a more general question -- can a Congressionally mandated Committee such as this one transmit their report directly to the Hill?

Thanks for your help.

Enclosures

* Have only heard as yet from Mike Boskin in detail - but as you recall, you, Roger, Boyden and I discussed this this morning. (DAB)

I will be in The Hague — if Grady, in particular, has problems Diane asked that my assistant, Judy Rastach make sure that his comments get to you on Monday.

SEMICONDUCTORS

SEMICONDUCTORS

A STRATEGIC INDUSTRY AT RISK

A Report to the President
And the Congress
From the
National Advisory Committee on
Semiconductors

Advance Edition
November 1989

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And the Congress
From the
National Advisory Committee on
Semiconductors

Advance Edition
November 1989
Washington, D.C.

National Advisory Committee on Semiconductors
1555 Wilson Boulevard, Suite 500
Arlington, VA 22209

November 1, 1989

Honorable George Bush
President of the United States
White House
Washington, D.C.

Dear Mr. President:

The semiconductor industry in the United States is in serious trouble. If this vital industry is allowed to wither away, the Nation will pay a price measured in millions of jobs across the entire electronics field, technological leadership in many allied industries such as telecommunications and computers, and the technical edge we depend on for national security.

The reasons why the once-dominant U.S. semiconductor industry is deteriorating are many. First and foremost is the fact that foreign producers enjoy advantages in ready access to low-cost patient capital for long-term investment. Foreign producers also operate in a business environment hospitable to cooperative ventures that are not general practice here, and they find shelter in home government protection against competition from abroad. But some blame for the semiconductor industry's poor health must also rest on the lack of long-range foresight of top management of American companies, who failed to realize the full consequences of retreating from key markets such as memories and consumer electronics.

The National Advisory Committee on Semiconductors believes that continued deterioration of America's semiconductor industry poses an unacceptable threat to U.S. economic and national security. We believe that this situation deserves your urgent attention. The Nation must act now, with the industry itself taking the lead and government at all levels participating as a strong partner. We believe that the American people, once fully apprised of the stakes involved for this country, will endorse the legislative and executive actions necessary to restore the semiconductor industry to good health.

The Committee recognizes that some of its recommendations may be controversial. We were charged by the Congress with "devising and promulgating a national semiconductor strategy." We have not shied away from controversy. In this report we present first steps toward a national semiconductor strategy. We believe that the country needs bold and innovative action.

This report warns of a major threat to the United States, a threat that endangers American industry, workers, and strategic self-sufficiency. That threat is immediate and serious and warrants the attention of the highest councils of government. In this first report, the National Advisory Committee on Semiconductors offers for your consideration and early action initial recommendations to counter that threat and enable the U.S. semiconductor industry to flourish. If this action succeeds, the whole Nation will benefit through more jobs, the creation of new wealth, and strengthened national defense.

Pursuant to Section 5142(c) of the National Advisory Committee on Semiconductor Research and Development Act of 1988 (Public Law 100-418), therefore, I have the privilege of transmitting to you the first annual report of the National Advisory Committee on Semiconductors.

Respectfully,

Ian M. Ross
Chairman

CONTENTS

PREFACE

The 100th Congress established the National Advisory Committee on Semiconductors as part of the National Advisory Committee on Semiconductor Research and Development Act of 1988 (Public Law 100-418) to devise and promulgate a national semiconductor strategy. The Congress acted in response to growing public awareness of the importance of America's semiconductor industry to the national security and economic destiny, the increasing and pervasive loss of world market share in key elements of the industry, and the necessity of preserving this industry for the national good.

From the outset of the its deliberations, the Committee agreed on the seriousness of the problems in the U.S. semiconductor industry. The Committee also recognized that this situation must be urgently addressed. This report represents early findings of the Committee, and is an effort to bring quickly to the President and the Congress suggestions for action.

In undertaking its work, the Committee drew on a number of Federal studies of issues affecting the U.S. semiconductor industry and national competitiveness in general. In a number of areas, the Committee undertook additional studies to supplement the earlier work. Finally, the Committee called on the expertise of the American electronics community in the persons of Federal Government officials, industry executives, researchers, and private-sector economists and scholars. The Committee is grateful to these individuals for their help.

For development and analysis of the data and preparation of suggestions for recommendations, the Committee formed three Ad Hoc Working Groups -- Business Environment, Market, and Technology -- each headed by a Committee member and each drawing its membership from experts in the electronics field. The Working Group members provided the Committee with a broad and deep base of knowledge of the problems facing the American semiconductor industry.

The enabling legislation requires the Committee to report on its planned activities for the coming year. The Committee believes that this report contains early key recommendations for the President and the Congress, but also believes that continued development of recommendations is in order and that additional recommendations will be forthcoming in subsequent reports. The Committee expects to continue its work throughout fiscal years 1990 and 1991, releasing reports during this period as appropriate.

EXECUTIVE SUMMARY

The semiconductor industry is strategic to America. The industry is the foundation of the information age, playing a crucial role in the consumer electronics sector, the computer and telecommunications industry, and other industries that have a high electronic content in their products. America's national security also depends on the semiconductor industry. United States and North Atlantic Treaty Organization forces rely on the technological advantage of advanced semiconductors to offset the numerical superiority of potential adversaries.

The semiconductor industry, after an era of world leadership, is now in trouble. It has lost its dominant position in the world market. This radical change has occurred in the 1980s despite the fact that American industry invented, developed, and dominated the semiconductor market for three decades. Japanese companies, encouraged by their government, have taken aggressive actions to establish a world-class semiconductor industry that now clearly leads the world marketplace. The U.S. semiconductor industry has been unable, for many reasons, to respond to this challenge.

It is imperative that U.S. industry, in cooperation with government, develop a strategy to retain a strong semiconductor capability. Major U.S. electronics systems industries, such as computers and telecommunications, depend on the timely availability of leading-edge semiconductor devices. In order for U.S. semiconductor manufacturers to produce leading-edge components they, in turn, need timely access to the latest state-of-the-art semiconductor manufacturing equipment and materials. If the U.S. position in semiconductor devices, equipment, and materials continues to deteriorate, the entire domestic electronics products industry will be at the mercy of foreign suppliers. The loss of control of this large segment of the economy puts millions of jobs and billions of dollars of tax revenues in jeopardy.

A major result of losing semiconductor world market share is that U.S. semiconductor manufacturers are not able to fund research and development (R&D) at the level of their foreign competitors. Research and development spending at the top five Japanese semiconductor firms is now twice as high as spending at their U.S. counterparts. Unchallenged, this large difference will accelerate the U.S. loss of market share in the future.

There is no single reason for the decline of the U.S. semiconductor industry. The causes include changes in the business environment, shifts in the markets for electronic products, and weaknesses in the approaches used by the semiconductor industry to advance technology.

The business environment in the U.S. imposes fundamental disadvantages on American semiconductor manufacturers. These include a high cost of capital, weaknesses in the education of the work force, difficulties in enforcing U.S. intellectual property rights abroad, and the ability of foreign competitors to benefit from closed markets and liberal antitrust laws.

One underrated but key factor in the deterioration of U.S. semiconductor leadership is the loss by U.S. producers of the consumer electronics industry. The shift to the Far East of manufacturing for nearly all consumer electronic products, such as televisions, video cassette recorders, and compact disc players, has had serious consequences because almost all the electronic components used in these products are also made in the Far East. In addition, because consumer electronics can drive technology applied to advanced commercial and military systems, for example in component packaging, foreign domination of the industry will put the United States at a greater disadvantage in the future.

As the U.S. position in the world semiconductor market has declined, so has its leading position in technology. For years the Japanese semiconductor industry has recognized the advantages of cooperation in the precompetitive phases of R&D. By contrast, the U.S. industry is characterized by relationships that are mostly competitive. Because U.S. firms have acted independently, each company is burdened with the full costs of advancing every aspect of new technologies. In an era of rapidly increasing costs of technology development, independent and duplicated efforts hinder competitiveness.

In the Committee's judgment, the United States is at a critical crossroad. The decline of the U.S. semiconductor industry, coupled with the increasing costs of staying at the leading-edge, limits the window of opportunity to establish an effective semiconductor strategy. Unless the U.S. industry and government take coordinated, concerted, and timely action, there will be a long-term deterioration of our industrial strength and military security, and an erosion of our economic wealth.

Recommendations: Toward a National Semiconductor Strategy

Timely industry action, supported by government, is required to arrest the deteriorating global position of the U.S. semiconductor industry. Industry and government must cooperate, with each providing its special strengths and acting in its appropriate role. The National Advisory Committee on Semiconductors has developed recommendations that serve as initial steps towards the development of a comprehensive national semiconductor strategy. These initial recommendations are:

1. Re-establish a fully competitive and supportive business environment in the United States to enable the U.S. semiconductor industry to operate on an equal footing with its major international competitors by:

   a. Promoting capital formation;

   b. Improving the education system;

c. Reforming trade law;

d. Protecting intellectual property; and

e. Improving the antitrust climate.

2. Expand the U.S. industry's global semiconductor market share by rebuilding a strong U.S. position in the growing high-volume, high-technology electronic systems market by:

a. Building a supportive business environment. There are several inseperable actions that must be implemented as a unit to accomplish this:

- Establishing a for-profit Consumer Electronics Capital Corporation (CECC) to resurrect the U.S. consumer electronics industry infrastructure by providing a multi-billion dollar pool of very-patient, low-cost capital;

- Urging the President to direct the appropriate agency to determine those factors which reduce the likelihood of a successful U.S. consumer electronics industry. Redress shall then be immediately sought through cooperative agreements (with non-U.S. corporations), consumer electronics technology licensing, local technology content minimums, and local R&D and design (or any combination of the preceeding); and,

- Having the Federal Government encourage and purposefully support the re-entry for the U.S. consumer electronics industry and its potential to compete vigorously. Accordingly, the Office of the U.S. Trade Representative shall ensure that access to the U.S. consumer electronics market shall be contingent upon reciprocal opportunity for U.S. companies to access foreign markets.

b. Providing expanded market opportunities by encouraging private industry to accelerate the development of a nationwide broadband network providing fiber-optic cable to the home, by modifying regulatory policy where necessary and broadly experimenting with prototype and trials.

3. Enable the U.S. semiconductor industry to retain an enduring world-class, competitive technology position with a healthy semiconductor manufacturing equipment industry by:

a. Accelerating research and development in the U.S. semiconductor materials and equipment industry by expanding the mission of SEMATECH, the semiconductor manufacturing technology consortium, in this area. SEMATECH's funding should be increased immediately by $100 million, half of which should be provided by the industry. Additional funding of $800 million will be required over the next 3 years for these programs fully to address the needs of this industry segment.

b. Sustaining the current Departments of Defense (DOD) and Energy (DOE) funding of $200 million per year that was previously allocated to

very-high-speed integrated circuits and direct it toward maintaining long-term industrial R&D efforts related to silicon technology and manufacturing tools.

c. Ensuring that the DOE transfer synchrotron ring x-ray technology and systems for microlithography to U.S. industry and aggressively pursue, with DOD's Defense Advanced Research Projects Agency, and the Department of Commerce programs in mask making, mask repair, aligners, metrology, and small x-ray sources.

The Committee's full recommendations appear in Section IV.

I. The Semiconductor Industry and Its Vital National Role

The uncommonly important semiconductor industry starts from some of the most common materials on Earth--sand, water, and aluminum. Through the application of complex manufacturing processes, these raw materials are transformed into the most intricate devices ever produced. Today, a single semiconductor integrated circuit chip can contain millions of microscopic components that channel the flow of electrons, and they can perform their tasks in a few billionths of a second. Before the next century, chips containing billions of components will be made.

The transformation of sand into complex silicon integrated circuits requires exceedingly high levels of scientific and engineering knowledge. The semiconductor industry's technological know-how encompasses a broad range of fields in the physical sciences such as physics, chemistry, electrical engineering, and materials science. The needs of the industry stimulate fundamental advances in these fields, and the resulting gains spill over to fill the Nation's reservoir of technological capability.

As chips become more complex, the costs of staying at the leading-edge escalate rapidly. Chip makers are at the forefront of all U.S. industries in their annual investment (as a percentage of total revenues) for research and development, and new plants and facilities. Since 1980, the cost of a typical state-of-the-art facility for semiconductor memory chips has risen eight-fold, from $25 million to $200 million. Over the next several product generations, state-of-the-art manufacturing facilities are expected to cost between $500 million and $750 million. Last year alone, the U.S. semiconductor industry spent about $3 billion on R&D and another $3.5 billion in capital investment. Such spending strains the resources of even very large companies.

Because more and more transistors can be packed on each chip, the cost per electronic function has fallen by a factor of 100 over the past 15 years. The gains in product performance have been commensurate with this extraordinary improvement in productivity. Compare, for example, the world's first electronic computer, America's ENIAC built in 1946, with an equivalent computer built today. ENIAC was room-sized, weighed 2 tons, drew power equivalent to 100 lighthouses, and used unreliable vacuum tube technology that frequently broke down. Today, American companies produce single semiconductor chips that have 1,000 times the processing power, almost never break down, draw no more energy than a night-light, weigh less than a gram, and cost 30,000 times less.

This tremendous improvement in productivity and performance has, in turn, opened semiconductor markets to ever wider applications. Semiconductor components are used ever more pervasively and intensively in almost all aspects of daily life. Today, chips drive products that help us to defend America, make medical diagnoses with sophisticated imaging equipment, navigate commercial aircraft, and warn when dangerous weather is approaching as well as improve the quality of our everyday lives through a broad range of consumer electronic products.

Today's $50 billion world chip industry leverages a $750-billion dollar global market in electronics products and 2.6 million jobs in the United States. This is more than double the number of jobs in the U.S. steel and auto industries combined. As products such as TVs, computers, anti-lock brakes, microwave ovens, and phone systems improve in performance and cost, demand for them increases. That increased demand prompts producers of these products to seek further advances from chip technology, pushing the industry forward toward further innovations. Such cycles of improved productivity and performance, and expanding demand for the products that take advantage of the

improvements, create enormous economic and social gains. The benefits range from saving lives through improved medical safety systems to communicating by voice and data with any point in the world.

America's national security also depends on excellence in semiconductors. United States and North Atlantic Treaty Organization forces rely on a technological advantage ultimately traceable to semiconductors to offset the numerical superiority of our adversaries, as a Department of Defense task force affirmed in 1987:

> The superiority of U.S. defense systems of all types is directly dependent upon superior electronics, a force multiplier which not only enhances the performance of the weapons themselves, but also maximizes the efficiency of their application through sophisticated intelligence and command and control systems... The United States has historically been the technological leader in electronics. However...U.S. defense will soon depend on foreign sources for state-of-the-art technology in semiconductors. The Task Force views this as an unacceptable situation.[1]

Progress in the semiconductor industry advances the technical capabilities of industries that are linked to chips in the production chain, from computers and telecommunications to new materials, and indirectly advances many other industries. The semiconductor industry promotes the development of ever purer chemicals and materials, more powerful computer-aided engineering and design, and computer-integrated manufacturing, all of which find broad application in other industries. In addition, the products of the electronics industry are essential tools used to achieve the increased productivity, lower cost, and higher quality that are required from all U.S. manufacturing. Leadership in chips can result in leadership in many industries--a fact widely recognized by our major international competitors.

