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"CORRESPONDENCE TRACKING"

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ORIGINATOR: 02 STATUS I DIRECTORATE STATUS  
\*\*\*\*\*

FROM: MATHEWS, CHARLES W.: PRESIDENT, NASA ALUMNI LEAGUE.

TO: DR. D.A. BROMLEY

DATE OF  
CORRESPONDENCE: 08/15/91

SUBJECT: REQUEST TO REVIEW THE ENCLOSED FINAL REPORT FROM A  
WORKSHOP SPONSORED BY THE NASA ALUMNI LEAGUE TO  
EXAMINE THE SUBJECT OF INTERNATIONAL COMPETITIVENESS  
FROM THE ASPECT OF APPLYING ADVANCED TECHNOLOGIES.

\*\*\*\*\*  
DIRECTORATE STAFF  
ASSIGNED: INDUSTRIAL ASSIGNED:

ACTION STAFF  
REQUIRED: DRAFT RESPONSE FOR DAB ACTION:

\*\*\*\*\*  
SENDER'S DUE DATE:  
OSTP DUE DATE: 09/04/91 STAFF DUE DATE  
DATE COMPLETED: DATE COMPLETED/DEPT: 8/26/91  
\*\*\*\*\*

COPIES TO: D. Allan Bromley  
PHYSICAL SCIENCES  
INTERNATIONAL/POLICY

\*\*\*\*\*

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OSTP RECEIVED: 08/19/91 FILE: P-INDUSTRIAL-ECON COMP  
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THE WHITE HOUSE  
WASHINGTON

August 26, 1991

Dear Mr. Mathews:

I deeply appreciate receiving a copy of the results of the Workshop on international competitiveness conducted by the NASA Alumni League last September. Such discussions involving industry, government and academic leaders are essential as we make the adjustments necessary to ensure our continued economic growth. Although I realize that your conclusions extend beyond the aerospace sector, that sector, nevertheless, is of such importance that attention such as you have given it is essential.

You may expect increased attention to the aerospace sector on the part of OSTP in the coming months. I assure you that the input of the Workshop will be carefully considered.

Sincerely,

A handwritten signature in dark ink, appearing to read "D. Allan Bromley". The signature is fluid and cursive, with the first name "D. Allan" and the last name "Bromley" clearly distinguishable.

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

Mr. Charles W. Mathews  
President  
NASA Alumni League  
922 Pennsylvania Ave., S.E.  
Washington, D.C. 20003





922 Pennsylvania Avenue, SE  
Washington, DC 20003  
(202)543-3587  
FAX (202)546-4189

August 15, 1991

Dr. D. Allan Bromley  
Assistant to the President for  
Science & Technology  
Old Executive Office Bldg. #360  
Washington, DC 20506

Dear Dr. Bromley:

Because of concern with the eroding U.S. position in the application of advanced technology from the perspective of international competitiveness, the NASA Alumni League conducted a Workshop on this subject. Five aerospace areas were examined by special panels: Civil Aeronautics, Satellite Communications, Earth Observations from Space, Software and Microgravity Applications. Although the results of the Workshop apply directly to these subjects, the League believes that they apply broadly to other high technology areas as well.

Sixty technically oriented individuals from industry, government and academia participated in the Workshop. Almost all had industrial experience. A few represented the NASA Alumni League directly.

The Workshop panels prepared individual reports. These reports were analyzed by League members and resulted in a Final Report prepared by the League.

We are enclosing a copy of the Final Report, which we believe will be of interest to you. The League requests that you review this report and distribute it to appropriate members of your staff. If you desire additional copies of the Final Report or any of the panel reports, (executive summaries are included in Appendix C), they may be purchased at \$5.00 a copy by submitting the appropriate amount to us along with your request.

The NASA Alumni League would be very interested in hearing your views of the Workshop Findings/Recommendations.

I look forward to your response on this important matter.

Sincerely,

Charles W. Mathews  
President

**NASA ALUMNI LEAGUE WORKSHOP  
ON  
TECHNOLOGY APPLICATIONS AND COMPETITIVENESS**

**FINAL REPORT**

**NASA ALUMNI LEAGUE  
922 Pennsylvania Avenue, S.E.  
WASHINGTON, D.C. 20003**

**April, 1991**



## ACKNOWLEDGMENT

The NASA Alumni League gratefully acknowledges the following Workshop Sponsors.

Allied Signal Company

The Boeing Company

Center for Space and Advanced Technology

Computer Sciences Corporation

Environmental Research Institute of Michigan

General Dynamics Corporation

General Electric Company

Hughes Aircraft Corporation

International Telephone and Telegram Corporation

Lockheed Missiles and Space Company

LTV Corporation

George C. Marshall Institute<sup>(a)</sup>

Martin Marietta Corporation

McDonnell Douglas Corporation

Mitre Corporation

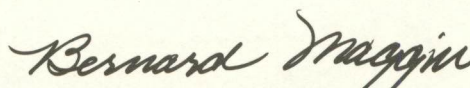
National Aeronautics and Space Administration

Orbital Sciences Corporation

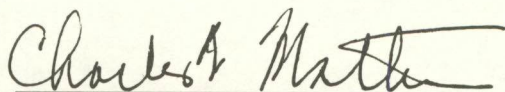
Rockwell International Corporation

Thiokol Corporation

TRW



Bernard Maggin, Project Manager



Charles W. Mathews, President  
NASA Alumni League

<sup>(a)</sup> Robert Jastrow of the Institute made a personal contribution.

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**Workshop  
on  
Technology Application and Competitiveness**

**Final Report**

**PREFACE**

In the week of September 11 to 14, 1990, the NASA Alumni League\* conducted a Workshop at Airlie, Virginia, to consider systemic problems in U.S. competitiveness in five areas related to the commercial application of advanced technology. Workshop discussion focused on national interests rather than the institutional or programmatic interests of government or industry. The areas addressed were Civil Aeronautics, Satellite Communications, Earth Observations from Space, Microgravity Applications, and Software.

About sixty experts and generalists from industry, government, and academia, including NASA Alumni League members, were organized in five panels to address the subject areas. The names of the workshop participants and their panel assignments, and the names of the introductory speakers are presented in Appendix A. The listing does not imply agreement by any individual with judgments expressed in the Workshop panel reports or in the Final Report of the Workshop prepared by the League.

In preparation for the Workshop, special papers and questions were given to the participants. The titles and authors of the papers and the set of questions are presented in Appendix B.

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\*The NASA Alumni League is an organization of former NASA managers, engineers and scientists. It is not affiliated with government or private institutions.

## INTRODUCTION

The NASA Workshop on Technology Applications and Competitiveness focused on possible remedies for the relative lagging of U.S. performance in the commercial application of advanced technology rather than on the facts or causes that have been widely analyzed. While emphasis varies, a gross consensus says that causes involve issues such as the short-term planning and operational perspective of U.S. industry and financial institutions, the widespread foreign government intervention on behalf of its industry through both stimuli and protection, and the inability of even large U.S. firms to independently take on the risks and costs of major new technological developments or their application. These and related well-known factors helped shape the remedies that emerged from the workshop.

It may be helpful in dealing with the discussion that follows to note that the U.S. government's expenditures for civil and defense research and development (R&D) are considerable. The FY 1991 budget proposed to Congress by the President is \$79 billion. The technologies developed in government sponsored programs are applied mainly to agency missions, with little consideration of commercial interests. The effectiveness of support of mission oriented programs is affirmed by the success in the Gulf War and decades of success in space exploration. These programs totally supported by the government do not and are not intended to respond to the dynamic and often random market forces of the commercial sector.

The question facing the Nation is will this approach to the use of the government's R&D funds serve us well in a future in which U.S. industry is faced with growth in both foreign technological competence and economic competition? Currently, the responsibility for providing for the Nation's economic security and its commercial competitiveness with other countries is left substantially to market forces and the private sector. For example, in the U.S. commercial sector there is no national assessment of direction, competitive goals, needs, priorities, or program support requirements, as there is for national defense.

Until the last decade or so the U.S. civil system in support of commerce has worked fairly well, albeit with considerable cyclical and other disturbances. The Nation's commerce, while continuing to



grow overall in most sectors, has nevertheless experienced a significant decline relative to other nations.

*Chairman  
Pharmaceuticals*  
The U.S. balance of trade has fallen to serious negative values in all manufacturing sectors except aerospace. Technology and business assessments show a continuing shift in capabilities in favor of overseas competitors.

This simplified but nevertheless broadly true portrait of the different management of the nation's defense and commercial interests does not suggest that commercial activities be reorganized in the image of the Defense department. For one thing, the industrial and consumer requirements imposed on commercial industries are far more varied and complex than those for defense. Clearly the mechanisms for meeting the two sets of requirements must differ. However, the private sector could benefit from some form of coordination or cooperation, along with some carefully limited assistance from the government. This assistance should be organized to address priorities and other competitive matters, always within the framework of the market system and only where the market system is not by itself meeting national interests. In the special case of advanced technology the vital economic interests of government and industry appear to establish, on a prima facie basis, the validity of such a modest proposition for government assistance. Hence the workshop was undertaken.

Generally, the U.S. government avoids assistance to industry because it is reluctant to cater to selected commercial interests. Industry shies away from research and development difficulties when technical risks and early market uncertainties exceed the capacity of the individual firm or when the short-term exigencies of financial performance in the market place, dominate business decisions. The victim of this situation is the U.S. public, in whose interest it is vital that the Nation performs well economically in both the near and long-term in a growing, competitive international arena.

## FINDINGS

The Executive Summaries of the five Workshop panel reports are included in Appendix C. The panels identify a generic problem: a shortfall of action by both government and industry in exploiting important, current or prospective, commercial application of advanced technology. In recognition of this dilemma the five panels call for action to engage the government--constructively and minimally and in the public interest--in technological progress and commercial application of advanced technology. The

panels believe firmly that such action is necessary and important to enhanced U.S. commercial competitiveness.