Because the semiconductor industry is so vital to the national economy, it is important to understand the structure of the industry and its position in world markets. The semiconductor industry has two major business segments. The first consists of the semiconductor manufacturers who actually produce semiconductor components (U.S. annual revenues are approximately $20 billion). These companies turn simple raw materials into finished wafers in expensive, ultra-clean manufacturing facilities. They also provide the packaging, testing, sales, marketing, and product support that are essential for success in the marketplace. The second segment of the industry includes the semiconductor materials and equipment (SM&E) firms that produce both the raw materials and the manufacturing equipment that go into the production of integrated circuits (U.S. annual revenues are about $5 billion). Together, semiconductor manufacturing and SM&E firms enable the entire U.S. electronics products industry, as illustrated by Figure 1.

The core of the electronic products industry is made up of SM&E companies. These firms supply the common set of tools and materials, used by most manufacturers, that enable efficient, low-cost, high-quality production. They supply both the equipment for various stages of the manufacturing process (photolithography, materials processing, chip handling, packaging, and testing) and the ultra-pure silicon, gases, chemicals, and metals that are transformed into circuits. Loss of leadership in these technologies undermines more than just semiconductors. Indeed, the SM&E industry advances[2] manufacturing disciplines as diverse as machine tools, vacuum control, automated controls,

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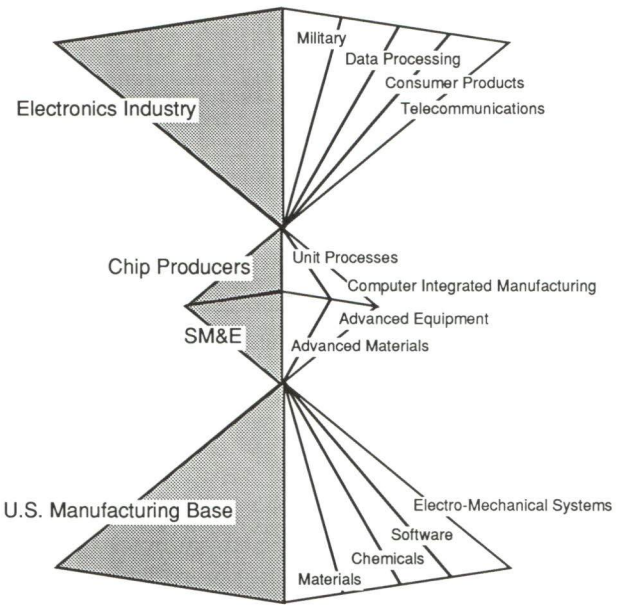
[1] "Report of Defense Science Board Task Force on Defense Semiconductor Dependency," Feb. 1987, p.1.

and computer-aided design. Advances within the SM&E industry, therefore, spill over into almost all aspects of the American manufacturing base.

Both the chip and SM&E industries have suffered declines in their world market positions over the past decade, as is demonstrated in the next section.

FIGURE 1: SEMICONDUCTORS: THE ENABLING INDUSTRY



Source: National Advisory Committee on Semiconductors.

II. The Decline of the Semiconductor Industry

Evidence of the Decline in the U.S. Semiconductor Manufacturing

The U.S. merchant semiconductor industry has lost its dominant world market share in the past 10 years.[2] Leadership of the industry has largely shifted to Japan, as shown in Figure 2. As a result, while United States semiconductor revenues nearly tripled from 1981 to 1988, revenues for Japanese producers rose six-fold. In addition to the loss of leading-edge semiconductor markets, the U.S. is continuing to lose market share in less complex discrete devices, as shown in Figure 3. These devices are key to a wide range of products from military equipment to consumer electronics.

Despite high investment rates relative to other U.S. industries, the U.S. chip industry is being substantially outspent by its major Japanese competitors in R&D and the gap is growing larger, as shown in Figure 4. In addition, Japanese firms have led U.S. firms in capital spending since 1982, although the United States had greater semiconductor sales until 1986. In 1988, Japanese capital spending was nearly $2 billion higher than that of the United States.

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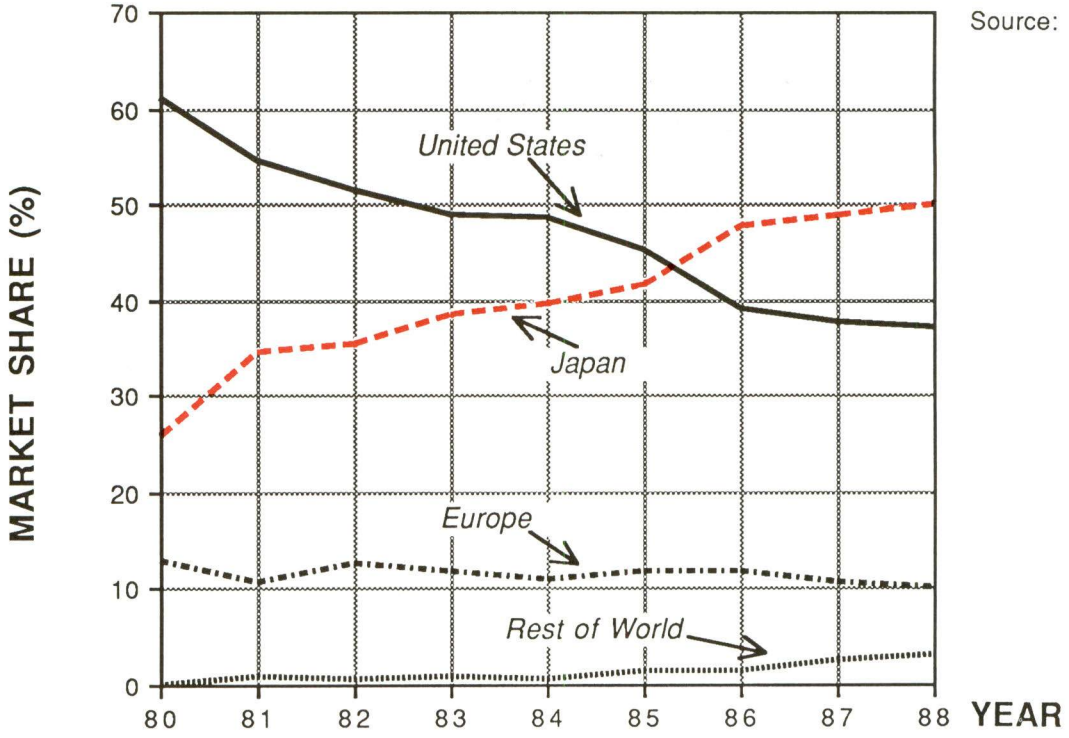
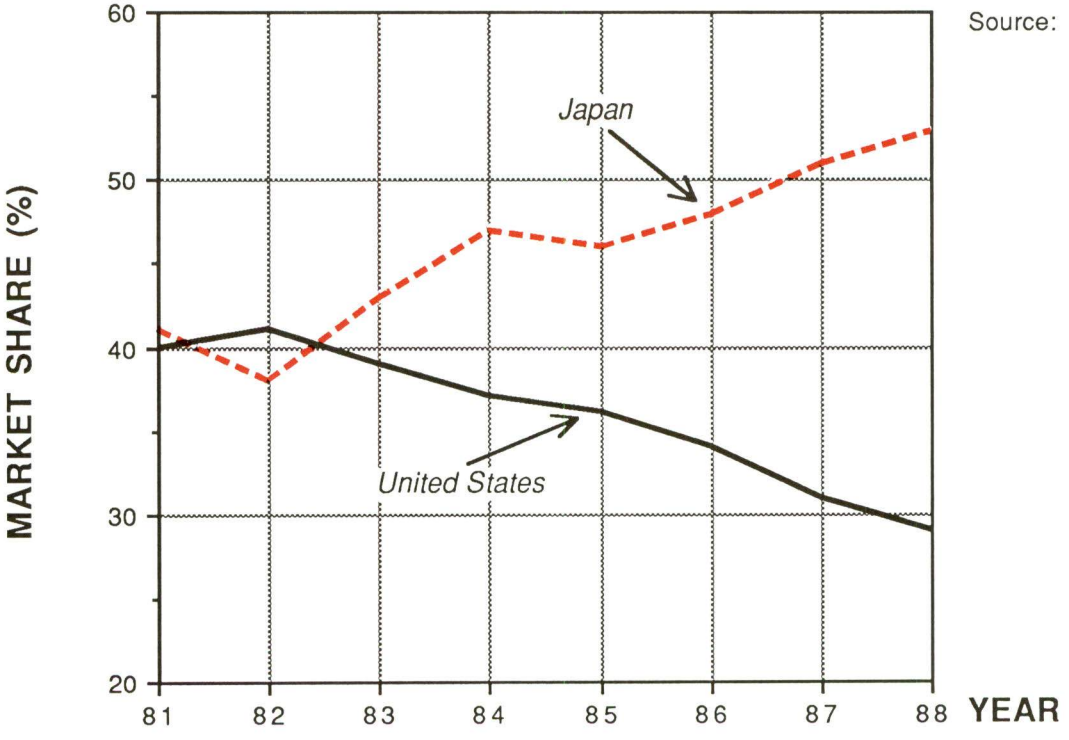
[2] Since U.S. captive semiconductor manufacturers do not disclose their financial position, data is presented only for the U.S. merchant industry. Data for the Japanese semiconductor industry include all production. Inclusion of U.S. captive production would slightly increase the market shares shown for the U.S. in several figures, but would not change the trends described. Based on experience in the field, the Committee believes the conclusions of this report apply equally well to merchant and captive chip producers.

FIGURE 2: WORLD SEMICONDUCTOR PRODUCTION BY REGION



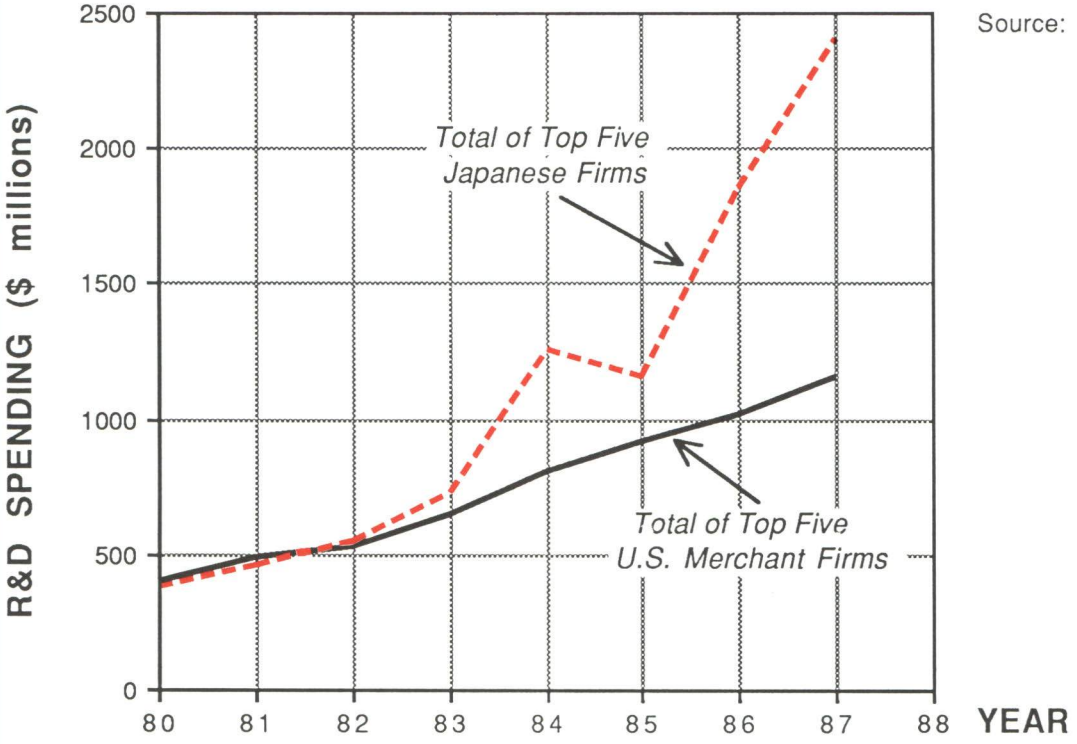
Source: Dataquest.

FIGURE 3: WORLD DISCRETE PRODUCTION BY REGION



Source: Dataquest.

FIGURE 4: WORLD SEMICONDUCTOR R&D SPENDING



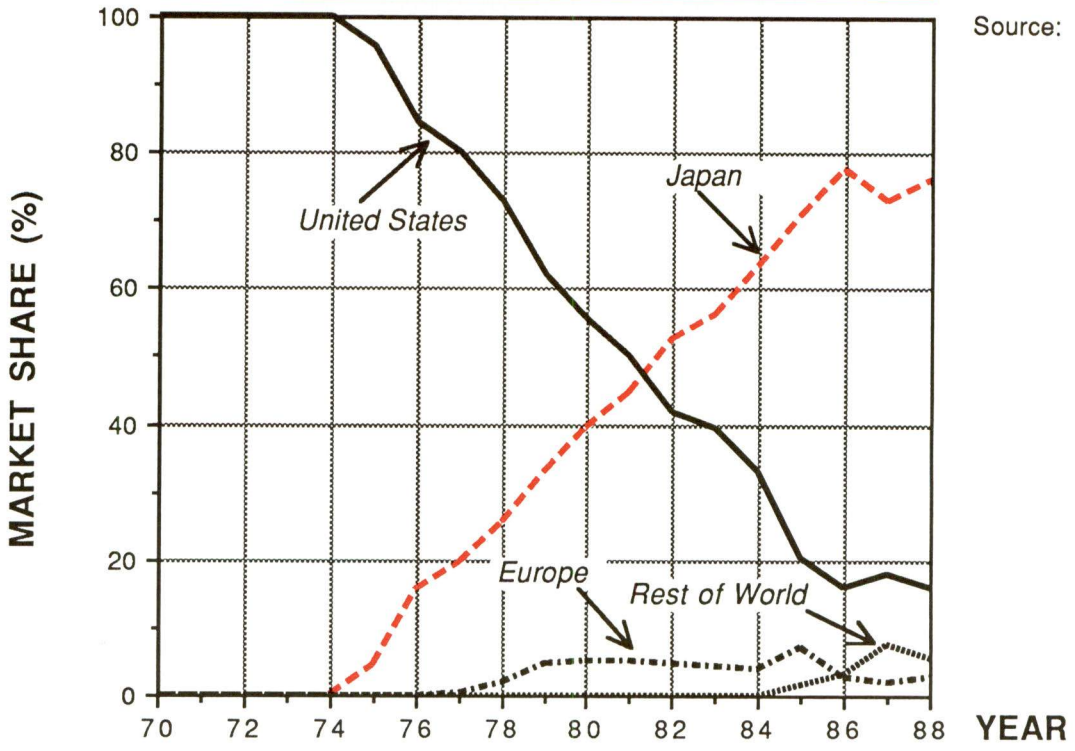
Source: Dataquest.

The erosion of the U.S. position is equally apparent in key semiconductor product markets. In 1970, when the first integrated circuit memory was being sold, Japan's market share was zero. In 1988, the world Dynamic Random Access Memory (DRAM) market share of Japanese producers was nearly 80 percent This market share loss by U.S. merchant firms is shown in Figure 5. The loss of position in memory is particularly disturbing because leading-edge memory drives technological advances in a broad range of process and manufacturing areas. DRAMs not only act as a technology driver for chip makers, but they are also an important driver for SM&E firms, as new equipment and materials are often first developed for memory production.

The U.S. semiconductor industry's simultaneous loss of global technology and market position results in lower revenues, further reducing R&D and capital spending and leading to further decline in market share. It has already led to a change in the world leadership among semiconductor producers, as illustrated by Figure 6. This figure shows the change in the regional control of the market for metal-oxide-semiconductor (MOS) devices, which is the largest and fastest growing segment of the semiconductor market.

Reversing this trend will not be easy. Indeed, the cumulative loss of world market position by U.S. producers has had a serious effect on America's position relative to Japan's in many important aspects of semiconductor technology. The United States is holding its technological position in only a few areas, and gaining position nowhere. In critical technologies such as computer-integrated manufacturing, production quality control, and component packaging and testing, the United States has lost its technological superiority. Because technological knowledge is cumulative, once technological leadership is lost, it is very difficult to regain. The United States, therefore, has an ever-shortening window of opportunity in which to regain technological leadership before it finds itself behind the state-of-the-art.

FIGURE 5: WORLD PRODUCTION OF DRAMS BY REGION



Source: Dataquest, PREL '88.

FIGURE 6: LEADING MOS PRODUCERS REVENUES ($ millions)

1973		1978		1983		1988	
Texas Inst.	65	Intel	283	*NEC*	786	*NEC*	3114
AMI	56	Texas Inst.	238	Intel	720	*Toshiba*	2546
Intel	41	*NEC*	183	Motorola	697	Intel	2328
Rockwell	40	Motorola	143	*Hitachi*	638	*Hitachi*	1885
Mostek	39	*Hitachi*	139	Texas Inst.	572	*Fujitsu*	1437
NEC	37	Mostek	125	*Toshiba*	458	*Mitsubishi*	1399
Hitachi	35	National	95	*Fujitsu*	406	Motorola	1399
RCA	35	*Toshiba*	88	Mostek	315	Texas Inst.	1271
National	21	AMD	71	National	280	*Matsushita*	882
Mil	20	AMI	71	*Mitsubishi*	247	*Oki*	841
Total Market	591		2332		7951		26964

Source: Intel.

(Japanese Firms *Italicized*)

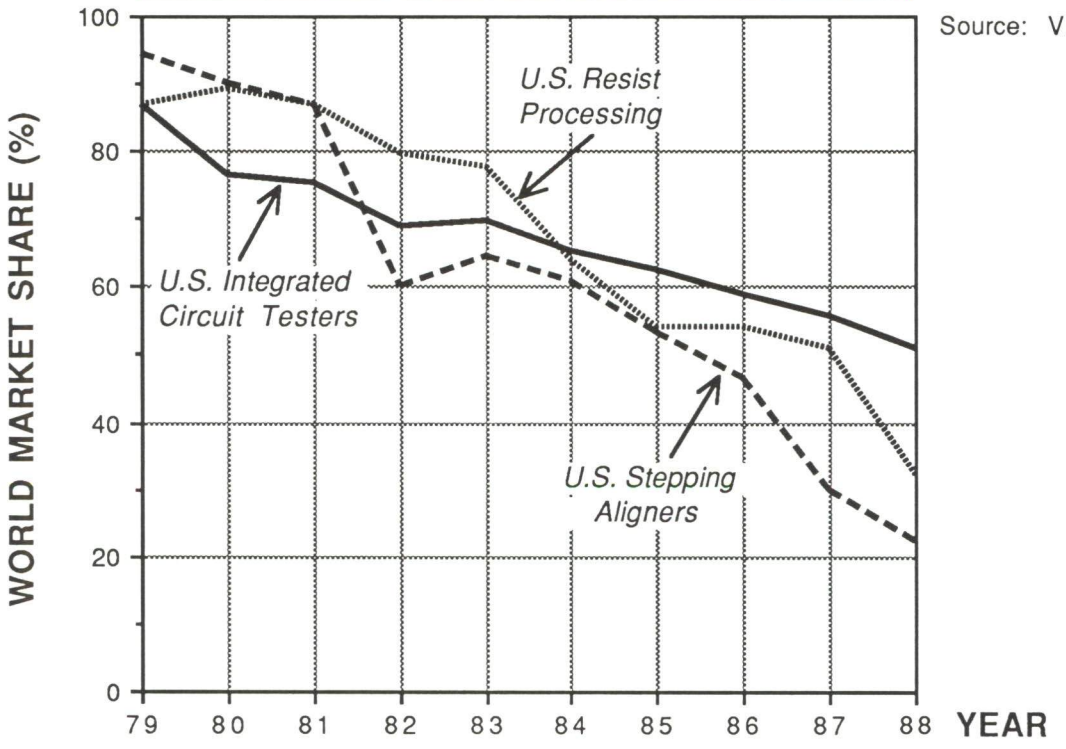
Evidence of the Decline of the U.S. SM&E Industry

Paralleling the loss in world market share for U.S. chip manufacturing has been a serious loss of market share for U.S. SM&E firms. Because SM&E firms supply the common tools and materials used by all chip manufacturers, weakness in semiconductor equipment and materials leads to weakness in semiconductor component manufacturing, and ultimately to weakness in electronic products markets.

Today's state-of-the-art silicon processing, driven principally by the manufacturing requirements of semiconductor memory chips, is moving toward decreasing feature sizes. Eighty-five percent of all leading-edge submicron manufacturing capacity is currently in the Far East. The predominance of leading-edge chip manufacturing outside the United States has very seriously undermined segments of the U.S. SM&E industry, largely because major foreign chip producers prefer working with local sources of supply they can control. These close working relationships spur equipment advances at foreign SM&E firms working with chip producers at the leading-edge.

The U.S. SM&E producers of lithography equipment, test equipment, and materials have seen their commanding market shares reduced, as shown by the examples in Figure 7. The three equipment markets shown in this figure represent critical tools used in chip manufacturing, and are representative of the declining U.S. share of most equipment markets. In 1982, U.S. SM&E firms were dominant suppliers worldwide; today, Far East firms are dominant, as shown in Figure 8. The only major U.S. SM&E survivors have succeeded by establishing close customer relationships in Asia.

FIGURE 7: SELECTED U.S. SEMICONDUCTOR EQUIPMENT



Source: VLSI Research, Inc.

FIGURE 8: TOP 10 SEMICONDUCTOR EQUIPMENT SUPPLIERS' WORLDWIDE SALES ($ millions)

1982		1988	
Perkin Elmer	$162	*Nikon*	*$521*
Varian	100	*Tokyo Electron (TEL)*	*508*
Schlumberger	96	*Advantest*	*385*
Takeda Riken (Advantest)	*84*	Applied Materials	382
Applied Materials	84	General Signal	375
Eaton	80	*Canon*	*290*
Teradyne	79	Varian	211
Canon	*78*	Perkin Elmer	205
General Signal	77	Teradyne	190
Nikon	*58*	LTX	180

(Japanese Firms *Italicized*)

Source: VLSI Research, Inc., Electronic Business.

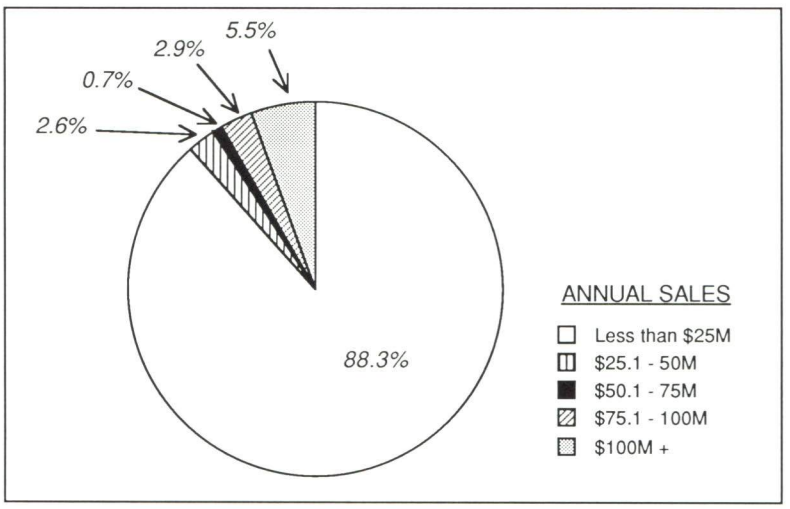
Maintaining a competitive position both in the United States and in the Far East is difficult for most U.S. SM&E producers, partly because their industry is highly fragmented and financially weak. While many Japanese SM&E firms are part of large, diversified companies, Figure 9 shows that 88 percent of the 850 U.S. SM&E companies had 1988 annual sales of less than $25 million. These companies face a difficult competitive environment of escalating capital requirements and R&D costs, while at the same time their major market is shifting to Asia.

Many U.S. SM&E firms still have excellent technology; the problem is that they will not be able to sustain their competitive position over time. They are also small enough to be attractive acquisitions for foreign conglomerates. Only recently, Materials Research Corporation (MRC), a critical U.S. manufacturer of semiconductor equipment and materials, accepted a tender offer from Sony. In addition, for several months Perkin Elmer has sought to sell its semiconductor lithography division. These companies represent important capabilities in the United States, and it would be damaging to the semiconductor industry, and to U.S. manufacturing as a whole, if these skills continue to migrate abroad. An example of the result of such a loss of U.S. capability is the sale of Monsanto's silicon materials business to the West German firm Huels, dropping U.S.-owned silicon wafer production from a 15 percent share of the world market to 1.8 percent. An initial analysis indicates that up to $1.2 billion over the next 3 years is required to restore this industry's health.[3]

The U.S. semiconductor manufacturing firms are already heavily dependent on foreign sources of critical materials and equipment, as shown in Figure 10. Even the largest and technologically strongest U.S. chip producers are at risk of failing to gain timely access to the SM&E technologies they need to remain competitive. Unfortunately, the prospect is for increased dependence and continued deterioration of the U.S. SM&E

[3]Analysis performed by the Semiconductor Equipment and Materials International (SEMI).

FIGURE 9: U. S. SM&E INDUSTRY SEGMENTED BY ANNUAL SALES



Source: Semiconductor Equipment and Materials International.

FIGURE 10: U.S. DEPENDENCE ON CRITICAL FOREIGN SEMICONDUCTOR EQUIPMENT AND MATERIALS

	1988 PERCENT IMPORTED
EQUIPMENT	
Stepping Aligners	68
Resist Processing	69
Scanning Electron Microscopes	>80
Wafer Saws	75
Die Bonders	80
Tape Automated Bonders	81
Mold and Sealing Equipment	65
Molding Presses	75
Lead Trim and Form	80
MATERIALS	
Silicon Wafers	97
Mask Blanks (share of U.S. market only)	91
Sputter Targets	96
Lead Frames	>95
TAB Tapes	85
Molding Compounds	78
Ceramic Packages	96
Ceramic Multilayer Packages	84
Ceramic Substrates	97
Hybrid Packages	80
Bonding Wire	>95

Source: SEMATECH.

industry as long as its major customers, the U.S. chip industry, is itself in relative decline. The decline of the U.S. SM&E industry will likely be hastened by further inroads of Asian SM&E manufacturers; an industry survey indicates that 75 percent of the next generation of processing equipment purchased by U.S. companies will be produced in Japan.

The Committee believes that the continued decline of the U.S. semiconductor manufacturing and SM&E industries is unacceptable. Neither segment of the semiconductor industry can remain strong without the other. Manufacturers depend on early access to advanced materials and equipment, and SM&E firms rely on the revenues generated by sales to domestic chip manufacturers. America needs a domestic-based and controlled semiconductor industry with a full complement of leading-edge activities from R&D through production, and with production costs, quality, and performance second to none. For the foreseeable future, neither imports nor foreign direct investment can ensure that the United States receives the same level of military, technological, and economic benefits that an American industry guarantees.

Consequences of the Decline

The economic, technological, and national security gains that flow from semiconductors provide a rare combination of benefits for America. The United States was able to capture those gains effectively so long as U.S. chip producers led the world and conducted nearly all of their leading-edge R&D and manufacturing activities at home. As the U.S. industry's competitive position and state-of-the-art domestic activities weaken, so does America's ability to reap the lion's share of the available national gains.

This point is most obvious from the perspective of national security. The qualitative edge in advanced weaponry that underlies America's strategic posture is put at risk by depending on trade flows that can be disrupted in wartime, and on foreign-owned capabilities, even if they are based in the United States.

Indeed, a recent publication[4] by Sony chairman Akio Morita and former Japanese minister Shintaro Ishihara, highlights the growing issue of Japan's pivotal role in developing leading-edge military electronics technology that contributes to the U.S. - Soviet balance of power. They argue that because Japan has such dramatically advanced production skills, their semiconductors have achieved a level of sophistication unmatched anywhere. As a result, they contend the United States could become almost totally dependent on Japan to supply chips for its weapon systems. They go on to point out that if the supply of advanced Japanese chips to the United States were interrupted, and if Japan were to make these chips available to the Soviet Union instead, the balance of power would change dramatically.

The absence of a strong domestic U.S. semiconductor industry would also give leverage to foreign competitors to control the flow of economic gains from semiconductors to the rest of the U.S. economy. Indeed, a scenario believed possible by many observers in industry and government foresees the withering away of the U.S. semiconductor materials and equipment industry in the face of cyclical downturns in U.S. semiconductor production and increased Japanese competition. In this scenario, the fate of the U.S. semiconductor industry--and, by extension, U.S. downstream industries--would soon be in the hands of mostly Asian suppliers. In the scenario's denouement, Asia dominates the U.S. downstream electronics industry and ultimately the global electronics landscape.

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4 The Japan that Can Say "No", The New U.S.-Japan Relations Card, Akio Morita and Shintaro Ishihara.

Our major competitors have a demonstrated capability -- compelled either by policy or their own strategy and organization -- to act in concert and exercise market power sufficient to control access to technology and its price. Compelling examples include the DRAM shortage, the inability of U.S. supercomputer companies to purchase the fastest foreign chips, and the inability of most U.S. chip producers to gain timely access to the most advanced foreign semiconductor manufacturing equipment and materials. In all of these areas, U.S. industry has already lost control of its own destiny, and as a result U.S. economic strength and national security is at risk.

Exploitation and realization of the economic gains that flow from semiconductors depends upon the development of a cumulative, readily accessible, and leading-edge knowledge base. In the absence of a viable domestic industry, these factors would reside under foreign control. And they would reside there for a long period, because resurrecting a leading-edge U.S. industry, once lost, would take an extraordinary, concerted investment of time and resources. Neither imports nor foreign direct investment can relieve this dependency. Because nearly all of the R&D will be done outside the United States, imports can neither generate the kind of skill and knowledge base that a domestic-based industry generates, nor substitute for the cumulative learning that domestic activities provide. Nor, without taking substantial risks, can the Nation depend on foreign producers operating within the United States to carry on sufficient state-of-the-art science, engineering, and production and adequately to support the country's research base.

For all of these reasons, the Committee concludes that the United States can be certain of enjoying the economic, technological, and national security benefits that flow from semiconductors only if America's industry is at the leading-edge, with a full complement of world-class activities from R&D through production here at home.

III. Major Root Causes of the Semiconductor Industry Decline

At the root of the U.S. semiconductor industry's loss of world position lie critical factors that have worked to the advantage of Far East producers. These factors include differences in the business environment that result in policies and practices, abroad and at home, that are detrimental to the U.S. industry. In addition, the markets available for U.S. semiconductors have shrunk as a result of shifts in the markets for electronic products. Finally, basic technological problems exist for the industry.