In recommending remedies, the guiding principle adopted by the panels is not to disturb the character of the market system. Thus, where joint industry and government mechanisms are suggested, the principal responsibility for leadership is placed on industry; where government funding is required, the panels propose that the funding be of a catalytic nature, such as the purchase of products or services when appropriate.

Panel recommendations differ in some instances and agree in others. This suggests that a variety of solutions is possible and needed for different areas of activity and situations.

In addition to the areas examined, it is likely that the suggested solutions are applicable to other areas of stalled technological development and application.

The major League findings derived from the Workshop results are:

**1. Increase Attention to Commercial Competitiveness**

The Satellite Communication panel and other panels express concern about how little the government, in evaluating its research and development (R&D) programs, factors the commercial application of technology into its judgments. As has been noted, the government has a very large investment in R&D, and the innovative technology that has been developed has been successfully applied to the missions of its agencies. However, the trickle down of those technologies to commercial products is not adequate for the maintenance of a satisfactory U.S. competitive position in the world marketplace.

It is essential to the national interest that the federal government identify technological activities in its own agencies that have significant potential for commercial application. It is also essential that the government give such activities appropriate priority. Industry's attention and advice to the government should be brought to bear on commercial implications of government R&D programs at an early stage through mechanisms designed for efficiency, transparency, and fairness.



## **2. Improve Industry/Government Interaction**

All panels cite the need for better industry-government communications and interaction related to R&D program identification, development, and oversight in areas critical to U.S. competitiveness. Currently, opportunities for new, competitive advances are lost because of limited communication, coordination, and cooperation.

When both government and industry have substantial interest in an important technology (for example, aeronautics and software) or when progress in application may not match foreign competition (remote sensing, for example), consideration should be given to establishing mechanisms for coordination and cooperation on projects and programs of mutual benefit, whether jointly or separately pursued.

Several panels propose the use of a system of working committees similar to that employed by NASA's predecessor, the National Advisory Committee for Aeronautics (NACA), which served the aeronautics industry and the country so well in both commercial and military aviation. The NACA committees and their working subcommittees had broad industrial, academic and government representation. These committees assisted in the identification and development of advanced technology programs, followed their implementation, expedited technology transfer, and considered program changes. A description of such a mechanism--a National Program Committee for Software-- is briefed in the Software Panel Executive Summary (Appendix C) and is detailed in the Software Panel report. The panel suggested that such joint mechanisms be led and funded primarily, but not necessarily exclusively, by industry.

The Microgravity Panel report encourages broader use of the NASA Centers for Commercial Development of Space for stimulating industrial involvement. These centers use academic or similar institutions as industry-government middlemen.

The Communications Panel report recommends that the government develop better mechanisms for joint demonstrations of new communication satellite capabilities through creation of strategic industrial partnerships.

### 3. Ready Technology for Application

All the panels emphasize the importance of getting advanced technology ready for application. The objective is to validate technology that has high potential for commercial applications so that technical and financial risks are reduced to practical levels when the technology is applied by industrial firms. It should be understood that this effort does not include the application of the technology to a specific product or system.

The panels agree that the federal government should establish means for facilitating industry development and application of technology of high public-commercial potential where industry is unable to move forward because of pre-market or other high-risk factors. Such assistance should be given only until a stage of reasonable business risk is reached. In this connection, the Dutch and similar pre-market technology readiness models may be considered. These are models in which government funding is provided as loans, and if commercial application ensues, is paid back into a revolving fund.

The Aeronautics Panel report notes that U.S. civil transport aircraft competitors (notably Airbus Industrie, a joint European venture) have applied advanced technology sooner and more rapidly than has been possible in the U.S., in part because of the type of R&D support their governments provide. As has been stated, the ability to apply advanced technology is a function of the state-of-readiness of the technology and the associated risks inherent in the application process. This panel strongly supports industry-government technology programs that help remove technological uncertainties that can adversely and unduly affect performance, reliability, development time, or aircraft certification.

The Satellite Communications Panel and Earth Observation Panel reports note the need to support system demonstrations when the system concept is new or the market is not developed but when the commercial potential is great. In the case of earth observation systems it is likely that the government could be a major user of new products before self-sustaining commercial markets develop. Thus, shared support for R&D as well as the initial design, development, and operation of new systems may be justified. Government support could take the form of guaranteed purchase of services and products, and the supporting industry(s) could be given special rights to the technology gained in a joint



endeavor. The panel notes that industry has to be the major and probably the primary player in these gap-filling activities. However, government involvement is necessary and critical.

In the case of major technological developments in which the national economic security (whether in the sense of public well-being or commercial competitiveness) requires broad and costly advances, federal support of the nature discussed would seem to be an obvious recourse in the public interest.

#### **4. Establish a Focal Point in Government for Technology Commercialization**

The panel reports indicate that more focused and coordinated oversight by the federal government in the area of commercial application of technology is needed as is the appropriate expertise for the function. In the aerospace areas examined this important capability is lacking. The Earth Observations and Software panels state that this important focus and coordination does not exist at all in their disciplines. Although the Aeronautics and Satellite Communications panels look to NASA for this kind of activity, the panels recognize that NASA alone can not provide all the necessary support since other government agencies play important roles (for example, FAA and DOD in aeronautics, and FCC and DOD in communications).

The above finding implies the need for a new level of government concern and engagement in pursuing the national interests in the commercial application of advanced technology. Both focused and expanded capabilities are essential for efficient technological assistance, similar to those provided by government for agricultural development and aid to the farmer. This effort helped achieve an unparalleled American agricultural system. Some government support in assisting industrial competitiveness in other areas is only rational. Accordingly, the panels suggest that a government umbrella organization be set up to assist and encourage government agencies and industry in the development of technology and its commercial application and to manage rotating or other funding in order to strengthen U.S. international competitiveness.

These findings have important similarities but also significant differences (for example, constituencies, state of commercial development and future program needs) that warrant selective attention, especially when extending the findings more broadly to other technology areas. However, this

situation in itself emphasizes the need for a more coordinated and cooperative effort for the handling of technological competitiveness considerations within government and for providing a more effective interface between government and industry.

### RECOMMENDATIONS

Based on a review of the panel reports and its own deliberations, the League presents the following recommendations:

1. Greater emphasis must be placed on R&D that has commercial potential. R&D programs sponsored by the federal government can be major contributors to our nation's commercial technological base. Therefore, the League recommends that **a Presidential directive be issued or legislation enacted requiring that the identification of commercial opportunities and proposed actions be an integral part of the submission and approval process for all government R&D programs.**
2. Improved interaction and more open communications among industrial firms and between industry and government must take place to assure that government and industry R&D plans, programs, and future thrusts are focused on critical technologies and the marketplace. Therefore the League recommends that **mechanisms similar to those employed by NASA's predecessor, the National Advisory Committee for Aeronautics (NACA), be implemented to affect better government-industry interaction for selected industrial sectors.** The NACA working committees provided a highly effective means for industry, academia, and government to address priorities and strategies for aeronautical R&D that was of commercial interest as well as of interest for defense.
3. Support from the government of readying technology for commercial application (proof of concept) is important and should be provided in cases where the application has great promise but reduction to practice by industry is too long-term, too risky, or requires development of new markets or levels of resources only the government can provide. Therefore, the League



recommends that **federal support be provided, including funding when necessary, to help ensure that technology and systems that have real commercial potential are truly ready for application and commercialization.** The federal support should be catalytic in nature employing concepts such as guaranteed purchase of industry products and services, a revolving fund based on industry paybacks, or a time period for exclusive use.

4. A focal point for commercial technology should be established within the government.

Currently each government agency has cognizance over and usually sponsors only those technological enterprises needed to perform its own mission. The complex dynamics of commercial technology and markets are important and require broad consideration. Economic competitiveness demands careful attention to technology efforts in both government and industry. No organization in government exists that fulfills this role and assures active involvement of industry and academia. Therefore, the League recommends that **a focal point for commercial technology be established within the Executive Branch and that appropriate resources be provided to accomplish these purposes.** The objective could be satisfied by extending the charter of an existing organization such as the National Science Foundation or the National Institute for Science and Technology or through creation of a new entity such as a National Technology Foundation.

### **SUMMARY**

The U.S. has adequate resources and currently outspends our competition for R&D. What is needed in the growing competitive environment are ways to ensure that our priorities are right and that a more cooperative effort between industry, academia and government, is brought to bear in the use of our valuable technological resources. The League feels strongly that action should be taken now, by the President and the Congress along the lines recommended in this report: action to ensure that our national R&D is adequately directed at technologies and their application that provide the foundation for future commercial products and services, action to improve our nation's future competitive posture. Such actions for sustaining or establishing leadership in the development and commercial application of technological innovations are critical to the nation's economic well-being.