The Business Environment

One fundamental cause of decline in the semiconductor industry results from differences in policies and practices between the United States and its major international competitors, differences that lend advantage to foreign producers. The most critical differences are the access to low-cost capital, the ability and willingness of foreign producers to benefit from trade practices such as closed markets and dumping, the failure of U.S. schools adequately to train the work force, and the difficulty of enforcing U.S. legal rights abroad.

For U.S. chip makers, one of the most serious disadvantages is a lack of access to low-cost capital. This disadvantage is critical for U.S. chip firms because of the semiconductor industry's increasing capital intensity. While there is some debate over the precise values for the real cost of capital in the United States and Japan, there is agreement that costs in Japan have been significantly lower. This differential was particularly

important during the early part of the 1980s when the Japanese semiconductor industry was investing heavily to expand capacity. A lower cost of capital enables foreign competitors to enjoy lower risk in making investment decisions, and consequently to operate with longer time horizons and greater immunity to swings in the business cycle.

Foreign competitors also benefit from supportive industrial policies and practices in their home markets. Policies range from closed domestic markets to subsidies and the coordination of precompetitive research and development. Practices range from concerted pricing behavior to captive customer and distribution arrangements (e.g., through increased vertical integration and cross-ownership). Together, these factors have helped to create an unstable market environment with unpredictable financial returns for U.S. chip firms. This condition has discouraged the long-term investment perspective required for success in the semiconductor industry. The instability in the market was, for example, directly responsible for the dramatic decline in U.S. DRAM production.

These problems of the semiconductor industry are compounded by America's ineffective efforts to stay at the forefront of education and training. In a world where capital and technology move rapidly across national boundaries, a nation's competitive performance will depend on the continued quality of its work force. This fact is especially significant in advanced technology industries such as semiconductors. Successful firms blend theoretical physics and practical manufacturing skills. While our educational system has concentrated on educating talented students in theoretical disciplines, it has neglected training for manufacturing. In addition, manufacturing industries have been slow to communicate their needs to institutions of higher education. A revised education emphasis is required to support the gains in productivity and quality in manufacturing needed to keep the United States competitive. Companies that have recognized quality programs have found they have had to implement extensive corporate training programs for their employees at a cost that can, at times, rival their R&D budgets. Much of this training should have been a part of a fundamental educational curriculum.

The advantages of active quality programs are demonstrated by success in the marketplace. Asian companies were quick to recognize the importance of the customer's perception of quality in electronic products, as well as for semiconductor components. The U.S. firms that were late to understand that comprehensive quality programs are fundamental to manufacturing at the leading-edge have found themselves at a serious competitive disadvantage.

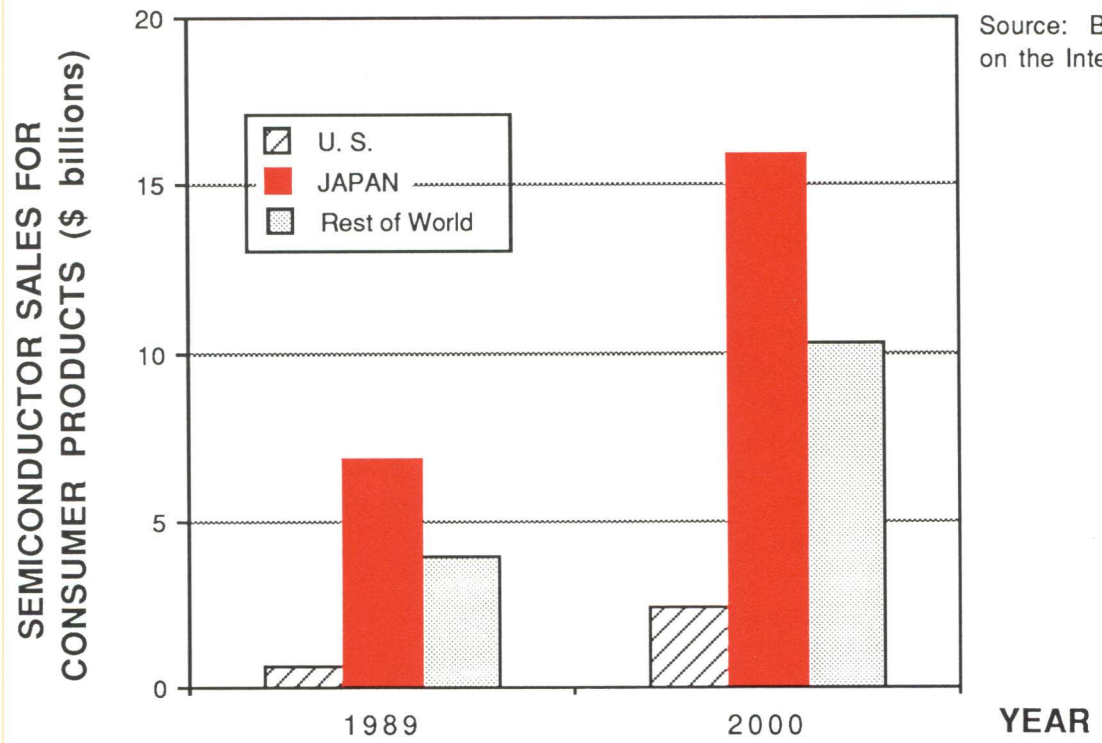
In addition, the Japanese have effectively used consensus and negotiation as a methodology for solving technical problems. This approach works well because of the relentless pace of technological change and the need for close cooperation between suppliers and customers in the semiconductor industry. In contrast, American industry has often been built on adversarial and contractual relationships. This approach slows reactions to emerging technologies, consumes valuable resources, and ultimately delays products' introduction to the market. In a rapidly changing market, such delays can mean the difference between success and failure .

Finally, differences exist in the legal system and practices of chip producing countries. In several key areas, notably intellectual property and antitrust, asymmetries between domestic and foreign laws frustrate the ability of U.S. companies to take full advantage of their competitive assets. Few countries in the Far East provide comprehensive protection of intellectual property, making it easier for foreign producers to reap the returns that would otherwise accrue to U.S. inventors. Similarly, foreign producers often engage in cooperative and coordinated behavior that would not be permitted under U.S. antitrust laws.

The Market

A fundamental problem facing U.S. chip makers is the migration of their customer base to the Far East. More and more of the world's electronics systems are being produced outside the United States, especially in Asia. In 1984, electronics systems produced in the United States and Europe consumed 63 percent of all semiconductors; by 1989, their combined share was only 47 percent, and Japan had supplanted the United States as the world's largest market. Even more important has been the shift in the production of consumer electronics products. At one time the United States held a dominant position in the production of products such as radios, televisions and video cassette recorders, but one by one U.S. market shares have been reduced dramatically. At the same time, the electronic content of these products has increased dramatically. As shown in Figure 11, consumer electronics products will consume more than $11 billion of semiconductors in 1989--more than 20 percent of the world's semiconductor production. Looking toward the year 2000, Japanese sales of semiconductors for consumer products are projected to be $13.5 billion greater than those of U.S. chip producers. If this projection is accurate, consumer products could fund more than $1 billion dollars of R&D in Japan in excess of that being funded in the United States. This difference in R&D funding attributable to the consumer products market alone is equivalent to the total R&D spending of the top five U.S. semiconductor firms in 1987.

FIGURE 11: WORLD SEMICONDUCTOR SALES FOR CONSUMER PRODUCTS APPLICATIONS

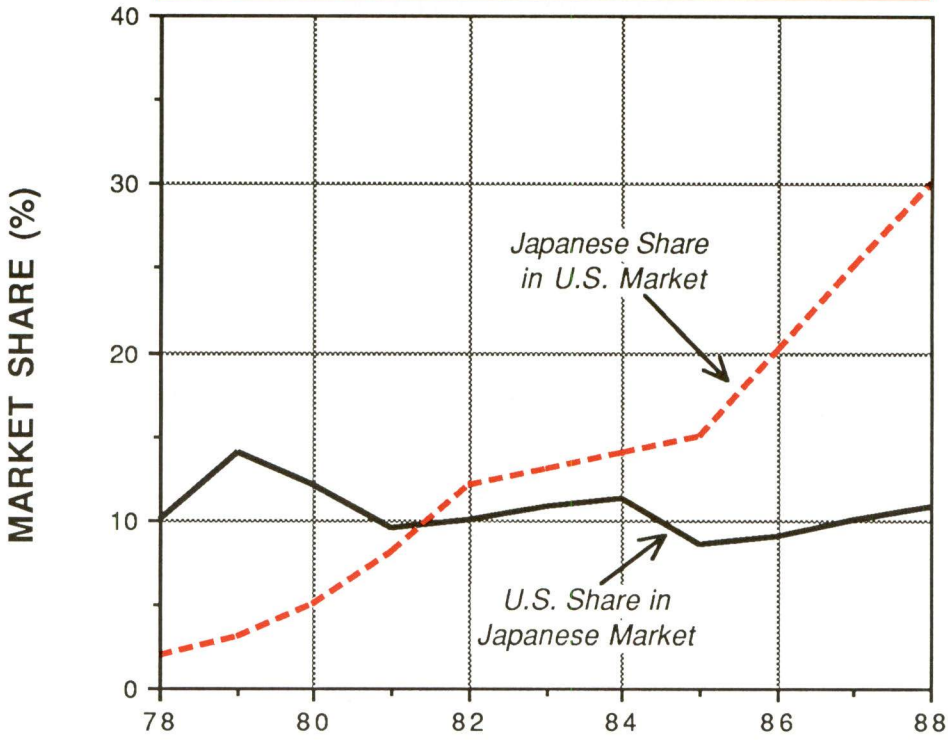


Source: Berkeley Roundtable on the International Economy.

Changes in the location of product manufacturing are important because the U.S. chip industry is more successful selling into the U.S. market than into foreign markets. Although losing market share, U.S. semiconductor manufacturers still control nearly 70

percent of the domestic chip market. In Japan however, in spite of intense efforts by both U.S. manufacturers and governmental agencies, the United States has about a 10 percent market share, as shown in Figure 12, with no growth through the 1980s. Thus, as product manufacturing shifts to Asia, the total market available to U.S. chip producers is shrinking.

FIGURE 12: U.S. AND JAPANESE MARKET SHARE IN EACH OTHER'S HOME MARKET



Sources: Semiconductor Industry Assn., Dataquest.

It should be noted that the Japanese share of the U.S. market has increased from 5 to 30 percent in the 1980s, as shown in Figure 12. There are two major reasons for the increasing use of Asian manufactured components in the U.S. market. First is the decline of U.S. market share in DRAMs. DRAMs now account for about 15 percent of the total semiconductor market, but the U.S. market share has dropped to less than 20 percent. Another reason for the decline in U.S. semiconductor market share at home is the use of foreign components in products assembled in this country by foreign firms. Although many Japanese companies assemble personal computers and consumer products in the United States, the designs are usually done in Japan and call for Japanese components. Although assembly jobs are created, the U.S. semiconductor industry is hurt by the reduction in sales volume and by a corresponding reduction in R&D funding.

Participation in consumer electronics markets will be even more critical in the future, as the newest consumer products increasingly use highly sophisticated chip technologies and are effective drivers of chip scale-of-integration, packaging, and sub-system assembly. Indeed, Far East producers are defining a new electronics market segment: high-volume, high-technology products such as camcorders and compact disc players, facsimile machines, laptop computers, optical disk mass storage systems, laser printers, and portable telephones.

Such products constitute the fastest growing world markets for chips. American electronics manufacturers currently participate only at the fringes of these critical new

markets. Developing a substantial new U.S. participation in these new consumer electronics markets would address a number of problems facing U.S. chip firms. First, increased U.S. presence in the manufacture of high-technology consumer products would provide additional markets for U.S. semiconductor manufacturers. Second, the same chips that would support a renewed U.S. consumer products industry could be marketed to foreign consumer products producers. Given the small market share currently held by U.S. firms, and the resistance to U.S.-sourced products outside of the domestic market, this effort may not produce substantial revenues initially. It would provide a better match, however, between the products U.S. semiconductor manufacturers sell and foreign markets demand.

Technology

For semiconductor firms to stay at the leading-edge of technology, the industry needs a long-term perspective, the patience to achieve high-quality through steady incremental improvements, and an understanding that the technical knowledge required for success is cumulative over many product generations. Very large, precompetitive investments in people, technology, and facilities must be made years before products are ready for market. Precompetitive investments are not related to specific products, they are aimed at the development of the common tools and technologies that will be used later in a variety of applications. With each succeeding technology generation, the precompetitive costs are rising. Because major process generations must be started 5 years or more before products are brought to market, and major product generations are introduced every 3 years, it is necessary for semiconductor firms to bear the costs of more than one precompetitive effort at once. The process development costs for a single generation now reach $150 million, and are escalating rapidly. These costs strain the financial resources of even the largest firms in the industry. The Japanese semiconductor industry has recognized this for some time, and has engaged in cooperative precompetitive research.

In the past, U.S. semiconductor firms have not supported cooperative research in the early phases of process and materials development. They viewed their early research efforts as proprietary, and did not share the results with competitors or with equipment and material suppliers. This adversarial atmosphere created inefficiency, redundancy, and even the misapplication of equipment, and it limited the financial resources applied to any single effort to those that could be borne by a single firm. One opportunity for cooperative precompetitive research efforts is x-ray lithography technology development, which is critical to the production of future generations of advanced integrated circuits. This development is expected to be extremely expensive and could greatly benefit from the pooled resources of the semiconductor industry. The U.S. effort in x-rays lacks the breadth, cooperation, and organization of the program in the Far East.

The U.S. semiconductor industry has been late to recognize the advantage of such cooperative research efforts, and have only recently organized to pool their resources. One result is SEMATECH, a government supported industry consortium dedicated to improving semiconductor manufacturing technology. By bringing together semiconductor manufacturers and SM&E firms prior to the competitive phase, it is hoped that some of the adversarial nature of their relationship can be avoided. A more cooperative atmosphere would reduce the costs for new equipment development at U.S. SM&E firms that have been hard pressed to fund enough R&D to remain competitive with foreign firms. A better working relationship would also remove risk from new product development, because SM&E firms would have more insight into the emerging needs of semiconductor manufacturers. Although a necessary effort, the $200-million-per-year SEMATECH program is by no means sufficient to solve the semiconductor industry's problems.

IV. Recommendations for Initial Steps Toward a National Semiconductor Strategy

Timely action by industry and government is urgently required to arrest the deteriorating global position of the U.S. semiconductor industry and restore that industry to competitive health. Industry and government must cooperate, with each providing its special strengths and acting in its appropriate role. Because of the immediacy of the threat and the extraordinary losses that will befall the Nation without prompt action, this first Committee report offers recommendations for immediate consideration and early action.

The following recommendations respond to the issues outlined in the last section. Taken together, they represent initial steps toward a national semiconductor strategy. They aim to:

- Expand the U.S. industry's global semiconductor market share.
- Establish a fully competitive and supportive business environment in the United States.
- Enable industry to achieve an enduring, world-class, competitive technology position with a healthy SM&E industry.