**APPENDIX A**  
**WORKSHOP PANELS**  
**AND**  
**INTRODUCTORY SPEAKERS**

• WORKSHOP PANELS

Civil Aeronautics

Sally Bath  
James Beggs  
Crawford Brubaker-Moderator  
Richard Golaszewski  
Gerald Kayten  
James Kramer  
Bernard Maggin-Rapporteur  
Richard Peal  
Roger Schaufele  
Calvin Watson

U.S. Department of Commerce  
SpaceHab  
Consultant (Lockheed, Ret.)  
Gellman Research & Associates  
NASA Alumni League  
General Electric  
Consultant (NASA Alumni League)  
The Boeing Company  
McDonnell Douglas Corporation  
The Boeing Company

Satellite Communications

Ray Arnold  
Robert Briskman  
Gene Cacciamani  
John Clark  
Dennis Curtin  
Burton Edelson-Rapporteur  
Troy Ellington  
Jack Hannon  
Leonard Jaffe-Moderator  
John Johnson  
Larry Kasulka  
Wilbur Pritchard  
Thomas Quaid  
Chuck Roof

NASA  
GEO Star  
Hughes Network System  
Consultant (RCA VP, Ret.)  
Orion Satellite Company  
Johns Hopkins University  
GTE Space Net Corporation  
Comsat  
Computer Sciences Corporation  
Consultant  
U.S. Department of Commerce  
W. L. Pritchard & Company  
Motorola Incorporated  
TRW

Earth Observations

Murray Felcher  
Marvin Holter-Rapporteur  
Charles Mathews-Moderator  
John McLucas  
Richard Mroczynski  
Willis Shapley  
Jerry Simonoff  
William Stoney  
James Taranik  
David Williamson

Washington Remote Sensing Letter  
Consultant (ERIM VP, Ret.)  
President, NASA Alumni League  
QUES TECH  
EOSAT  
NASA Alumni League  
Citibank  
MITRE  
Desert Research Institute  
NASA Alumni League



### Microgravity

Charles Bugg  
L. J. (Bud) Evans  
Thomas Glenn  
Frank J. Jelinek-Moderator  
Gilbert Keyes  
Jack R. Knox  
Simon Ostrach  
Frank Penaranda-Rapporteur

University of Alabama-Birmingham Center  
Center for Space and Advanced Technology  
Biocryst, Inc.  
Battelle Advanced Materials Center  
Boeing Commercial Space Development Company  
Consultant  
Case Western Reserve University  
NASA

### Software

Robert Beland  
William Brown  
Arnold Frutkin-Moderator and Rapporteur  
Brian Fugate  
Douglas Jerger  
David Kessell  
Jack Munson  
Jerry Rosenberg  
William Schneider  
Robert Valleni

IBM  
Environmental Research Institute of Michigan  
Consultant (UNISYS VP Ret.)  
MCC  
ADAPSO  
Bellcore  
UNISYS  
Exec. Dir. NASA Alumni League  
Consultant (CSC VP, Ret.)  
TRW

### At-Large Attendees

Robert C. Seamans, Jr.  
Lawrence Vogel

Chairman, NASA Alumni League  
NASA Alumni League

### • INTRODUCTORY SPEAKERS

Sally Bath, Director  
Office of Aerospace Policy and Analysis  
U.S. Department of Commerce

Aeronautical Competitiveness

James Beggs, Chairman  
Space Hab Incorporated

Space Habitat Experience

William Brown, President  
Environmental Research  
Institute of Michigan

Technology Transfer

Edward Donley, Past Chairman  
Air Products and Chemicals, Inc.

Commercialization

Aaron Gellman, President  
Gellman Research and Associates

Competitiveness

Clyde Prestowitz, President  
Economic Strategy Institute

MITI

James Rose, Assistant Administrator  
NASA, Office of Commercial Programs

NASA Commercial Programs

## APPENDIX B

### SPECIAL PAPERS AND QUESTIONS

- PAPERS (UNPUBLISHED)

|                         |                                |
|-------------------------|--------------------------------|
| Aeronautical Technology | G. G. Kayten, Consultant       |
| Communications          | L. Jaffe, VP CSC               |
| Microgravity            | R. E. Halpern, CSAT            |
| Software*               | A. W. Frutkin, UNISYS VP, Ret. |
| Earth Observations      | M. R. Holter, ERIM VP, Ret.    |

- WORKSHOP GENERAL QUESTIONS

Please note: These questions are intended to stimulate the thinking of the members of the Workshop. It is not intended nor expected that responses to these questions will be developed by the Workshop. However, it is intended and expected that the special panels to be organized at the Workshop will identify their own sets of questions and issues, and possible responses related to improving U.S. technology applications and competitiveness from policy and institutional perspectives.

### TECHNOLOGICAL OPPORTUNITIES

- Are there significant technological requirements, opportunities or developments, with potential commercial or public interest, that are not moving forward in the United States?
- Does industry consider such opportunities not ripe for independent commercial exploitation (for whatever reason)?
- Does the government consider the sector reserved for industry?
- Is there general agreement that for these technology sectors we face a situation in which commercial advances are not taking place because neither government nor industry is stepping up to it?

### UNITED STATES POLICY

- From competitive considerations are current NASA, DOC, OSTP and OTA positions regarding the aeronautical and space technology utilization adequate?

\*The Software panel also used Software Working Paper, AIAA Software Systems Technology Committee.



- What do panel members perceive to be the competing foreign practices and their effectiveness in England, France, Germany, Japan, etc.?
- Are there foreign practices that the United States should consider adopting?

### OBSTACLES AND PROBLEMS

- What are the commercial obstacles--financial risk, capital availability, manufacturing technology, market development, production costs, government regulation, manpower, etc.--to improving competitiveness?
- Are the key problems essentially technological, commercial, governmental, political, or a combination of these?
- Do these apply mostly within the United States market or are they influenced by international competition?
- What is the nature of the political obstacles--ideology, budgets, fragmented government agency responsibility, tax or legal discouragement, etc.?
- What are the key problems (for the sector) that need to be solved in the United States so that competitive advances may be made and/or the public interest served?
- What are the conditions under which industry can evaluate and accept technology as ready for application? How is technology brought to that stage?

### FOREIGN APPROACHES

- Is United States industry at a serious disadvantage relative to its foreign competition?
- Is this for technical, commercial or political reasons?
- Are foreign groups making better progress in technology? If so, why?
- What mechanisms or processes do they use?
- To what extent are they applicable in the United States?
- Does the foreign competitor benefit from his government policies and institutions?

- Should United States industry expect to compete without comparable assistance?
- Is it important to protect "United States" technology, and if so how, when United States firms joint-venture with foreign firms?

### ADDRESSING PROBLEMS

- How can key problems be addressed?
- Are there specific government actions which could serve?
- Should government actions be limited to catalysis or should there be a government or government/industry/mechanism(s)?
- Are there specific stages and circumstances of technological development and application appropriate for government assistance and if so, what kind?
- How can industry be assisted, guided or postured for improved competitiveness and support of public interests while preserving private enterprise?
- How can government support be contained so as to avoid excessive support, micro-management, etc.?
- Are there cases where there should be a "middleman" between government and industry?
- If we could legitimately factor residual commercial/economic value of proposed aero and space programs into decision making, would we arrive at different sets of national program priorities?

### INDUSTRY/GOVERNMENT ACTIONS

- If specific industry action is warranted, what is it?
- If industry is caught between short-term and long-term considerations, how can industry be induced to act in the long-term national interest?
- How can appropriate constituencies be cultivated to properly advise the Federal Government (including NASA) regarding the priorities and needs for technology to support industries that have not been traditionally supported through Federal programs.



- What can be done to bring better balance to the advice given Government and to place priority on those programs which can enhance the nation's economic well being?

## APPENDIX C

### EXECUTIVE SUMMARIES OF PANEL REPORTS

#### CIVIL AERONAUTICS SUMMARY

The aeronautics panel reviewed the nature and general state of aeronautical competition and identified actions required if the U.S. industry is to maintain a strong competitive posture in the future. The panel concentrated primarily on technology and technology application but recognized that other factors must be examined to fully assess and resolve competitive issues.

For several decades foreign governments have, in effect, subsidized their industries to gain market share, and they continue to do so. Their products are essentially on a par technologically with those of U.S. manufacturers, and because of government assistance they are more than price competitive despite the productivity edge still held by U.S. industry. Meeting price competition under such conditions reduces U.S. manufacturer's profits, reduces their ability to invest in research technology and development (RT&D) and reduces their future profits. To help decrease investment risk and increase market access, U.S. industry has actively pursued joint ventures, as has foreign industry. The possibility of technology transfer may be more injurious to U.S. industry because it has apparently been slower, for business and other reasons, to apply advanced technology.

The Workshop devoted its primary attention to the theme of technology applications. Other factors affecting competitiveness, such as education (and training), tax structure, capital formation, and business strategies, were addressed briefly.

The panel believes that the strong and growing competition in both Europe and the Orient will seriously challenge our goal of continuing leadership in aeronautics. The panel believes that the U.S. response must be to not only continue aggressive investment in innovative technology, but to also significantly accelerate the readiness of state-of-the-art technology for rapid application with low technical and financial risk. The latter requires industry-government cooperation in the selection and support of appropriate technology readiness activity and the structuring of an industrial environment to speed specific application of the technology. The development of a framework for such action is a matter of high priority and is important to improvement of U.S. competitiveness. The panel also recommends that the review and assessment of foreign RT&D activity be improved.

#### SATELLITE COMMUNICATIONS SUMMARY

The Satellite Communications panel considered the status of technology and the U.S. industrial posture and future in its deliberations. The panel finds that this industry is so successful that it is targeted by foreign



competitors as an area for future growth. Part of the growth will come from demand and part from evolving and new technologies for both the space and earth segments of communications systems.

Communications satellites will undergo major changes in the next decade or two. Their size and complexity will grow in order to remain competitive with fiber optic cable in the area of conventional long-distance services. In addition, satellites will be used for new communications services, such as mobile services and broadcasting services. The competition for radio frequency spectrum and space in the geosynchronous orbit will increase. All of this will require continued advances in technology.

The panel's basic recommendation for improving the Nation's competitive posture in world markets is that the government should change the way it prioritizes and selects its research technology and development (RT&D) programs and the way it is organized to direct and support its RT&D expenditures. It should continue to support basic research but balance that with the development of technology and its application.

The panel made the following observations and recommendations:

1. Review policies and plans for satellite communications. Strategic planning for satellite communications in the U.S. is severely segmented and the policies that exist come from a series of public laws, executive orders, regulations, and court decisions that are in many cases confusing or conflicting and potentially detracting to U.S. competitiveness.
2. Reestablish NASA RT&D leadership with secure long-term funding so that industry is assured of needed technology in a timely manner.
3. Establish a NASA Satellite Communications Advisory Committee patterned after the old NACA Advisory Committees to ensure that industry's needs are accommodated as well as those of government and academia.
4. Provide incentives for industrial development of technology and new applications development. The government should establish policies and procedures that offer incentives for industrial funding. For example, government should give prompt, preferential consideration to such proposals from industry and give the investor exclusive use of the resulting technology for an appropriate period of time.
5. Make early commitment to government use of commercial systems. Early commitment to legitimate governmental use of new applications of satellite systems can make introduction of such services worthwhile and accelerate market development.
6. Provide NASA Office of Commercial Programs with funds to support greater industry-academia involvement in the ACTS program. Allow broader participation in ACTS, for example, INTELSAT use of ACTS to conduct experiments.



7. Support radio frequency and orbit utilization efforts. NASA's R&D program should support the Department of State and the FCC in international frequency and orbit utilization negotiations.
8. Support development of low cost expendable boosters and services. An important factor in the application of space technology is the cost of successfully placing a satellite in orbit.
9. Balance priorities for government R&D. Federally funded programs are a major contributor of new technology and therefore a major contributor to the competitive posture of U.S. industry. The potential return on investment that can result from certain R&D should be a significant factor in programming our nation's R&D expenditures. An executive order should be issued by the President, requiring that all federal agencies give high priority to R&D programs that enhance this country's competitive posture.

#### **EARTH OBSERVATIONS SUMMARY**

The Earth Observations panel analyzed the civil applications of U.S. earth observations from space. The analysis focused on the need for and value of such information, as well as its bearing on U.S. economic competitiveness. The panel found that space remote sensing, which provides data on conditions at or near the earth's surface, has great value. It is particularly important in such applications as land-use evaluation, agricultural production estimation, mineral exploration, pollution detection, sea state determination, and weather forecasting.

For a number of reasons the civil market for space-based land and sea observations remains immature. However, the market for such information and products is expected to have explosive growth partly as a result of advances in and application of computer-based geographic information systems. Market growth is expected to sustain total system capabilities in about a decade.

The application and potential of earth observations from space has caused other nations to aggressively pursue the commercial development of earth sensing techniques and products. The panel finds that a U.S. response is imperative. The response in part requires the federal government, as a matter of policy, to assure a continuing U.S. earth observations capability. This would mean providing sufficient funds for bridging from government to private support.

The panel also finds that the private sector should identify new civil earth observations capabilities and propose programs to the government. The private sector is in the best position to determine the nature of systems and services that will have the greatest market potential. The panel proposes that program costs be shared between the government and the private sector with decisions on bridging support made by the government. It is expected that federal budget increases are not needed. Better integration and coordination of federal agency earth observations programs should allow support of this effort without additional government funds.



The panel recommends that the responsibility for managing the government's support to the private sector be vested in a government agency that is capable of coordinating the civil remote sensing mission requirements of all the interested agencies.

The panel also recommends that to stimulate the growth of the U.S. market share in the face of foreign competition, the existing U.S. civil systems ground resolution constraints be relaxed. The allowable resolution should be in the range of three to five meters. In addition, the federal government should encourage the private sector to supplement the usual optical sensors with a synthetic aperture radar by providing appropriate financial support or else by deploying such a sensor as a part of the government's own civil program.

### **MICROGRAVITY SUMMARY**

The Microgravity panel restricted its deliberations to the better understanding and improving of processes in the near-zero gravity environment. Emphasis was on metals, organics, inorganics, polymers, and biological materials. The panel made the following recommendations:

1. Broaden the scope of the microgravity program. Most microgravity effects are not yet completely understood. Additional basic cross-disciplinary work is needed to improve fundamental understanding and provide a sound foundation for commercial applications (for example, physico-chemical transport, heat and mass transport, and chemical reactions).
2. Increase flight laboratory time. There is a need to increase experimental time at low to zero gravity. Limited time and access has resulted in limited data. These factors as well as high risk and cost and long-term payback have limited commercial interest in microgravity program involvement. Attention to increasing flight laboratory time is critical.
3. Establish mechanisms to enhance programs. There is a need to strengthen partnerships between industry, government, and academia and for the structuring of advisory (and advocacy) groups to identify and prioritize technology. Joint-cooperative research and development as well as proprietary programs involving industry and academia are needed. Mechanisms to accomplish these ends are required.

### **SOFTWARE SUMMARY**

New data and competent judgment indicate that the current U.S. lead in software is diminishing and has in fact been lost in certain key sectors that are critical for future leadership and market share. The issue is a matter for major national concern since software is a central element in vital civil and military systems and is the critical infrastructure that undergirds virtually all other high industrial and defense technologies as well as an increasing range of consumer technologies.



Apart from the issue of competitive standing, software systems and applications are inordinately labor-intensive, plagued by excessive cost in time and money. All could be substantially reduced by deliberate improvements in design, development, and testing.

The implications are obvious when it is seen that the Department of Defense spends about 30% of its annual budget on software design, acquisition, and support, that 85% of the development costs of virtually all computerized applications go for the software component (in both military and civil sectors), and that 75% of the national software expenditure is for maintenance (fixes of one kind or another).

On the international scene, the U.S. share of the computer equipment and software market fell from 81% to 61% between 1983 and 1989. While the hardware component is a large part of this drop, the linkage to software is integral and inescapable. The U.S. lead is expected to continue to diminish in key software segments and is judged already to have been lost in formal methods, modeling, and tool development, software segments critical for future competitiveness. These basic issues are compounded by cultural and institutional factors including greater receptivity abroad for advanced techniques and long-term solutions, intervention by foreign governments, and acquisition of U.S. software skills by foreign firms.

To deal with a national issue possessed of such pervasive implications for technological and economic well-being, as well as for leadership, the panel recommends that a national mechanism be established to assure the design and implementation of a program to preserve U.S. software leadership. That mechanism would be modeled in many respects on an outstandingly successful precedent, the National Advisory Committee for Aeronautics. This suggested mechanism, a National Program Committee for Software, would include industry, government, and academic personnel. It would be jointly funded by government and industry, but its largest representation and support, and its leadership, would come from industry. This mechanism would address the priority concerns of the industry at a national level by all appropriate means and by using existing institutions and capabilities. An illustrative program for the recommended organization is described in some detail in the individual software panel report. This report describes the organization's central objective, and its programs for enhancing productivity and reliability, strengthening standards, supporting intellectual property rights activities, and addressing education requirements.



"CORRESPONDENCE TRACKING"

TYPE: ACTION DOCUMENT NUMBER: 9122944  
ORIGINATOR: 02 STATUS I DIRECTORATE STATUS  
\*\*\*\*\*

FROM: CALLAHAN, William M.: AMERICAN PRIDE IS AMERICA'S FUTURE

TO: DR. D.A. BROMLEY

DATE OF  
CORRESPONDENCE: 07/23/91

SUBJECT: REQUEST TO SIGN AND RETURN THE ENCLOSED CARD, RE:  
REGAINING AMERICA'S COMPETITIVE EDGE.

\*\*\*\*\*  
DIRECTORATE STAFF  
ASSIGNED: D. Allan Bromley ASSIGNED:

ACTION STAFF  
REQUIRED: AS APPROPRIATE ACTION:

\*\*\*\*\*  
SENDER'S DUE DATE:  
OSTP DUE DATE: 08/12/91 STAFF DUE DATE  
DATE COMPLETED: DATE COMPLETED/DEPT:

COPIES TO:

\*\*\*\*\*  
WHITE HOUSE TRACKING #: CONTACT PERSON:  
REMARKS: PHONE: EXT:

CLOSED

OSTP RECEIVED: 07/29/91 FILE: P-IND-ECONOMIC COMPETITIVENESS  
DEPT RECEIVED:

*KY*  
*What is this?*  
*a form letter*

*yes -*  
*see what*  
*Bill P. thinks*

*B Phillips: Does this*  
*require any action*  
*on DAB's part?*

*What is it?*  
*Danner*  
*7/31*

Danar,  
This is a retort  
trying to do his bit  
and, just incidentally,  
trying to get some  
high level endorsement - see  
last page.

DAD should not  
respond.

KOP

MS

As above, file

Sh



WILLIAM M. CALLAHAN  
PRESIDENT & FOUNDER

AMERICA'S PRIDE  
SUITE 111  
10028 MANCHESTER RD  
GLENDALE, MO 63122-1827  
314-821-8341



AMERICA'S PRIDE  
SUITE 111  
10028 MANCHESTER RD.  
GLENDALE, MO 63122-1827





2944  
*American Pride*

IS AMERICA'S FUTURE

RECEIVED

21 JUL 29 P 3: 54

July 23, 1991

OFFICE OF THE  
DIRECTOR

Mr. D. Allan Bromley  
The White House Office  
1600 Pennsylvania Avenue, NW  
Washington, DC 20500

Dear Mr. Bromley:

As a member of the Executive Office of the President, you can have a tremendous impact on the redirection of America's efforts to ensure America has the strengths and resources required to compete in today's fiercely competitive markets. It is imperative we take immediate action to improve America's position among its foreign counterparts.

America's Pride is a not-for-profit organization committed to building a coalition of leaders to effect the changes necessary to fortify the foundation for America's future.

The first phase of the awareness campaign is directed towards government, industry and labor leaders, the media and private citizens to enlist their support and commitment to our efforts. The campaign will emphasize the major areas of concern that must be addressed to develop a long-term approach to improve our competitive ability in the global marketplace. The attached fact sheets briefly describe the serious nature of the concerns affecting America's ability to compete.

You can play an important role in providing the leadership necessary to ensure America is a country with the strength and ability to forge into the future with the same dynamism and pride that made it a world leader only a generation ago.