MARKET

1. REBUILDING THE U.S. CONSUMER ELECTRONIC INDUSTRY: An effective way to expand the U.S. semiconductor industry's market share would be to reverse the flow of the consumer electronics and equipment manufacturing (and company ownership) to Asia, while simultaneously increasing significantly the likelihood of success in rebuilding the U.S. consumer electronics industry. Accordingly, we recommend that the following inseparable actions be implemented as a unit:

a. ESTABLISH A CONSUMER ELECTRONICS CAPITAL CORPORATION (CECC): The CECC should be a for-profit, privately managed investment holding corporation. Its mission should be to provide the momentum necessary to resurrect the U.S. consumer electronics industry infrastructure by creating a multi-billion dollar pool of low-cost, very patient capital. Its investments would be judged both on their long-term profit potential and their strategic value to the mission. The key objective should be the establishment of sustainable market share through the introduction of innovative, high-quality consumer electronics products. In light of the importance of establishing market share, profits should not be expected in the short term. The CECC would be responsible for financial and investment decisions and facilitating the development of independent operating companies; these companies would be run by proven business executives.

- Initial funding for CECC would be in the form of a multi-hundred-million-dollar equity investment from industry sources, private and institutional investors, and State and local governments. Subsequent major funding should be forms of commercial debt, accompanied by pledges of support from Federal, State, and local governments. The CECC would be subject to a maximum debt/equity ratio in order to ensure that CECC bore some risk with respect to its debt. Multiple secondary offerings are anticipated to attract private equity investments directly in CECC's independent operating companies, gradually leading these companies to total financial self-sufficiency.

- CECC would fund operating companies in the consumer electronics industry through equity investments. Emphasis should be on advanced technology development and productization.

- CECC would work with State and local governments in conjunction with its operating companies with regard to the establishment, location, and support of manufacturing facilities.

- CECC would search out consumer electronics-related technologies developed in United States laboratories, such as universities and the national laboratories.

- CECC would function as a clearinghouse for consumer electronics R&D by working with U.S. electronics and components manufacturers to select key technologies and identify specific opportunities.

- CECC would provide its operating companies with a range of support, the most important being financial and managerial.

b. PROVIDE AN EQUITABLE INDUSTRY OPERATING ENVIRONMENT: The President should direct the appropriate Federal agency to: (1) determine, under applicable U.S. law, those factors that detract from the industrial operating environment and the expectation for successful investment by private U.S. investors in consumer electronics; and (2) seek redress of those factors. Such redress of these factors could include but not be limited to the following:

- Establishing cooperative agreements;

- Initiating industry-led negotiations for the licensing of consumer electronics technology to U.S. companies;

- Formulating and evaluating implementation policy options for local technology content; and

- Conducting substantial local R&D and design work.

c. ENFORCE FAIR TRADE PRACTICES: By means of the following, the Federal Government should encourage and purposefully support the entry and potential for U.S. industry to compete vigorously:

- The Office of the U.S.Trade Representative should ensure that access to the U.S. consumer electronics market be contingent upon reciprocal opportunity for U.S. companies to access foreign markets; and

- The Department of Commerce should ensure and enforce timely application of anti-dumping laws with commensurate penalties.

2. CHAMPIONING BY THE COMMERCE DEPARTMENT: The Department should be empowered to champion the establishment and maintenance of a benevolent operating environment for the U.S. consumer electronics industry and should coordinate the efforts of other cooperating Federal agencies. Additionally the Department should chair a working group of the Economic Policy Council concerning consumer electronics.

3. ESTABLISHING STANDARDS: The Federal Government (including the Federal Communications Commission) should expedite the establishment of standards affecting the introduction of consumer electronics technologies and should cooperate therein with U.S. industry.

4. ACCELERATING FIBER OPTIC SERVICE: By changing and harmonizing regulatory policy where necessary and broadly experimenting with prototype and trends, the Nation should encourage private industry to accelerate the development of a nationwide broadband network providing fiber optic services to the home. Such a network would stimulate next -generation development of a broad range of semiconductor-intensive consumer products (facsimile machines, digital photography, image compression, high definition television, etc.) that would serve as a technology driver for high-volume, high-technology consumer product manufacturing. Priority should be given to U.S.-produced goods containing significant local technology content in prototype trials.

BUSINESS ENVIRONMENT

1. CAPITAL FORMATION: The single most important consideration for the current and future health of the semiconductor industry is the availability, cost, and patience of capital. Therefore the following actions are recommended:

a. MAKING THE R&D TAX CREDIT PERMANENT (Channeling capital): The U.S. R&D (technically research and engineering, or R&E) tax credit has been renewed for 1989, but remains temporary. Stimulation of corporate R&D, through improving and making permanent the R&E credit, is essential to U.S. competitiveness in high-technology industries. Legislation should be enacted to make the R&E credit a permanent part of the Tax Code, ensuring that a wide base of taxpayers is eligible for the credit, and allowing start-up ventures to claim the credit, even before market sales. The size of the credit should be increased, and it should be made applicable to all, not just incremental R&D.

b. REINSTATING THE INVESTMENT TAX CREDIT (Channeling capital): The Tax Reform Act of 1986 eliminated the investment tax credit (ITC). Limitations on the use of the ITC carry forward amplified the negative impact of ITC elimination. The Congress should reinstate the ITC. Carry forward of the credit should be permitted. The market for U.S.-built over foreign- built equipment could be increased if tax credits favored U.S.-made equipment. The semiconductor equipment industry together with the semiconductor industry should propose ways to make the ITC favor the purchase of U.S.-made equipment.

c. REDUCING TAXES ON CAPITAL GAINS (Supply and cost of capital): The 1986 Tax Reform Act eliminated a long-standing policy of favoring capital gains with lower tax rates. The Committee supports proposals now before the Congress to reduce the taxation of capital gains. Special support is given to those aspects of the proposals that provide extra benefits for longer term investments.

d. INCREASING PATIENT AND RISK-TOLERANT CAPITAL (Quality of capital): There is widespread concern that American business management has an excessive preoccupation with immediate profit, sacrificing longer term, more risky opportunities that in other times may have been undertaken and formed the basis for major technological and economic breakthroughs. Financial regulators should review their regulations on investment advisers and pension funds and rules governing private placements and public issuance of new securities, to identify

actions that discourage longer term investments and appropriate risk-taking, and to correct such biases.

e. FACILITATING CONSORTIA (Channeling capital): Industry and government have jointly funded SEMATECH. Other industry R&D consortia in semiconductors (such as the Semiconductor Research Corporation (SRC) and the Microelectronics and Computer Technology Corporation (MCTC)) have cleared antitrust and other restrictions. Some of these efforts do not, however, qualify for basic research tax credits. The Congress should enact and the Administration should support legislation to extend the definition of organizations qualified as eligible for the basic research credit to include a broad range of cooperative R&D efforts in semiconductors and other high-technology fields.

f. IMPROVING SM&E DEPRECIATION RULES (Channeling capital): The Congress revised the depreciation schedule for semiconductor equipment in the 1986 Tax Reform Act to reduce it to 5 years from 8 years. At the same time, it mandated that the Treasury Department's Office of Depreciation Analysis review this matter and make a recommendation to the Congress by 1992. At this time, the Treasury Department has postponed an investigation on depreciation rates for semiconductor equipment until 1991. As groundwork for a proposed acceleration of depreciation schedules, the semiconductor industry should update the study of economic depreciation lives, and include data on Japan, where there are much shorter depreciation schedules assigned for most advanced semiconductor equipment (1 to 3 years).

g. EASING THE BURDEN OF SECTION 482 (Quality of capital): Section 482 of the Tax Code requires that transfers of goods, services, and intangibles between U.S. companies and related parties outside the United States be priced as if they were market-based, arm's-length transactions between unaffiliated parties. A recent Treasury Department White Paper made comprehensive recommendations that included many modifications in current practices. These changes will result in greater paperwork, difficulties in interpretation, and greater uncertainty in intercompany relationships with especially onerous problems for semiconductor firms where risk and intangibles are shared among different corporate entities. The Treasury Department should revamp its entire approach to intercompany transfer pricing to incorporate less onerous documentation and recordkeeping, greater accommodation of accepted, proven business practices, and greater certainty and less complexity in pricing transfers and allocating value.

h. REDUCING THE FEDERAL DEFICIT (Supply and cost of capital): The continuing deficits reduce our national savings and investment, contributing to our low rates of productivity growth. Although the shortfall of saving and investment may be offset to some degree by inflows of foreign capital, these inflows entail larger trade deficits and a reduced standard of living for Americans. The Congress should place a high priority on continuing to keep the growth of Federal spending below the growth of nominal gross national product. To the extent that changes in the Tax Code are considered necessary, they should be revenue-neutral adjustments used to tilt the tax structure away from consumption and toward increases in saving and investment.

i. OPPOSING FOREIGN CAPITAL CONTROLS (Supply and cost of capital): The net inflow of foreign capital into the United States has increased substantially over the past 6 years. There is growing dependence on foreign capital to make up

for the shortfall of domestic savings. Disrupting these inflows could have potentially disastrous consequences for the United States. However, foreign purchases of U.S. corporate assets--especially in strategically sensitive industries such as electronics--are creating concerns that the United States is mortgaging its economic future. The recent increase of oversight authority to the interagency Committee on Foreign Investment in the United States (CFIUS) goes at least part way toward minimizing that concern. The CFIUS should comprehend the impact on entire industries, rather than case by case. The Committee opposes all forms of legislated restrictions on foreign capital flows, including reporting requirements for foreign investment.

j. INCREASING PERSONAL SAVING INCENTIVES: (Supply and cost of capital): Personal saving in the United States is lower than among its major competitors, including Japan. Using the income tax system to favor personal saving offers one means to increase personal saving. The Congress should broaden individual retirement account (IRA) provisions, including removal of restrictions on eligibility, increasing the allowed contributions, and expanding the uses of IRA savings--for higher education, for example. The taxation on interest from savings should be eliminated or reduced.

k. ELIMINATING DOUBLE TAXATION OF CORPORATE DIVIDENDS (Channeling capital): In our income tax system, corporate dividends are taxed twice--as corporate profits and when received as dividends. This double taxation may discourage the use of equity financing and unduly encourage leveraging and earnings retention. The Congress should integrate the corporate and individual income taxes to eliminate this bias. Any move toward integration that results in the loss of tax revenues should be accompanied by offsetting increases in consumption taxes or reductions in Federal spending so as not to increase the Federal deficit.

l. OPPOSING LIMITS ON LEVERAGED BUYOUTS (Quality of capital): Media coverage of large, leveraged buyouts (LBOs), in which new debt is issued to buy in equity in order to take corporations private, has brought calls for public policy to restrain such activity. Among the proposed "solutions" are limits on the tax deductibility of interest payments, as well as other legislative and regulatory restrictions. The Committee opposes ad hoc policies targeted at restricting LBOs and other forms of corporate restructuring.

m. OPPOSING THE SPECULATION TAX (Quality of capital): There is some support for a tax on short-term turnover of securities in financial markets. Advocates assert that such a tax would not only raise funds to cut the deficit, but would also discourage speculative turnover that can create instability, and does shorten managerial horizons. The Committee opposes such a tax on the grounds that it depresses stock prices and raises the cost of capital generally, and that the asserted benefits for capital market behavior are unproven. Any scheme to tax short-term investments should be considered only in the context of providing additional resources to further reduce taxes on long-term investment to rates below what they would be in the absence of the short-term tax.

2. EDUCATION: The semiconductor industry requires well-educated workers who can adapt to new technologies and who are flexible enough to respond quickly to an increasingly sophisticated workplace. Additionally, technical training, frequently at the advanced degree level, is the lifeblood of the rapid evolution of new generations of products and processes required for world-class competitive performance. Increasingly, additional emphasis must be placed on training

related to manufacturing engineering and on coursework supporting thrusts into advanced applications of total quality control.

a. PRESCHOOL: Early childhood education offers the greatest potential for improving the quality of our educational system. A nationwide, quality, comprehensive preschool for economically disadvantaged, at risk, 4-year-old children should be implemented. For every dollar invested in quality preschool, $7 are returned to society during the lifetime of the child in the form of increased earnings, less crime, and less welfare.

b. PRIMARY/SECONDARY EDUCATION: To meet the needs for a literate work force, teacher competency should be enhanced and educational standards raised. A system of national teacher certification should be established that will supplement the States' minimum competency measurements. Business should share management skills with educators. Summer sessions taught by industry experts would help to develop mathematics and science teachers.

c. DROPOUTS: The currently unemployed, uneducated, and unskilled must be provided the literacy and skills to qualify for current and future jobs in the workplace. Government should support literacy, mathematics, and science education under the Job Training Partnership Act. The country should develop an intensive, West German-type skills-training-employment alternative to high school.

d. HIGHER EDUCATION: The semiconductor, and other high-technology industries will require increasing numbers and quality of technical personnel to meet the standards established by international competition. Curricula stressing manufacturing engineering and total quality concepts should be emphasized. The Federal Government should increase immigrant permanent resident status visa quotas, and relax labor certification rules for non-U.S. Ph.D. graduates of U.S. universities.

e. WORKPLACE LITERACY: Most remedial programs are not available to people who are on the job, yet 20 million to 30 million adults have basic literacy problems. Alternatives should be explored to promote business and government involvement in improving workplace literacy. Federal and State tax credits for employee literacy training should be provided. A new title under the Job Training Partnership Act should be created to deal with adult work force needs.

3. TRADE LAW REFORM:

a. NEW INITIATIVES: A senior U.S. Government interagency committee should consider, in the context of trade remedies or actions undertaken to counter unfair trade policies, whether additional governmental and/or private sector actions or policies are necessary to complement the current statutory processes as a means of promoting the competitiveness of the U.S. semiconductor industry.

b. MARKET ACCESS: Full access to foreign markets is critical. As the largest semiconductor market in the world, Japan must take immediate and meaningful steps to increase its purchases of U.S. semiconductor products. Specific sectors in Japan's market should segregated for increased purchases, and the success of these efforts should be measured in terms of increased market share. The Administration should investigate the effectiveness of the sanctions currently in place to ensure compliance with Japan's commitments under the Semiconductor Arrangement.

c. EXPORT CONTROLS: Export controls for both semiconductors and semiconductor manufacturing equipment should be adjusted to maximize export opportunities for U.S. producers to the highest degree possible consistent with security needs.

d. ANTI-DUMPING LAW REFORM: Anti-dumping law should be strengthened and made more effective by incorporating the principles being developed by the Semiconductor Industry Association and the American Electronics Association. Embodied principles should include accelerated processing of dumping cases, more effective penalties to deter dumping, and alternative approaches for the use of revenues collected from the dumping in third countries. The United States should actively support the strengthening of the General Agreement on Tariffs and Trade (GATT) anti-dumping code.

4. INTELLECTUAL PROPERTY:

a. SECTION 337: The U.S. Government should maintain that the GATT panel report on Section 337 is legally faulty, and will not be accepted by the United States. The Administration should maintain continued support and appropriate enforcement in accordance with existing regulations and practices of Section 337, while seeking broadly supported alternatives to resolve any valid conflicts between Section 337 and GATT.

b. GRANTING OF FOREIGN PATENTS: Government and private initiatives seeking more efficient patent-granting systems and harmonization of differences between national patent systems should receive increased emphasis.

c. NEW INITIATIVES: The Administration should convene a group to study and make recommendations within this Congressional term concerning clarification of mask works regulations regarding application-specific integrated circuits (ASICs) and new forms of protection such as design protection. National trade secret legislation should be reviewed in light of possible GATT and other international agreements to determine whether to urge accession by other countries to the Hague litigation conventions.

d. USE OF CURRENT MECHANISMS: The U.S. semiconductor industry should focus on protecting its intellectual property by availing itself of existing means.