Americans are entitled to the assurance that their country has the capability to provide the foundation for a secure economic future. Will history look upon us as a courageous people committed enough to making the needed sacrifices to ensure we regain our competitive edge? Signing and returning the enclosed card demonstrates your personal commitment to making that answer a resounding "YES".

Sincerely,



William M. Callahan  
President and Founder



#### AMERICA'S PRIDE MISSION STATEMENT

OUR MISSION IS TO INCREASE THE AWARENESS OF THE AMERICAN PUBLIC OF THE NEED FOR AMERICA TO IMPROVE ITS ABILITY TO COMPETE IN THE GLOBAL MARKETPLACE, AND TO INSTILL THE COMPETITIVE SPIRIT BACK INTO THE AMERICAN CULTURE.

BY ADDRESSING THE ISSUES AFFECTING AMERICA'S COMPETITIVENESS, WE CAN IMPROVE THE QUALITY AND PERCEPTION OF AMERICAN PRODUCTS AND SERVICES. PRIDE IN QUALITY PRODUCTS AND SERVICES CAN BECOME THE COMMON BOND THAT WILL UNITE AMERICANS FROM ALL WALKS OF LIFE AND ENABLE THE UNITED STATES TO REGAIN ITS COMPETITIVE EDGE AND CONTINUE TO AGGRESSIVELY COMPETE IN TODAY'S MARKET.

AN ECONOMICALLY SOUND COUNTRY CAN ENSURE THAT EACH AND EVERY AMERICAN IS AFFORDED THE OPPORTUNITY TO ATTAIN THE QUALITY OF LIFE TO WHICH THEY ARE ENTITLED. IMPROVING OUR COMPETITIVENESS IS A CRUCIAL STEP IN ENSURING A SECURE FUTURE FOR ALL AMERICANS.





BY NOW YOU MAY BE ASKING . . .

"Who is Bill Callahan, and why is he asking for my help?"

As a concerned citizen, husband, father and businessman, I feel a strong responsibility to do my part in making America the best it can be.

Since I can remember, I've had a deep sense of pride in my country. Deteriorating conditions over the past decade have been very disheartening to me. As far back as 10 years ago, I was moved to do a commentary on a local television program stating the need for America to improve the quality of American products and to develop a new sense of pride in our country.

Not a day has passed that I haven't thought there must be something I can do to reverse the downhill slide of America's competitiveness. I realized to really make a difference, I needed help - that's when America's Pride and you came into the picture. I concluded that if I could get the American people to pull together and combine their resources, there would be no problem we could not overcome.

I have invested hundreds of hours of my personal time and made a financial commitment to this cause for one reason and one reason only: My heartfelt and sincere interest in the future of America and its people. It's very distressing to see our great country losing ground to foreign competition; it is especially distressing to know we are letting it happen without making the effort to preserve what our parents and grandparents worked so hard to build.

But, no matter how distressing it may seem, I am still optimistic that we can turn things around; however, we must start today. We can no longer say, "There's always tomorrow." Tomorrow will be too late.



WILLIAM M. CALLAHAN  
PRESIDENT & FOUNDER

AMERICA'S PRIDE  
SUITE 111  
10028 MANCHESTER RD.  
GLENDALE, MO 63122-1827  
314-821-8341

*The first step to success is making a commitment.*

*By signing below and returning this card you can join the list  
of Americans who are committed to America's future.*

\_\_\_\_\_  
(Signature)

\_\_\_\_\_  
(Printed Name)





The attached information compiled from various sources highlights the areas where America must make an unprecedented commitment to reverse the current unfavorable trends. The material will address:

- |                   |                          |
|-------------------|--------------------------|
| * Competitiveness | * Technology             |
| * Productivity    | * Investment             |
| * Manufacturing   | * Research & Development |
| * Education       | * U.S. Deficits          |

There are many theories on the best approach to solving America's problems; but no matter which theory America adopts, it must be a long-term approach dedicated to insuring a better quality of life for all Americans.

The facts speak for themselves: To be more competitive in today's world economy, we must improve our productivity. Achieving a labor productive average increase of less than 1 percent a year is not acceptable in today's fiercely competitive markets; we must move back into the 2 to 3 percent range.

In manufacturing, revitalization is imperative for the industries that are fundamental to our ability to be competitive and that are the foundation of a strong economic system.

Education must take a broad approach to developing new strategies for improving America's educational system. We need to look at options such as, lengthening the school year, more stringent minimum requirements for graduates and increasing project/experimental learning.

And, of course, the U.S. federal deficit must be reduced. We cannot operate effectively under current conditions; Washington must take immediate action to demonstrate to the American people that the American government is in control of the situation. The uncertainty plays havoc on the economy - how can Americans have confidence in their government if that government cannot demonstrate the ability to manage its own affairs.

It is imperative we increase cooperation among leaders of government, industry, labor and the educational system to find solutions to our nation's problems.

After reviewing the enclosed information, I hope you, too, will be driven to make a personal commitment to becoming part of the solution. By signing and returning the enclosed card, you will be joining a coalition committed to building a stronger America.

# COMPETITIVENESS

## AMERICAN SAMURAI, WARRIOR FOR THE COMING DARK AGES OF AMERICAN BUSINESS

By William Lareau, New Win Publishing Inc.

American business is facing a crisis of incredible proportions. Unless we face some hard facts and deal with the coming disaster immediately, we will be lost as a world economic power. We will enter the Dark Ages of American business, unable to compete and cut off from world markets.

America is headed for a drastic reduction in the quality of life as a direct result of the escalating inability of American business to be competitive in the rapidly changing international marketplace. No longer can intelligent workers hide their heads in the sand and simply go blindly along for the ride. They won't like the destination. Business life and careers from now on will be zero-sum games (there's only so much to go around), with a decreasing sum and more players. Those who act as if things haven't changed since the 1950s will be the losers. Our future demands a new work credo and a new American worker--a warrior who will battle to hold off the coming Dark Ages and lead us to rebirth as the preeminent world economic power.

### WE'RE NOT NUMBER ONE ANYMORE

The data in the table below, which shows that eight of the world's top ten largest publicly held companies were Japanese, was shocking when it first appeared in 1987. Now such information is commonplace. The reaction has become, "So, what else is new?" What else is new is that it's getting worse every day. If we want to survive as an economic power, much less recover the number one spot, we had better do more than furrow our brows and turn on the television set (made in Japan, of course) to escape reality.

The ten largest publicly held companies in  
the world in 1987.\*

- 
1. Nippon Telegraph and Telephone (Japan)
  2. IBM (U.S.)
  3. Exxon (U.S.)
  4. Sumitomo Bank (Japan)
  5. Industrial Bank of Japan (Japan)
  6. Tokyo Electric Power (Japan)
  7. Nomura Securities (Japan)
  8. Dai-Ichi Kangyo Bank (Japan)
  9. Fuji Bank (Japan)
  10. Mitsubishi Bank (Japan)
- 

\*Parade Magazine, November 22, 1987



# COMPETITIVENESS

The situation hasn't gotten any better in the last three years. Listed below are the world's top 20 companies in terms of total market value. Thirteen of the 20 are Japanese (as are 43 out of the top 100). This is a pattern of almost complete domination. Whatever Japan is doing is working.

The world's top 20 companies in  
total market value in 1990.\*

| Rank | Company Name                   | Country      | Market value          |
|------|--------------------------------|--------------|-----------------------|
|      |                                |              | (billions of dollars) |
| 1.   | Nippon Telegraph & Telephone   | Japan        | 118.79                |
| 2.   | IBM                            | U.S.         | 68.89                 |
| 3.   | Industrial Bank of Japan       | Japan        | 67.71                 |
| 4.   | Royal Dutch/Shell Group        | Neth/Britain | 67.14                 |
| 5.   | General Electric               | U.S.         | 62.54                 |
| 6.   | Exxon                          | U.S.         | 60.00                 |
| 7.   | Sumitomo Bank                  | Japan        | 55.81                 |
| 8.   | Fuji Bank                      | Japan        | 53.17                 |
| 9.   | Toyota Motor                   | Japan        | 50.54                 |
| 10.  | Mutsui Taiyo Kobe Bank         | Japan        | 49.80                 |
| 11.  | Dai-Ichi Kangyo Bank           | Japan        | 49.57                 |
| 12.  | Mitsubishi Bank                | Japan        | 47.17                 |
| 13.  | AT&T                           | U.S.         | 46.96                 |
| 14.  | Sanwa Bank                     | Japan        | 45.60                 |
| 15.  | Tokyo Electric Power           | Japan        | 41.68                 |
| 16.  | Philip Morris                  | U.S.         | 39.11                 |
| 17.  | Hitachi Ltd                    | Japan        | 33.04                 |
| 18.  | Merck                          | U.S.         | 32.72                 |
| 19.  | Nomura Securities              | Japan        | 32.54                 |
| 20.  | Long-term Credit Bank of Japan | Japan        | 32.44                 |

\*Business Week, July 16, 1990

# PRODUCTIVITY

## U.S. PRODUCTIVITY PERFORMANCE

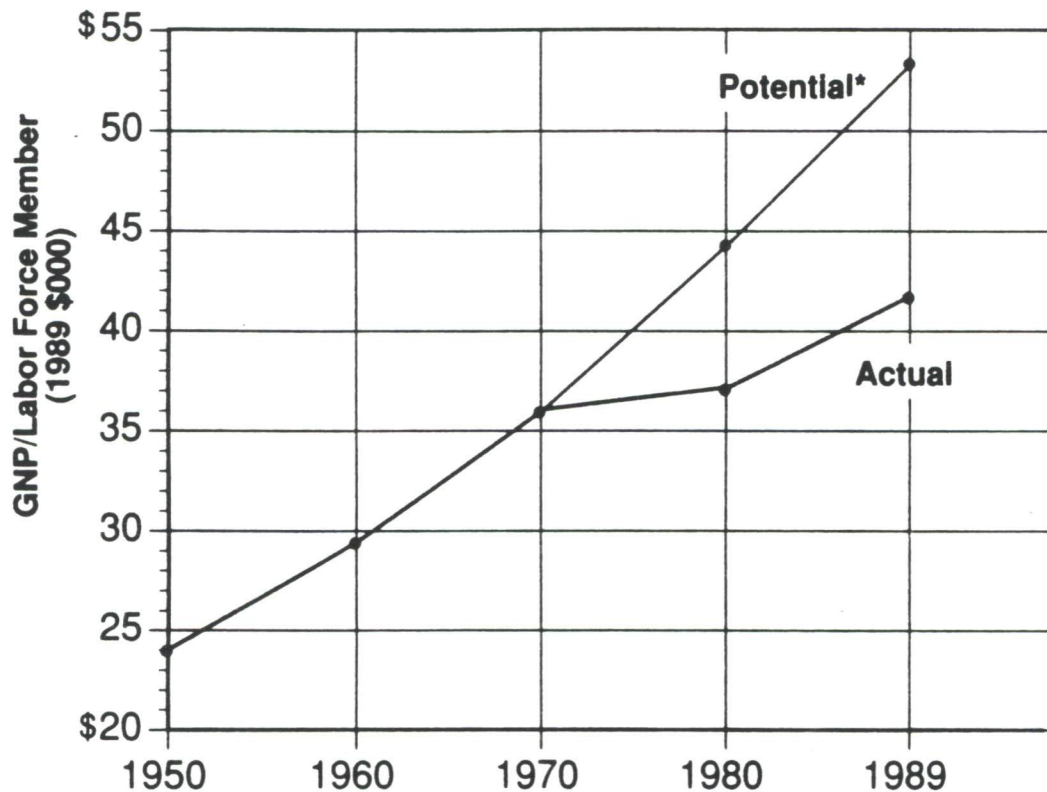
Perspectives '91; American Productivity & Quality Center

By Carl G. Thor

Following World War II, the United States was able to improve labor productivity at a steady 2 to 2.5 percent per year for more than 20 years. As international competition revived in many industries, the going became tougher and the labor productivity improvement rate began to slip to an overall average of less than 1 percent per year for the 1970-89 period. What this means for the average U.S. citizen is shown below.

If the productivity improvement rate of the 1950-70 period had continued for 1970-89, the 1989 Gross National Product per member of the labor force would have been \$53,337 in 1989 dollars. But the actual value was only \$41,686. The difference of \$11,651 is the amount of additional standard of living that each worker would have had in 1989 if the nation had taken productivity improvement seriously!

### Standard of Living, Actual and Potential



\* Potential: 1950-70 Growth Rate in GNP/Labor Force Member Applied Beyond 1970.  
Source: American Productivity & Quality Center



# PRODUCTIVITY

## INTERNATIONAL PRODUCTIVITY

Perspectives '91; American Productivity & Quality Center

By Carl G. Thor

The U.S. is still the world leader in gross domestic product (GDP) per employee if the currency translation basis used is purchasing power parity. With the U.S. 1989 level set at an arbitrary 100, the figure below shows the nearest competitor is Canada at 94. Most of Europe is in the 80's and Japan is almost 73. However, the productivity growth story is very different. Japan's growth rate in labor productivity over 1979-89 is 3.0 percent. The Europeans are around 2 percent. The United States is growing at only 1.1 percent.

If an extrapolation were made from 1989 levels using 1979-89 growth rates, France, Italy and Japan would all pass the U.S. in the first decade of the twenty-first century.

## INTERNATIONAL LABOR PRODUCTIVITY

(GDP/EMPLOYEE, PURCHASING POWER PARITY)

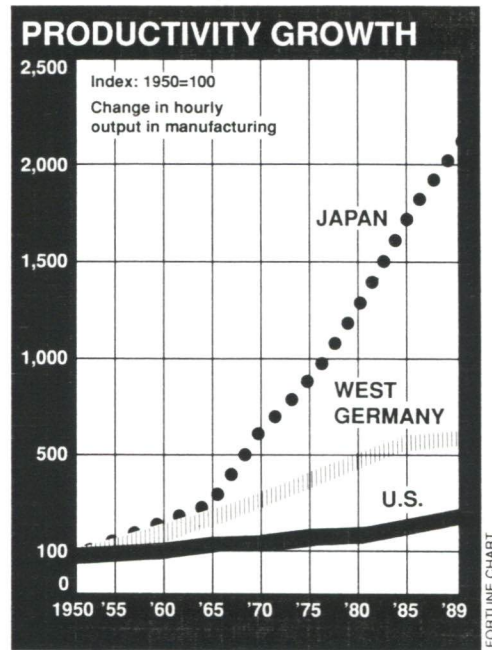
| <u>Country</u> | <u>1989 Level</u><br><u>(U.S. = 100)</u> | <u>Avg % Growth</u><br><u>1979-89</u> | <u>Hypothetical</u><br><u>Relative Levels*</u> |             |
|----------------|------------------------------------------|---------------------------------------|------------------------------------------------|-------------|
|                |                                          |                                       | <u>2000</u>                                    | <u>2010</u> |
| United States  | 100.0                                    | 1.1                                   | 100                                            | 100         |
| Canada         | 94.0                                     | 1.3                                   | 96                                             | 98          |
| France         | 85.9                                     | 2.0                                   | 95                                             | 103         |
| Italy          | 87.3                                     | 1.9                                   | 95                                             | 103         |
| West Germany   | 82.0                                     | 1.7                                   | 87                                             | 93          |
| United Kingdom | 71.5                                     | 1.8                                   | 77                                             | 83          |
| Japan          | 72.7                                     | 3.0                                   | 89                                             | 107         |
| Korea          | 39.8                                     | 5.2                                   | 62                                             | 92          |

\*Using 1979-89 Growth Rates

Source: Bureau of Labor Statistics

# PRODUCTIVITY

The following graph taken from Fortune; A New American Century, Spring/Summer 1991, illustrates America's productivity performance in relation to Japan and West Germany.



\* \* \* \* \*

## INTERNATIONAL PRODUCTIVITY

Perspectives '91; American Productivity & Quality Center

By Carl G. Thor

In the manufacturing sector (see figure below), the relative growth spreads are even larger. Japan has consistently improved manufacturing productivity at over 5 percent per year. The U.S. record is variable, over 3 percent in 1979-87, but only around 2 percent in 1973-79 and 1987-89. Most of Europe is again between the two in most years.

## INTERNATIONAL MANUFACTURING LABOR PRODUCTIVITY

(PERCENT GROWTH PER YEAR, OUTPUT PER HOUR)

| Country        | 1987-89 | 1979-87 | 1973-79 |
|----------------|---------|---------|---------|
| Japan          | 5.2     | 5.5     | 5.5     |
| United Kingdom | 5.2     | 4.7     | 1.2     |
| France         | 4.9     | 3.0     | 4.6     |
| West Germany   | 4.5     | 1.4     | 4.2     |
| Italy          | 2.8     | 4.2     | 5.7     |
| United States  | 2.1     | 3.4     | 1.6     |
| Canada         | 1.9     | 1.7     | 2.1     |

Source: Bureau of Labor Statistics



# MANUFACTURING

## COMPETING IN WORLD CLASS MANUFACTURING - AMERICA'S 21ST CENTURY CHALLENGE

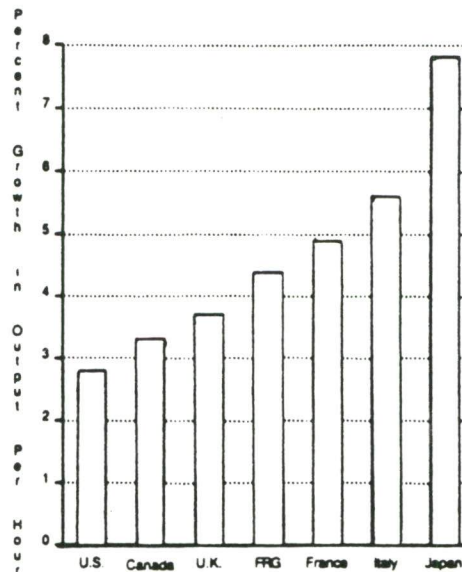
By T. Olson, C. Giffi, A. V. Roth and G. M. Seal  
Business One Irwin

The U.S. must regain a globally competitive position in manufacturing if it expects to maintain its current standard of living. To make matters worse, many U.S. business leaders are still unaware of the problem, unsure of how to address it, or unwilling to step up to the challenge. If they do not act soon, America's long-term future will be at risk. The United States could follow in the footsteps of England, declining from a position of industrial and economical leadership to a second-rate status among industrialized nations.

### THE WORLD SURPASSES AMERICAN MANUFACTURING

The U.S. real GNP growth is modest. Relative to the rest of the world, the rate of U.S. productivity growth had been declining. By 1988, annual productivity growth in manufacturing was smaller in the U.S. than in any of its global rivals. Japan, once ridiculed for cheap products and poor quality, became America's worst competitive nightmare. Alone among advanced industrial countries, Japan managed in the 1980s to combine great productivity growth in manufacturing with rising manufacturing employment, wages, benefits, and output (see chart below).

FIGURE 1-4 Average Annual Productivity Growth in Manufacturing-1960-1988



Source: U.S. Department of Labor, Bureau of Labor Statistics, "International Comparisons of Manufacturing Productivity and Labor Trends, 1988," June 1989, Table 1.

# MANUFACTURING

## AMERICAN SAMURAI, WARRIOR FOR THE COMING DARK AGES OF AMERICAN BUSINESS By William Lareau, New Win Publishing Inc.

The table below shows what has happened to the world market share of U.S. companies in basic industries between 1970-1987.