5. ANTITRUST: Legislation to facilitate production joint ventures, as the 1984 National Cooperative Research Act (NCRA) facilitated R&D joint ventures such as the Semiconductor Research Corporation and SEMATECH, would help to strengthen the U.S. presence in strategic infrastructure electronics industry sectors and thereby bolster American competitiveness. The Congress should amend the NCRA to expand the scope of the legislation to include Production Joint Ventures. Under the expanded NCRA, the "rule of reason" and not "per se" would apply to any court challenge to a Production Joint Venture. In addition, providing notice had been given, liability would be limited to actual, not treble, damages.

TECHNOLOGY

1. INCREASING R&D FOR EQUIPMENT AND MATERIALS: The U.S. semiconductor and SM&E industries must identify means to increase significantly the level of R&D activity dedicated to manufacturing tools, materials, and processes.

SEMATECH's mission should be expanded to include project management for these development programs extending beyond 1993. SEMATECH's funding should be increased immediately by $100 million, half of which would be provided by the developers of such equipment materials and processes. Additional funding of $800 million would be required over the next 3 years for these programs to fully address the needs of this industry segment.

2. CONTINUING FUNDING FOR SILICON R&D: The Departments of Defense (DOD) and Energy (DOE) should sustain the current $200 million per year funding previously allocated to very high-speed integrated circuits to maintain long-term industrial R&D efforts related to silicon technology and manufacturing tools.

3. ENHANCING X-RAY LITHOGRAPHY: The synchrotron ring x-ray technology that has been developed in the national laboratories represents a unique capability and opportunity for future advancement of a critical semiconductor manufacturing technology. The DOE should ensure the transfer of synchrotron ring x-ray technology and systems for microlithography, by having two corporations design and build prototype rings and by funding the participation of national laboratory experts in these projects. In order to ensure timely availability and rapid insertion of this critical technology, DOD's Defense Advanced Research Projects Agency (DARPA), DOE, and the Department of Commerce programs in mask making, mask repair, aligners, metrology and small x-ray sources must be pursued aggressively as well.

4. ENHANCING ACADEMIC RESEARCH AND TEACHING: The DOD, DOE, and the National Science Foundation should substantially enhance their funding of personnel, equipment, and especially facilities in support of academic research and teaching associated with silicon technology.

5. ESTABLISHING METROLOGY AND STANDARDS: The National Institute for Standards and Technology should establish the sophisticated metrology and standards that industry will need for manufacturing technology in the coming generations of advanced semiconductors, including the x-ray era of microlithography. The new Technology Administration Act of 1989 is an appropriate step in that direction.

6. ACCELERATING RESIDENCY: The Federal Government should evaluate and implement procedures allowing foreign-born students receiving M.S. and Ph.D., and equivalent degrees in natural science and engineering from U.S. academic institutions to obtain permanent residency permits within 3 months after graduation, without departure from the United States.

7. DOUBLING SCHOLARSHIPS AND FELLOWSHIPS: The Congress should double the number of federally funded undergraduate scholarships and graduate fellowships for natural science and engineering, and the real monetary value of these awards should be made more competitive with starting salaries in industry.

V. Next Steps

The recommendations presented in this report represent the first critical steps towards a national semiconductor strategy. Further developing and working to implement that strategy is the goal of the next year of the Committee's activities. In fiscal year 1990, the Committee intends to:

- Establish the Consumer Electronics Capital Corporation:

  a) Develop business plan;
  b) Obtain seed capital;
  c) Begin operation as implementation of the other unit actions permit;
  d) Achieve major equity infusion;

- Continue examination of issues pertaining to a national fiber optic network. Future efforts by the Committee will be directed towards further development of the business and government initiatives required to put this network in place;

- Release a separate and more detailed report on the impact of the business environment recommendations on the semiconductor industry;

- Continue analysis of what is further needed to revitalize the semiconductor manufacturing and equipment industry; and

- Examine two new areas: the status of American industry involved in compound semiconductors (those made from materials other than silicon), and the implications for American industry of the development of photonics (integrated electrical and optical devices), which many observers expect to constitute the next major area of growth in electronics technology.

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BIBLIOGRAPHY

1. Jeanne Alford, Meeting the Global Challenge: Advanced Electronics Technology and the American Semiconductor Industry, Semiconductor Industry Association, Cupertino, California, 1989

2. Norman R. Augustine, Chair, Report of the Defense Science Board Task Force on Defense Semiconductor Dependency, Department of Defense, Washington, D.C., February, 1987

3. Michael G. Borrus, Competing for America's Stake in Microelectronics Control, Ballinger Publishing Company, Cambridge, Massachusetts, 1988

4. W. Dale Compton and George E. Solomon, Cochairs, The Technological Dimensions of International Competitiveness, National Academy of Engineering, Washington, D.C., 1988

5. Robert B. Costello, Bolstering Defense Industrial Competitiveness, Report to the Secretary of Defense by the Under Secretary of Defense (Acquisition), Washington, D.C., July 1987

6. Robert B. Costello, Enhancing Defense Standardization, Report to the Secretary of Defense by the Under Secretary of Defense (Acquisition), Washington, D.C., November 1988

7. Edward E. David, Chair, Report of the White House Science Council Panel on Semiconductors, Office of Science and Technology Policy, Executive Office of the President, Washington, D.C., 1987

8. Charles H. Herz, Chair, The Semiconductor Industry, Report of a Federal Interagency Staff Working Group, National Science Foundation, Washington, D.C., 1987

9. William C. Hittinger, Chair, Foreign Production of Electronics Components and Army System Vulnerabilities, National Academy Press, Washington, D.C., 1986

10. David Packard, Chair, A Quest for Excellence, Final Report to the President by the Blue Ribbon Commission on Defense Management, Washington, D.C., June 1986

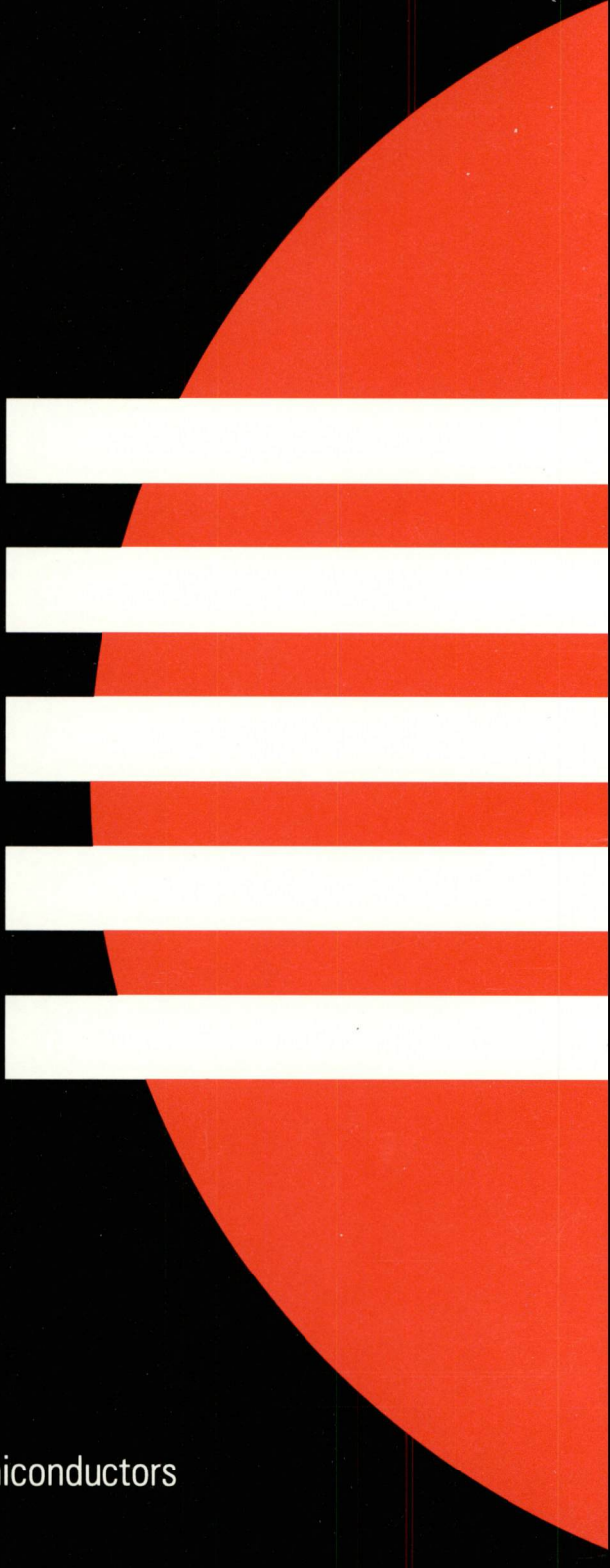
11. Clyde V. Prestowitz, Trading Places, Basic Books, Inc., New York, New York, 1988

12. David Russell, Chair, High Definition Television (HDTV): Economic Analysis of Impact, American Electronics Association, Washington, D.C., 1988

13. David H. Staelin, Chair, The Decline of U.S. Consumer Electronics Manufacturing: History, Hypotheses, and Remedies, Consumer Electronics Sector Working Group MIT Commission on Industrial Productivity, Massachusetts Institute of Technology, Boston, Massachusetts, 1988

14. Sidney Topal, Consumer Electronics, HDTV, and the Competitiveness of the U.S. Economy, Electronics Industry Association, Washington, D.C., 1989

15. John A. Young, Chair, Picking up the Pace: The Commercial Challenge to American Innovation, Council on Competitiveness, Washington, D.C., September 1988



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THE CHAIRMAN OF THE
COUNCIL OF ECONOMIC ADVISERS
WASHINGTON

November 3, 1989

MEMORANDUM FOR THE HONORABLE D. ALLAN BROMLEY

FROM: MICHAEL J. BOSKIN MJB

SUBJECT: The Report of the National Advisory Committee on Semiconductor Research and Development

Here is some suggested language for your memorandum to the President and letter to Ian Ross. As I understand, the Committee transmits its report directly to the Congress, and no transmittal from the President is required.

If I can be of any further assistance please do not hesitate to contact me.

Memorandum for the President:

I am hereby transmitting to you the enclosed report of the National Advisory Committee on Semiconductor Research and Development Act of 1988. I have just received the report and am circulating it to your senior economic advisers for study. The report deals with an industry of undisputed importance, but its proposals for aiding that industry are controversial.

Letter to Ian Ross:

I have received the first annual report of the National Advisory Committee on Semiconductor Research and Development Act of 1988, which I am transmitting to the President and his senior economic advisers for study.

Thank you for the considerable time and effort you and your colleagues have put into the report.

THE WHITE HOUSE

WASHINGTON

November 1, 1989

MEMORANDUM FOR MICHAEL J. BOSKIN
ANDREW H. CARD, JR.
ROGER PORTER
C. BOYDEN GRAY
STEPHEN DANZANSKY
ROBERT E. GRADY
LEHMANN K. LI

FROM: D. ALLAN BROMLEY

SUBJECT: THE FIRST ANNUAL REPORT OF THE NATIONAL ADVISORY COMMITTEE ON SEMICONDUCTORS

I am enclosing herein the above mentioned report. Unfortunately it was leaked to the New York Times and I also enclose a copy of the resulting Times article.

Although we cannot change the content of this report of a Presidentially appointed commission (established in last year's trade act - see page vii) it is important that it be transmitted appropriately to the President. Because the recommendations are substantially more aggressive than is usual in such reports, I would ask each of you to take a look at the report, at the Commission's letter of transmittal that they have bound into the report and at my draft cover letter. Any comments or suggestions would be most welcome before I send this on to Jim Cicconi.

Since I shall be away all next week at The Hague and since the leak has generated substantial pressure to release of this report, I would much appreciate your comments by COB Friday -- and I realize that this is very short notice.

Enclosures

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WASHINGTON

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Enclosures

New York Times
October 30, 1989
p. D-1

U.S. Aid Sought for Electronics

Report Could Help Get Venture Capital To Bolster Industry

By ANDREW POLLACK

Special to The New York Times

SAN FRANCISCO, Oct. 29 — In a report that will be delivered to the President this week, a national advisory committee on semiconductors will recommend that the Government establish a multibillion-dollar venture capital operation intended to resurrect the American consumer electronics industry.

The report could give new impetus to flagging efforts aimed at forming a Government-industry initiative in high-definition television. The advanced video product has become the focus of efforts to bring American companies back into the consumer electronics business, which they have all but abandoned to Japanese and European companies.

The Bush Administration is divided on that issue, and it has recently backed away from the idea of offering support for any particular industry. But members of Congress and electronics industry representatives say the new report could help swing momentum their way.

'Serious Consideration'

"I think it's a report that will get serious consideration," said Representative Mel Levine, Democrat of California and a leading proponent of a national policy on high-definition television. "Hopefully, something like this will move the debate, both within the Administration and beyond it."

Mr. Levine said he expected to introduce a bill soon that would create a Technology Corporation of America, which would be similar to the semiconductor committee's proposed investment company. The major difference, he said, is that his proposed corporation would get direct Federal financing while the semiconductor committee's proposed company apparently would not.

The semiconductor committee consists of semiconductor and computer industry leaders and high-level Government officials. Its proposal calls for an investment company that would be known as the Consumer Electronics Capital Corporation, which would be privately managed and run for a profit and would serve as a source of "low-cost, very patient capital" for companies wishing to enter the consumer electronics business.

The Government would provide loan guarantees that would enable the corporation to borrow money at low interest rates and invest in new consumer electronics technologies and companies.

The group issuing the report, known as the National Advisory Committee on Semiconductors, was created by last year's trade act to come up with policies to maintain a competitive American computer chip industry.

The panel recommends that the investment company would get initial equity funding from industry sources, private and institutional investors, and state and local governments. The corporation would raise billions of dollars in commercial debt, using Federal, state and local government loan guarantees to insure a low interest rate.

Such an investment corporation would counteract a key advantage the Japanese have in their access to low-cost capital. Many American companies have said they cannot afford the heavy long-term investments needed to get into the manufacture of televisions, videocassette recorders and other consumer products while still showing a profit for their shareholders.

Financing for Sematech

The report, which has not yet been released, also recommends that financing for Sematech, the Government-backed semiconductor research consortium, be immediately increased to $300 million a year from its current level of $200 million, and by $800 million over the next three years.

In his cover letter to the President, the committee's chairman, Ian M. Ross, the president of the American Telephone and Telegraph Company's Bell Laboratories, acknowledges that the recommendations may be controversial.

"We have not shied away from controversy," Dr. Ross says. "In this report we present necessary first steps toward a national semiconductor strategy. We believe that the country needs bold and innovative action."

The report never mentions high-definition television, preferring to focus on all of consumer electronics and avoid the criticisms from those who say the importance of high-definition television has been overblown.

The report documents a decline in the competitiveness of the American semiconductor industry, which makes the silicon chips that are the heart of everything from computers and telephones to robots and weapons. The report finds an equally serious decline in the American industry that produces the sophisticated machinery and raw materials used to make chips.

Tax Breaks

The 29-page report also calls for the Government to play a stronger role in insuring that American companies can participate in consumer electronics. For instance, it asks the Government to consider requiring products sold in the United States to use a certain number of United States components. It also calls for the Government to help American companies license the technology they need from foreign companies that now control many of the key patents in consumer electronics.

The report also recommends numerous steps to lower capital costs by making the research and development tax credit permanent, reinstating the investment tax credit, reducing taxes on capital gains and facilitating the formation of industry consortiums. It also recommends steps to improve education, protect American patents and copyrights, and promote access to foreign markets.

Members of the advisory committee from industry were John A. Armstrong, vice president for science and technology at I.B.M.; Norman Augustine, chairman and chief executive of Martin Marietta; Robert W. Galvin, chairman of Motorola; Jerry R. Junkins, chairman, president and chief executive of Texas Instruments; James C. Morgan, chairman and chief executive of Applied Materials; Charles E. Sporck, president and chief executive of National Semiconductor, and James G. Treybig, president and chief executive of Tandem Computers.

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AT&T
Bell Laboratories

Ian M. Ross
President

Crawfords Corner Road
Holmdel, NJ 07733
201 949-3242

October 30, 1989

Honorable D. Allan Bromley
Assistant to the President for
Science and Technology
The White House
Washington, D.C. 20506

Dear Allan:

I enclose the first annual NACS report. I would appreciate it if you will deliver it to the President at your earliest convenience. The report contains my letter of transmittal to the President. The Committee plans to transmit the report to the House and Senate tomorrow, and to distribute copies to all Members of Congress by Wednesday. As we discussed, I am scheduled to testify before the House Subcommittee on Transportation, Aviation and Materials on November 8 and, in all probability, will include a summary of the Committee recommendations in my testimony.

A suggestion has been made that representatives of NACS should meet with the President prior to November 8. I would appreciate your advice on this, and if you believe it to be a good idea, would you be willing to explore the possibility of attempting to arrange such a meeting?

Thank you for your considerate assistance.

Sincerely,

Ian

Attachment

THE WHITE HOUSE
WASHINGTON

November 1, 1989

MEMORANDUM FOR MICHAEL J. BOSKIN
ANDREW H. CARD, JR.
C. BOYDEN GRAY
STEPHEN DANZANSKY
ROBERT E. GRADY
LEHMANN K. LI

FROM: D. ALLAN BROMLEY Duan

SUBJECT: THE FIRST ANNUAL REPORT OF THE NATIONAL ADVISORY COMMITTEE ON SEMICONDUCTORS

I am enclosing herein the above mentioned report. Unfortunately it was leaked to the New York Times and I also enclose a copy of the resulting Times article.

Although we cannot change the content of this report of a Presidentially appointed commission (established in last year's trade act - see page vii) it is important that it be transmitted appropriately to the President. Because the recommendations are substantially more aggressive than is usual in such reports, I would ask each of you to take a look at the report, at the Commission's letter of transmittal that they have bound into the report and at my draft cover letter. Any comments or suggestions would be most welcome before I send this on to Jim Cicconi.

Since I shall be away all next week at The Hague and since the leak has generated substantial pressure to release of this report, I would much appreciate your comments by COB Friday -- and I realize that this is very short notice.

Enclosures

New York Times
October 30, 1989
p. D-1

U.S. Aid Sought for Electronics

Report Could Help Get Venture Capital To Bolster Industry

By ANDREW POLLACK

Special to The New York Times

SAN FRANCISCO, Oct. 29 — In a report that will be delivered to the President this week, a national advisory committee on semiconductors will recommend that the Government establish a multibillion-dollar venture capital operation intended to resurrect the American consumer electronics industry.

The report could give new impetus to flagging efforts aimed at forming a Government-industry initiative in high-definition television. The advanced video product has become the focus of efforts to bring American companies back into the consumer electronics business, which they have all but abandoned to Japanese and European companies.

The Bush Administration is divided on that issue, and it has recently backed away from the idea of offering support for any particular industry. But members of Congress and electronics industry representatives say the new report could help swing momentum their way.

'Serious Consideration'

"I think it's a report that will get serious consideration," said Representative Mel Levine, Democrat of California and a leading proponent of a national policy on high-definition television. "Hopefully, something like this will move the debate, both within the Administration and beyond it."

Mr. Levine said he expected to introduce a bill soon that would create a Technology Corporation of America, which would be similar to the semiconductor committee's proposed investment company. The major difference, he said, is that his proposed corporation would get direct Federal financing while the semiconductor committee's proposed company apparently would not.

The semiconductor committee consists of semiconductor and computer industry leaders and high-level Government officials. Its proposal calls for an investment company that would be known as the Consumer Electronics Capital Corporation, which would be privately managed and run for a profit and would serve as a source of "low-cost, very patient capital" for companies wishing to enter the consumer electronics business.

The Government would provide loan guarantees that would enable the corporation to borrow money at low interest rates and invest in new consumer electronics technologies and companies.

The group issuing the report, known as the National Advisory Committee on Semiconductors, was created by last year's trade act to come up with policies to maintain a competitive American computer chip industry.

The panel recommends that the investment company would get initial equity funding from industry sources, private and institutional investors, and state and local governments. The corporation would raise billions of dollars in commercial debt, using Federal, state and local government loan guarantees to insure a low interest rate.

Such an investment corporation would counteract a key advantage the Japanese have in their access to low-cost capital. Many American companies have said they cannot afford the heavy long-term investments needed to get into the manufacture of televisions, videocassette recorders and other consumer products while still showing a profit for their shareholders.

Financing for Sematech

The report, which has not yet been released, also recommends that financing for Sematech, the Government-backed semiconductor research consortium, be immediately increased to $300 million a year from its current level of $200 million, and by $800 million over the next three years.

In his cover letter to the President, the committee's chairman, Ian M. Ross, the president of the American Telephone and Telegraph Company's Bell Laboratories, acknowledges that the recommendations may be controversial.

"We have not shied away from controversy," Dr. Ross says. "In this report we present necessary first steps toward a national semiconductor strategy. We believe that the country needs bold and innovative action."

The report never mentions high-definition television, preferring to focus on all of consumer electronics and avoid the criticisms from those who say the importance of high-definition television has been overblown.

The report documents a decline in the competitiveness of the American semiconductor industry, which makes the silicon chips that are the heart of everything from computers and telephones to robots and weapons. The report finds an equally serious decline in the American industry that produces the sophisticated machinery and raw materials used to make chips.

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Cicconi

November 3, 1989

MEMORANDUM FOR JAMES W. CICCONI

FROM: D. ALLAN BROMLEY

SUBJECT: THE REPORT OF THE NATIONAL ADVISORY COMMITTEE ON SEMICONDUCTORS RESEARCH AND DEVELOPMENT

Enclosed herewith is a copy of the aforementioned report, a copy of the relevant Section 5142 of the Omnibus Trade Act of 1988, a draft memorandum transmitting this report to the President, and a draft letter from me to Ian Ross, Chairman of the Committee. Although I am, by statute, a member of the Committee, I attend only a small part of the Committee's final meeting before finalizing the report.

I circulated the report for comment to Michael Boskin, Andy Card, Roger Porter, Boyden Gray, Steve Danzansky, Bob Grady and Lehmann Li.

I suggest that the press release, if one is normal with the release of this report, might include some statement such as "the views expressed are those of the NACS Committee and do not necessarily represent those of the Bush Administration or the Federal Government." You know better than I the approved wording.

As we discussed earlier, there is time pressure generated by the fact that an early version of this report was leaked to the New York Times, (resulting in the enclosed article) and Congressman Valentine has scheduled a hearing for November 8 at which Dr. Ross will testify. I hope that we can get the report to the Hill by Tuesday November 7.

As a more general question -- can a Congressionally mandated Committee such as this one transmit their report directly to the Hill?

Thanks for your help.

Enclosures

P-NACS

DRAFT

MEMORANDUM FOR THE PRESIDENT

FROM: D. ALLAN BROMLEY

SUBJECT: THE REPORT OF THE NATIONAL ADVISORY COMMITTEE ON SEMICONDUCTOR RESEARCH AND DEVELOPMENT

I am transmitting to you herewith the first annual report of the National Advisory Committee on Semiconductors -- a Commission established under Section 5142 of Public Law 100-48 entitled, National Advisory Committee on Semiconductor Research and Development Act of 1988. I have just received the report and am circulating it to your senior executive advisers for study. The report deals with an industry of undisputed national importance but its proposals for aiding that industry are controversial.

Enclosure

DRAFT

Dear Ian:

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Let me take this occasion to express to you, and to your colleagues, my thanks for the obvious time and effort that was devoted to this report.

Sincerely yours,

D. Allan Bromley

Dr. Ian M. Ross
President
AT&T Bell Laboratories
Crawfords Corner Road
Room 31650
Holmdel, New Jersey 07733

THE WHITE HOUSE
WASHINGTON

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Thanks for your help.

Enclosures

* Have only heard as yet from Mike Boskin in detail - but as you recall, you, Roger, Boyden and I discussed this this morning. (DAB)

I will be in The Hague — if Grady, in particular, has problems Diane asked that my assistant, Judy Bostach make sure that his comments get to you on Monday.

A STRATEGIC INDUSTRY AT RISK

A Report to the President
And the Congress
From the
National Advisory Committee on
Semiconductors

States companies, including activities under the Technology Share Program created by Executive Order 12591;

(C) Federal research and technology transfer arrangements with selected business sectors;

(D) Federal encouragement of, and assistance to, private joint research and development ventures; and

(E) such other mechanisms of Federal-industry cooperation as may be identified by the Secretary.

Reports.

(4) A report based on the findings and recommendations of the review panel shall be submitted to the Secretary, the President, and Congress within 18 months after the Secretary signs the contracts with the National Academies of Sciences and Engineering.

Subpart D—Technology Reviews

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The President shall, at the time of submission of the budget request for fiscal year 1990 to Congress, also submit to the Congress a report on—

(1) the President's policies and budget proposals regarding Federal research in semiconductors and semiconductor manufacturing technology, including a discussion of the respective roles of the various Federal departments and agencies in such research;

(2) the President's policies and budget proposals regarding Federal research and acquisition policies for fiber optics and optical-electronic technologies generally;

(3) the President's policies and budget proposals, identified by agency, regarding superconducting materials, including descriptions of research priorities, the scientific and technical barriers to commercialization which such research is designed to overcome, steps taken to ensure coordination among Federal agencies conducting research on superconducting materials, and steps taken to consult with private United States industry and to ensure that no unnecessary duplication of research exists and that all important scientific and technical barriers to the commercialization of superconducting materials will be addressed; and

(4) the President's policies and budget proposals, identified by agency, regarding Federal research to assist United States industry to develop and apply advanced manufacturing technologies for the production of durable and nondurable goods.

Omnibus

PART OF TRADE ACT, 1988

National Advisory Committee on Semiconductor Research and Development Act of 1988. 15 USC 4632.

SEC. 5142. SEMICONDUCTOR RESEARCH AND DEVELOPMENT.

(a) SHORT TITLE.—This section may be cited as the "National Advisory Committee on Semiconductor Research and Development Act of 1988".

(b) FINDINGS AND PURPOSES.—(1) The Congress finds and declares that—

(A) semiconductor technology is playing an ever-increasing role in United States industrial and commercial products and processes, making secure domestic sources of state-of-the-art semiconductors highly desirable;

(B) modern weapons systems are highly dependent on leading edge semiconductor devices, and it is counter to the national

Share Program created by Executive Order 12591;

(C) Federal research and technology transfer arrangements with selected business sectors;

(D) Federal encouragement of, and assistance to, private joint research and development ventures; and

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for this technology;

(C) governmental responsibilities related to the semiconductor industry are divided among many Federal departments and agencies; and

(D) joint industry-government consideration of semiconductor industry problems is needed at this time.

(2) The purposes of this section are—

(A) to establish the National Advisory Committee on Semiconductors; and

(B) to assign to such Committee the responsibility for devising and promulgating a national semiconductor strategy, including research and development, the implementation of which will assure the continued leadership of the United States in semiconductor technology.

(c) CREATION OF COMMITTEE.—There is hereby created in the executive branch of the Government an independent advisory body to be known as the National Advisory Committee on Semiconductors (hereafter in this section referred to as the "Committee").

(d) FUNCTIONS.—(1) The Committee shall—

(A) collect and analyze information on the needs and capabilities of industry, the Federal Government, and the scientific and research communities related to semiconductor technology;

(B) identify the components of a successful national semiconductor strategy in accordance with subsection (b)(2)(B);

(C) analyze options, establish priorities, and recommend roles for participants in the national strategy;

(D) assess the roles for government and national laboratories and other laboratories supported largely for government purposes in contributing to the semiconductor technology base of the Nation, as well as to access the effective use of the resources of United States private industry, United States universities, and private-public research and development efforts; and

(E) provide results and recommendations to agencies of the Federal Government involved in legislative, policymaking, administrative, management, planning, and technology activities that affect or are part of a national semiconductor strategy, and to the industry and other nongovernmental groups or organizations affected by or contributing to that strategy.

(2) In fulfilling this responsibility, the Committee shall—

(A) monitor the competitiveness of the United States semiconductor technology base;

(B) determine technical areas where United States semiconductor technology is deficient relative to international competition;

(C) identify new or emerging semiconductor technologies that will impact the national defense or United States competitiveness or both;

(D) develop research and development strategies, tactics, and plans whose execution will assure United States semiconductor competitiveness; and

(E) recommend appropriate actions that support the national semiconductor strategy.

(e) MEMBERSHIP AND PROCEDURES.—(1)(A) The Committee shall be composed of 13 members, 7 of whom shall constitute a quorum.

(B) The Secretary of Defense, the Secretary of Commerce, the Secretary of Energy, the Director of the Office of Science and

Technology Policy, and the Director of the National Science Foundation, or their designees, shall serve as members of the Committee.

President of U.S.

(C) The President, acting through the Director of the Office of Science and Technology Policy, shall appoint, as additional members of the Committee, 4 members from outside the Federal Government who are eminent in the semiconductor industry, and 4 members from outside the Federal Government who are eminent in the fields of technology, defense, and economic development.

(D) One of the members appointed under subparagraph (C), as designated by the President at the time of appointment, shall be chairman of the Committee.

(2) Funding and administrative support for the Committee shall be provided to the Office of Science and Technology Policy through an arrangement with an appropriate agency or organization designated by the Committee, in accordance with a memorandum of understanding entered into between them.

(3) Members of the Committee, other than full-time employees of the Federal Government, while attending meetings of the Committee or otherwise performing duties at the request of the Chairman while away from their homes or regular places of business, shall be allowed travel expenses in accordance with subchapter I of chapter 57 of title 5, United States Code.

(4) The Chairman shall call the first meeting of the Committee not later than 90 days after the date of the enactment of this Act.

Reports.

(5) At the close of each fiscal year the Committee shall submit to the President and the Congress a report on its activities conducted during such year and its planned activities for the coming year, including specific findings and recommendations with respect to the national semiconductor strategy devised and promulgated under subsection (b)(2)(B). The first report shall include an analysis of those technical areas, including manufacturing, which are of importance to the United States semiconductor industry, and shall make specific recommendations regarding the appropriate Federal role in correcting any deficiencies identified by the analysis. Each report shall include an estimate of the length of time the Committee must continue before the achievement of its purposes and the issuance of its final report.

(f) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to be appropriated to carry out the purposes of this section such sums as may be necessary for the fiscal years 1988, 1989, and 1990.

15 USC 1803 note.

SEC. 5112. REVIEW OF RESEARCH AND DEVELOPMENT PRIORITIES IN SUPERCONDUCTORS.

President of U.S.

(a) NATIONAL COMMISSION ON SUPERCONDUCTIVITY.—The President shall appoint a National Commission on Superconductivity to review all major policy issues regarding United States applications of recent research advances in superconductors in order to assist the Congress in devising a national strategy, including research and development priorities, the development of which will assure United States leadership in the development and application of superconducting technologies.