Changes in basic industry share, 1970-1987\*

| Industrial category         | Share of world market<br>held by U.S. companies |      |      |
|-----------------------------|-------------------------------------------------|------|------|
|                             | 1970                                            | 1987 | Loss |
| Black and white televisions | 65%                                             | 3%   | 62%  |
| Color televisions           | 90%                                             | 10%  | 80%  |
| Phonographs                 | 90%                                             | 1%   | 89%  |
| Ball bearings               | 87%                                             | 70%  | 17%  |
| Machining centers           | 95%                                             | 35%  | 60%  |
| Semiconductors              | 90%                                             | 64%  | 26%  |
| VCR                         | 10%                                             | 1%   | 9%   |
| Audio tape recorders        | 40%                                             | 1%   | 39%  |
| Telephone sets              | 97%                                             | 25%  | 72%  |

\*U.S. Department of Commerce data.

The VCR situation is the best of the list, with a loss of only 9%. Of course, we only had 10% to start with. It just goes to show you that one way to avoid being beaten badly is never to show up for the fight in the first place! As you can see, the situation in the automotive industry isn't unique; it's all too typical. American business has been beaten to the barroom floor of the world economy and is now being kicked into unconsciousness. Is there time to fight back and get up before a fatal blow is struck? Who can say? But we had better do something fast, both as individual American Samurai and as an economy as a whole, or we're finished as an industrial power of any consequence.

Things are looking even darker in the areas of advanced technology. The Japanese are poised to do the same thing to the computer industry that they're doing to the automotive industry. Japan already has the lead in such critical computer-related technologies as flat-panel displays, color flat-panel displays, CD-ROM (compact disk-read only memories) drives, erasable optical disk drives, key laser printer components, and tape-automated bonding.

A key element in manufacturing computer semiconductor chips, which is the basis of the entire industry, is stepping aligner equipment. The United States manufactured more than 90% of this equipment in 1979, compared with about 5% for the Japanese. The U.S. share had fallen to about 20% in 1988, whereas the Japanese share increased to more than 70%. More layoffs and plant closings, anyone?



# EDUCATION

## PRODUCTIVITY BRIEF, AMERICA'S THIRD DEFICIT: EDUCATION

By C. Jackson Grayson, Jr. and Carla S. O'Dell

America's economic pre-eminence is threatened by a deficit triad: the trade deficit, the budget deficit, and perhaps most dangerous of all, the education deficit.

Behind America's vibrant growth in the golden 50s and 60s was a deteriorating educational system.

First came the beeping of Sputnik, spotlighting the shortage of scientific and engineering skills. Then there was the downward trend in SAT scores.

Startling figures on "functional illiteracy" followed. Exact numbers are debated, but anywhere from 46 million to 60 million Americans - up to one third of American adults - can't function well in a literate economy.

The most shocking indictments have come in the past four years in a flurry of reports on deficiencies in content areas in primary and secondary schools. American students' low ranking on international comparison tests, low teacher pay, inadequate teacher skills, and more.

### EDUCATION AND COMPETITIVENESS

Education is directly linked to competitiveness. No society can have high quality outputs without having high quality inputs. Education provided "human capital" to combine with "physical capital" for increased productivity and quality.

One well-publicized area is the high rate of illiteracy in the U.S. The education system is not producing an educated citizenry nor a trained workforce.

"We are in a life and death struggle with the Japanese," one electronics industry corporate executive has said. "We try to employ high school graduates in our semiconductor plant, but they can't read or write. They don't understand simple graphs and all too often they can't add, subtract, or multiply numbers."

# EDUCATION

## RENEWING AMERICAN INDUSTRY: EDUCATIONAL WARNING SIGNALS

By Paul Lawrence and David Dyer

- \* An estimated 60 million people, one third of the entire U.S. adult population, are functionally illiterate.
- \* About 15 percent of recent graduates of urban high schools read at less than sixth grade level.
- \* In 1983-84, 16 percent of college freshmen were enrolled in remedial reading and 25 percent in remedial mathematics.
- \* The average achievement level of high school students on most standardized tests is lower than it was 26 years ago when Sputnik was launched.
- \* Illiteracy costs an estimated \$20 billion a year in welfare payments, jail costs, and lost productivity.
- \* Almost 90 percent of Japanese students finish high school, compared to 75 percent of American students--a dropout rate of one in four for the U.S., one in fourteen for Japan.
- \* Japanese students attend 240 days of instruction per year; Americans about 180. When a Japanese student completes high school, he or she has completed about four more years of school than an American high school graduate.
- \* In a fourteen-nation International Mathematics study of students in the eighth grade, Japan ranked number one and the U.S. ranked number twelve.
- \* The percent of U.S. doctoral degrees awarded to foreign students has risen steadily for many years. In 1984, 55 percent of all doctoral engineering degrees awarded in the U.S. were awarded to foreign students, along with 39 percent of those in mathematics and 37.5 percent of those in computer sciences.
- \* The U.S. graduated 67,000 engineers in 1982; Japan graduated 74,000. On a per capita basis, that's about twice the U.S. rate.



# EDUCATION

## THE DECLINE OF EDUCATION National Science Foundation

A strong national economy requires sustained growth in productivity. In today's competitive, interdependent worldwide marketplace, such growth is produced by scientific and technological innovation and by the ability to efficiently convert creative ideas into high-quality, marketable products.

The deterioration of our educational capabilities in math and science at all levels poses a fundamental threat to the ability of the nation to compete in the next century. The nation's elementary and secondary schools are simply not doing an adequate job of preparing students in the math and science skills necessary to compete in the job market of the future. The shortcoming in this educational "pipeline" will be made even worse by demographic trends. Finally, at the university level, there is a shortage of faculty in key scientific and technical fields, a shortage that will grow worse as the generation of technical faculty hired during the 1960's retires in the 1990's. Three years ago, the National Commission on Excellence in Education offered this assessment: "If an unfriendly foreign power had attempted to impose on America the mediocre educational performance that exists today, we might well have viewed it as an act of war."

### Student Achievement in Science

| <u>Fifth Grade</u> | <u>Ninth Grade</u> |
|--------------------|--------------------|
| 1. Japan           | 1. Hungary         |
| 2. Korea           | 2. Japan           |
| 3. Finland         | 3. Netherlands     |
| 4. Sweden          | 4. Canada          |
| 5. Hungary         | 5. Finland         |
| 6. Canada          | 6. Sweden          |
| 7. Italy           | 7. Korea           |
| <u>8. USA</u>      | 8. Poland          |
| 9. Australia       | 9. Norway          |
| 10. Norway         | 10. Australia      |
| 11. Poland         | 11. Italy          |
| 12. England        | 12. England        |
| 13. Singapore      | 13. Singapore      |
| 14. Hong Kong      | 14. Thailand       |
| 15. Philippines    | <u>15. USA</u>     |

# EDUCATION

## ILLITERACY IS ON RISE AMONG U.S. WORKERS, REPORT SAYS

By a Wall Street Journal Staff Reporter  
October 9, 1990

NEW YORK - U.S. companies will confront a big influx of illiterate or marginally literate workers in the 1990's, a new Conference Board report suggests.

As part of a continuing examination of work force trends, the Conference Board surveyed 163 large companies in a variety of industries. Nearly 20% of surveyed firms say they are having problems finding workers who read well enough for entry-level jobs. Almost 50% say that between 15% and 35% of their current employees aren't capable of handling more complex tasks, and 10% say that up to half of their current workers do not have the skills needed for promotion.

There appears little optimism for the near future. The report said nearly a quarter of students currently entering high school will not graduate, and those who do will be less literate than their counterparts a decade ago.

Despite these problems, few companies are preparing for the influx. More than 70% of the companies surveyed do not have formal procedures to test job candidates for reading and writing. And with a few notable exceptions, the report indicated widespread reluctance by firms to test their workers' literacy.

The report makes a series of recommendations, including the establishment of a universally accepted definition of literacy, a universal system of auditing workplace illiteracy and an increase in literacy programs sponsored by employer coalitions.



# TECHNOLOGY

## INTERNATIONAL PRODUCTIVITY

Perspectives '91; American Productivity & Quality Center

By Carl G. Thor

The issue of Japanese competitiveness is particularly urgent in the high-tech products that used to be the major strength of the U.S. The figure below presents the trends in market share of selected high-tech product categories. In aerospace, the U.S. remains dominant, but in computers and precisions equipment, where the U.S. was also strong, the Japanese strides are dramatic. The U.S. has also lost significant ground to the Japanese in machine tools, telecommunications equipment, and microelectronics.

### MARKET SHARE OF SELECTED HIGH-TECH EXPORTS

|                                | <u>U.S.</u> |             | <u>Japan</u> |             |
|--------------------------------|-------------|-------------|--------------|-------------|
|                                | <u>1980</u> | <u>1987</u> | <u>1980</u>  | <u>1987</u> |
| Microelectronics               | 18.3%       | 13.6%       | 13.2%        | 22.7%       |
| Computers                      | 38.6        | 24.6        | 4.3          | 17.4        |
| Telecommunications Equipment   | 10.9        | 8.3         | 10.3         | 29.5        |
| Aerospace                      | 47.6        | 45.2        | 0.6          | 0.8         |
| Machine Tools/Robots           | 14.1        | 11.7        | 11.3         | 20.9        |
| Scientific/Precision Equipment | 28.3        | 21.8        | 7.1          | 11.3        |
| Medical/Biological             | 11.4        | 10.6        | 2.2          | 2.6         |
| Organic Chemicals              | 13.9        | 11.7        | 6.3          | 7.3         |

Source: Central Intelligence Agency

\* \* \* \* \*

### DECLINING MARKET SHARE OF U.S. HIGH-TECH INDUSTRIES

The following chart from the Council on Competitiveness illustrates the declining market share of U.S. high-tech industries.

|                | 1980 | 1988 |
|----------------|------|------|
| Fiber optics   | 73%  | 42%  |
| Semiconductors | 60%  | 36%  |
| Supercomputers | 100% | 76%  |
| DRAMS*         | 56%  | 20%  |
| Machine Tools  | 18%  | 7%   |

\*Dynamic Random Access Memory

# TECHNOLOGY

## JAPAN COULD SURPASS THE U.S. IN OUTPUT OF ELECTRONICS SOON, NEW REPORT SAYS

By Eduardo Lachica, The Wall Street Journal  
June 11, 1990

WASHINGTON - In its bleakest report yet on the competitiveness of the U.S. electronics industry, the Commerce Department said Japan could surpass the U.S. in production of electronic goods by the early 1990's.