(b) MEMBERSHIP.—The membership of the National Commission on Superconductivity shall include representatives of—

(1) the National Critical Materials Council, the National Academy of Sciences, the National Academy of Engineering, the National Science Foundation, the National Aeronautics and Space Administration, the Department of Energy, the Depart-

DRAFT

MEMORANDUM FOR THE PRESIDENT

FROM: D. ALLAN BROMLEY

SUBJECT: THE REPORT OF THE NATIONAL ADVISORY COMMITTEE ON SEMICONDUCTOR RESEARCH AND DEVELOPMENT

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Dr. Ian M. Ross
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New York Times
October 30, 1989
p. D-1

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"STAFF MEMOS"

TYPE: Information DOCUMENT NUMBER: 8910214

****

FROM: Bromley

TO: James Cicconi

DATE OF CORRESPONDENCE: 11/03/89

SUBJECT: Transmittal of The Report of the National Advisory Committee on Semiconductiors Research and Development.

****

COPIES TO: Judith Bostock
Bob Post
Michelle VanCleave
Thomas Ratchford
James Wyngaarden

****

RESULTING ACTION:

ASSIGNED TO:

OSTP DUE DATE:

DATE COMPLETED: ----------

****

REMARKS: Copies sent to: [redacted]
NEOB Files with report

DATE RECEIVED: 11/03/89 FILE: EOB

THE WHITE HOUSE

WASHINGTON

October 30, 1989

MEMORANDUM FOR DAVID Q. BATES

FROM: TODD G. BUCHHOLZ

SUBJECT: National Advisory Committee on Semiconductors

The National Advisory Committee on Semiconductors (the "Committee") was established by the Omnibus Trade and Competitiveness Act of 1988 (the "Act"). Section 5142 of the Act requires the Committee to devise a national semiconductor strategy that considers the needs and capabilities of the industry, as well as the "appropriate" role of the Federal government in assuring the "continued leadership of the United States in semiconductor technology."

The Act also charges the Committee with identifying new or emerging technologies that will impact on national defense or United States competitiveness.

At the end of each fiscal year, the Committee must submit to the President and to Congress a report of its activities conducted during such year and its planned activities for the coming year, including specific findings and recommendations. The first report must explicitly recommend the "appropriate Federal role in correcting any deficiencies" in manufacturing or any other technical areas.

Relevant sections of the Act are attached.

OMNIBUS TRADE AND COMPETITIVENESS ACT OF 1988

For Legislative History of Act, see p. 1547.

An Act to enhance the competitiveness of American industry, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

Omnibus Trade and Competitiveness Act of 1988.
Exports.
Imports.
International agreements.
19 USC 2901 note.

SECTION 1. SHORT TITLE AND TABLE OF CONTENTS.

(a) SHORT TITLE.—This Act may be cited as the "Omnibus Trade and Competitiveness Act of 1988".

(b) TABLE OF CONTENTS.—

(B) cooperation between Federal laboratories and United States companies, including activities under the Technology Share Program created by Executive Order 12591;

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Reports.

(4) A report based on the findings and recommendations of the review panel shall be submitted to the Secretary, the President, and Congress within 18 months after the Secretary signs the contracts with the National Academies of Sciences and Engineering.

Subpart D—Technology Reviews

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(1) the President's policies and budget proposals regarding Federal research in semiconductors and semiconductor manufacturing technology, including a discussion of the respective roles of the various Federal departments and agencies in such research;

(2) the President's policies and budget proposals regarding Federal research and acquisition policies for fiber optics and optical-electronic technologies generally;

(3) the President's policies and budget proposals, identified by agency, regarding superconducting materials, including descriptions of research priorities, the scientific and technical barriers to commercialization which such research is designed to overcome, steps taken to ensure coordination among Federal agencies conducting research on superconducting materials, and steps taken to consult with private United States industry and to ensure that no unnecessary duplication of research exists and that all important scientific and technical barriers to the commercialization of superconducting materials will be addressed; and

(4) the President's policies and budget proposals, identified by agency, regarding Federal research to assist United States industry to develop and apply advanced manufacturing technologies for the production of durable and nondurable goods.

National Advisory Committee on Semiconductor Research and Development Act of 1988.
15 USC 4632.

SEC. 5142. SEMICONDUCTOR RESEARCH AND DEVELOPMENT.

(a) SHORT TITLE.—This section may be cited as the "National Advisory Committee on Semiconductor Research and Development Act of 1988".

(b) FINDINGS AND PURPOSES.—(1) The Congress finds and declares that—

(A) semiconductor technology is playing an ever-increasing role in United States industrial and commercial products and processes, making secure domestic sources of state-of-the-art semiconductors highly desirable;

(B) modern weapons systems are highly dependent on leading edge semiconductor devices, and it is counter to the national

security interest to be heavily dependent upon foreign sources for this technology;

(C) governmental responsibilities related to the semiconductor industry are divided among many Federal departments and agencies; and

(D) joint industry-government consideration of semiconductor industry problems is needed at this time.

(2) The purposes of this section are—

(A) to establish the National Advisory Committee on Semiconductors; and

(B) to assign to such Committee the responsibility for devising and promulgating a national semiconductor strategy, including research and development, the implementation of which will assure the continued leadership of the United States in semiconductor technology.

(c) CREATION OF COMMITTEE.—There is hereby created in the executive branch of the Government an independent advisory body to be known as the National Advisory Committee on Semiconductors (hereafter in this section referred to as the "Committee").

(d) FUNCTIONS.—(1) The Committee shall—

(A) collect and analyze information on the needs and capabilities of industry, the Federal Government, and the scientific and research communities related to semiconductor technology;

(B) identify the components of a successful national semiconductor strategy in accordance with subsection (b)(2)(B);

(C) analyze options, establish priorities, and recommend roles for participants in the national strategy;

(D) assess the roles for government and national laboratories and other laboratories supported largely for government purposes in contributing to the semiconductor technology base of the Nation, as well as to access the effective use of the resources of United States private industry, United States universities, and private-public research and development efforts; and

(E) provide results and recommendations to agencies of the Federal Government involved in legislative, policymaking, administrative, management, planning, and technology activities that affect or are part of a national semiconductor strategy, and to the industry and other nongovernmental groups or organizations affected by or contributing to that strategy.

(2) In fulfilling this responsibility, the Committee shall—

(A) monitor the competitiveness of the United States semiconductor technology base;

(B) determine technical areas where United States semiconductor technology is deficient relative to international competition;

(C) identify new or emerging semiconductor technologies that will impact the national defense or United States competitiveness or both;

(D) develop research and development strategies, tactics, and plans whose execution will assure United States semiconductor competitiveness; and

(E) recommend appropriate actions that support the national semiconductor strategy.

(e) MEMBERSHIP AND PROCEDURES.—(1)(A) The Committee shall be composed of 13 members, 7 of whom shall constitute a quorum.

(B) The Secretary of Defense, the Secretary of Commerce, the Secretary of Energy, the Director of the Office of Science and

Technology Policy, and the Director of the National Science Foundation, or their designees, shall serve as members of the Committee.

President of U.S.

(C) The President, acting through the Director of the Office of Science and Technology Policy, shall appoint, as additional members of the Committee, 4 members from outside the Federal Government who are eminent in the semiconductor industry, and 4 members from outside the Federal Government who are eminent in the fields of technology, defense, and economic development.

(D) One of the members appointed under subparagraph (C), as designated by the President at the time of appointment, shall be chairman of the Committee.

(2) Funding and administrative support for the Committee shall be provided to the Office of Science and Technology Policy through an arrangement with an appropriate agency or organization designated by the Committee, in accordance with a memorandum of understanding entered into between them.

(3) Members of the Committee, other than full-time employees of the Federal Government, while attending meetings of the Committee or otherwise performing duties at the request of the Chairman while away from their homes or regular places of business, shall be allowed travel expenses in accordance with subchapter I of chapter 57 of title 5, United States Code.

(4) The Chairman shall call the first meeting of the Committee not later than 90 days after the date of the enactment of this Act.

Reports.

(5) At the close of each fiscal year the Committee shall submit to the President and the Congress a report on its activities conducted during such year and its planned activities for the coming year, including specific findings and recommendations with respect to the national semiconductor strategy devised and promulgated under subsection (b)(2)(B). The first report shall include an analysis of those technical areas, including manufacturing, which are of importance to the United States semiconductor industry, and shall make specific recommendations regarding the appropriate Federal role in correcting any deficiencies identified by the analysis. Each report shall include an estimate of the length of time the Committee must continue before the achievement of its purposes and the issuance of its final report.

(f) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to be appropriated to carry out the purposes of this section such sums as may be necessary for the fiscal years 1988, 1989, and 1990.

30 USC 1803 note.

SEC. 5143. REVIEW OF RESEARCH AND DEVELOPMENT PRIORITIES IN SUPERCONDUCTORS.

President of U.S.

(a) NATIONAL COMMISSION ON SUPERCONDUCTIVITY.—The President shall appoint a National Commission on Superconductivity to review all major policy issues regarding United States applications of recent research advances in superconductors in order to assist the Congress in devising a national strategy, including research and development priorities, the development of which will assure United States leadership in the development and application of superconducting technologies.

(b) MEMBERSHIP.—The membership of the National Commission on Superconductivity shall include representatives of—

(1) the National Critical Materials Council, the National Academy of Sciences, the National Academy of Engineering, the National Science Foundation, the National Aeronautics and Space Administration, the Department of Energy, the Depart-

THE WHITE HOUSE
WASHINGTON

TO: ALAN BROMLEY

FROM: **DAVID Q. BATES**

☒ FYI

☐ Action

☐ Comment

"CORRESPONDENCE TRACKING"

TYPE: Information DOCUMENT NUMBER: 8910204

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FROM: David Q. Bates

TO: Bromley

DATE OF CORRESPONDENCE: 10/30/89

SUBJECT: (FYI) Memo and attachement on NACS from Todd G. Bucholz

****

ASSIGNED TO:

ACTION REQUIRED: NONE

****

SENDER'S DUE DATE: OSTP DUE DATE:

DATE COMPLETED:

****

COPIES TO: Judith Bostock
Bob Post

****

REMARKS:

DATE RECEIVED: 11/02/89 FILE: EOB

THE WHITE HOUSE

WASHINGTON

November 16, 1989

MEMORANDUM FOR D. ALLAN BROMLEY

FROM: ROGER B. PORTER RBP

SUBJECT: First Annual Report of the National Advisory Committee on Semiconductors

Thank you for sending me a copy of the report of the National Advisory Committee on Semiconductors. I offer the following comments.

The report is troublesome in its emphasis on government measures specifically aimed at the semiconductor industry. These measures include:

-- Public support for a corporation to rebuild a consumer electronics industry in the United States;

-- Defining minimum standards for local technology content;

-- Allowing access to the U.S. consumer electronics market only for goods from countries that provide reciprocal access; and

-- Increasing funding levels for Sematech.

These and similar recommendations in the report can appropriately be criticized as implying the kind of interventionist "industrial policy" that the Administration has strongly opposed. As the New York Times article that you attached confirms, these recommendations are also the ones that will receive the most attention from the public and in the Congress.

The report does contain many helpful suggestions for improving the overall business environment for the semiconductor industry, including changes in tax, education, and trade policy. While the Administration cannot support all of the Committee's recommendations to improve the business environment, especially given our current fiscal problems, I support the Committee's focus on cross-cutting measures that will affect the underlying competitiveness of the United States in all sectors. Specifically, the Administration strongly supports the report's call for lower capital gains taxes, the extension and expansion of the Research and

Experimentation credit, and cutting the budget deficit so that investment funds are freed for the private sector. These measures are not the immediately attractive ones in the public debate, as demonstrated by the brief paragraph devoted to them in the New York Times article.

The role of the Committee, as defined in section 5142 of the Omnibus Trade and Competitiveness Act of 1988, is to define a national semiconductor strategy and to provide advice on implementation of that strategy. To be successful, the Committee's strategy must be consistent with the economic policies of the Administration. One of our priority tasks should be to achieve this consistency as the Committee continues to define a strategy. A quick review of the names of Committee members and supporting staff reveals a heavy concentration of expertise in the semiconductors industry. Given this orientation, you might consider whether the Committee would benefit from regular exchange with officials charged with implementing the Administration's economic policies.

My staff and I would be pleased to work with you in any way possible to produce results that further the Administration's objectives.

THE WHITE HOUSE

WASHINGTON

December 27, 1989

Dear Mr. Hakim:

Many thanks for your letter of December 8, in which you tell me of some of your concerns about the future of the U.S. microelectronic industry. I agree with you that it has been a tremendous pity that this country did not recognize the methodology and concepts developed by Dr. Deming many years ago and put them into practice, as have the Japanese. It could have made a very substantial difference in our present competitive situation.

Many thanks for taking the time to write.

With all best wishes,

Sincerely yours,

D. Allan Bromley
Assistant to the President
for
Science and Technology

Mr. Edward B. Hakim
2412 Emerson Avenue
Spring Lake Heights, New Jersey 07762

"CORRESPONDENCE TRACKING"

TYPE: Action Item DOCUMENT NUMBER: 8920674

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FROM: EDWARD B. HAKIM

TO: BROMLEY

DATE OF CORRESPONDENCE: 12/08/89

SUBJECT: ENCLOSING VARIOUS IDEAS AND VIEWS CONCERNING THE SEMICONDUCTOR INDUSTRY.

****

ASSIGNED TO: Bob Post

ACTION REQUIRED: APPROPRIATE RESPONSE

****

SENDER'S DUE DATE: OSTP DUE DATE: 12/30/89

DATE COMPLETED:

****

COPIES TO: D. Allan Bromley
Judy Bostock

****

REMARKS:

DATE RECEIVED: 12/12/89 FILE: NEOB

89206 PR

December 8, 1989

Office of Science & Technology Policy
Executive Office of the President
Attn: Dr. D. Allen Bromley
Washington, D.C. 20506

Dear Dr. Bromley,

I am taking this time to commend you on your recent briefing before the Senate Armed Services Subcommittee concerning the report of the National Advisory Council on Semiconductors.

More government spending to promote hi-tech developments will not make the US more "competitive". The chairman of the council, with a straight face, told the nation that this august group after a year of study believed the major causes of our decline in the production of microcircuits was insufficient funds for optoelectronics and cheap money. Not surprising since he is chairman of AT&T!

The reason we are non-competitive in the microelectronic business is that the Japanese can sell cheaper with a profit and have a higher quality and reliable product. Neither you nor the council addresses this root cause. The Japanese employ statistical process control (SPC) methodology and concepts, developed by Dr. W. Deming, which assures lower reject and scrap and higher yields-which means low cost!

I am employed in the DoD and we are putting SPC requirement in our new specifications for microcircuits. This has been accomplished through the cooperative efforts of DoD and the microelectronic industry. The first fruits of the revolutionary qualification program will be in 1990 with the generation of a QML (Qualified Manufactures List) having leaders such as Intel, AT&T, National, TI, IBM, and VLSI Technology on the list.

rec'd 12/12/89

This program received very little funding (about $5.5 million over four years), but will bring U.S. chip manufacturing back on-shore. Commercial chips will have greatly improved quality and military systems will profit by having chips of the highest reliability and greatly improved availability, at a reasonable cost. These are the types of programs needed, not the massive spending, short sighted initiatives.

Sincerely,

Edward B. Hakim
2412 Emerson Ave.
Spring Lake Heights,
NJ 07762