"Except for software and medical equipment, the U.S. has been losing market share in all products since 1984," said John McPhee, director of the department's office of computers and business equipment and a co-author of the report. Although the U.S. still leads the world with more than \$180 billion in annual output of electronic goods, Japan could spurt ahead by 1994 if the current trend continues, the report said.

Moreover, Japan outspends the U.S. in X-ray lithography, the most promising method for printing the multibillion-transistor memories of the future, the report says.

In 1987, the latest year for which reliable global-trade figures are available, Japan already led the world in electronic exports with shipments valued at \$38 billion. The U.S. trailed with \$35 billion in exports, followed by the European Community with shipments of \$26 billion.



# INVESTMENT

## ARE WE EATING OUR SEED CORN?

Critics claim that G.E. and others miss opportunities by buying back their stock. Would developing new products be wiser?

By John Holusha, May 13, 1990

Many economists, scholars, executives and other experts on American industrial policy say that financial engineering of this sort is often indicative of short-term thinking and a lack of confidence. They say it is sapping the nation's global competitiveness.

Rather than buying stock, they say, chief executives like Mr. Welch should be investing in new products and processes to keep home-grown inventions from being wrested away by more efficient producers abroad. They should be plowing money into leading-edge technologies and into basic research to develop products not even imagined today.

Otherwise, companies in Europe and Asia will surpass the United States, as they have done in consumer electronics, machine tools and semiconductors. And that could endanger America's wealth. "If we are not willing to get to a long-term orientation, we are going to lose one strategic industry after another, and that has implications for our standard of living," said Representative Mel Levine, a Democrat from California.

Corporate America's preoccupation with quarterly results emerged as a serious irritation in the 1980's. But some experts believe the 90's may provide an opportunity for change. Hostile takeovers and "junk bond" financing, which drove companies to keep their stock prices aloft to avoid being a target of predators, have fallen out of flavor. And institutional investors, politicians, economists and the industries themselves are stepping forward with their pet incentives for change.

But the remedies will need to be potent. Industrial America, some experts believe, has lost its vision and nerve. "Deep down, there is a defeatist attitude in this country about manufacturing," said Andrew Grove, the president of Intel Inc., a world leader in computer chip manufacturing. "Part of the justification process for investments includes figuring out how to compete with the Japanese. There have been few success stories."

Perhaps nothing is more symptomatic of this malaise than the growing popularity of stock repurchases. "The attitude is to throw up their hands," said Michael Borrus, a professor at the University of California at Berkeley. "They figure, 'If I cannot compete, at least I can boost my stock price'."

# INVESTMENT

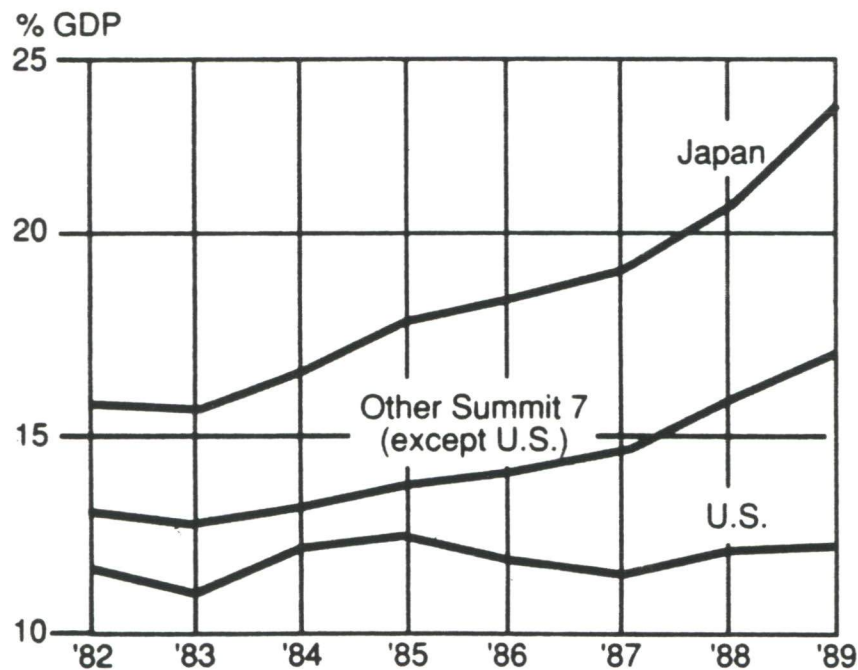
## INTERNATIONAL PRODUCTIVITY

Perspectives '91; American Productivity & Quality Center

By Carl G. Thor

Private industry investment in plant and equipment is showing amazing strides in the past few years in Japan (see chart below). With Japan's current stock market and land value declines, this number may be peaking for Japan in 1989. But it is still very far above Europe and the U.S. The absolute value of Japan's investments now exceeds that of the U.S. even though the U.S. has twice the GNP!

### Private Industry Expenditure on Plant and Equipment

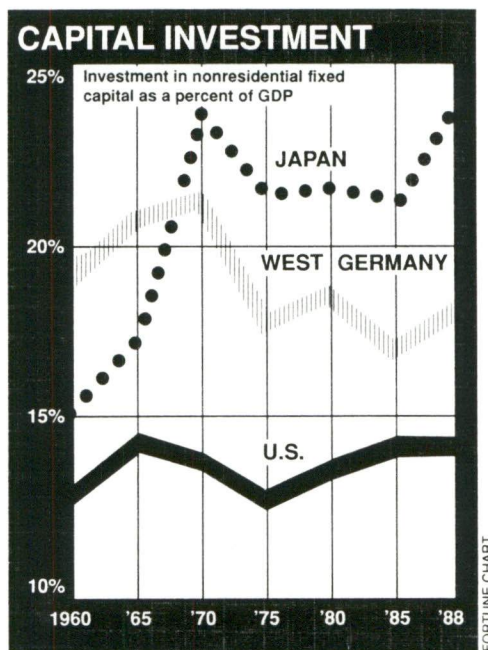


Source: Council on Competitiveness and OECD



# INVESTMENT

The graph below taken from Fortune; A New American Century, Spring/Summer 1991, illustrates the gap in capital investment between America, Japan and West Germany.



# RESEARCH & DEVELOPMENT

## RESEARCH & DEVELOPMENT SPENDING GROWTH IS DOWN TO A CRAWL

Business Week, August 21, 1989

Data Resources, a McGraw-Hill Inc. unit, attributes the ongoing slump in R&D spending to business' continuing obsession with short-term profits, a trend that has been fostered by the merge and acquisition boom, rising debt burdens, and persistently high real interest rates. Yet, note economists, research studies suggest that after a few years, R&D investment produces annual returns of about 20% for the initial investors -- plus another 25% that accrues to society as a whole as new technology and other advances spill over the rest of the economy. Indeed, DRI's economic model indicates that a permanent 1% reduction in the growth rate of real R&D investment eventually leads to a 0.85% cut in the economy's potential growth rate.

\* \* \* \* \*

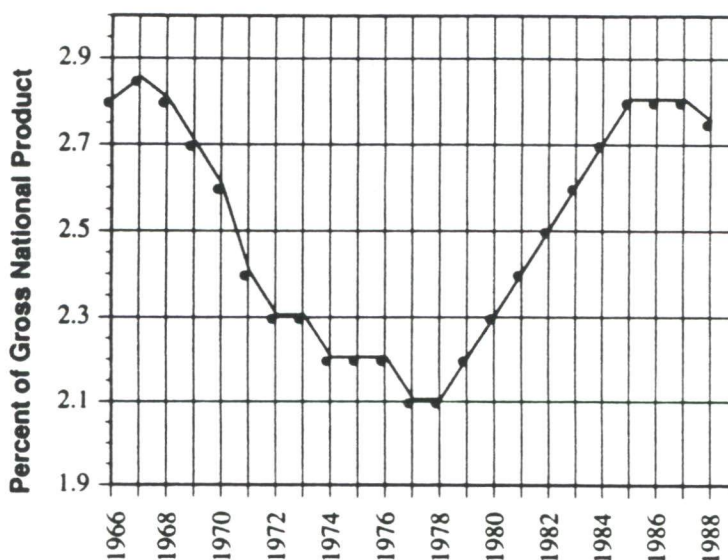
### INTERPRETING U.S. PERFORMANCE

Perspectives '91; American Productivity & Quality Center

By Carl G. Thor

R&D has recovered from the late 70's neglect, but it is still not at a world-class level, especially in non-defense industries (see chart below).

### U.S. Research and Development, 1966-1988



Source: National Science Foundation



# U.S. DEFICIT

## U.S. DEFICIT FOR 1990 SURGED TO NEAR-RECORD \$220.4 BILLION

By Louis Uchitelle, The Wall Street Journal

While the prospect of \$200-billion-plus deficits is scaring Congress and the White House into working out a record deficit-reduction package, economists say the huge number suggests more damage to the economy and to the well-being of Americans than has actually occurred.

They argue, for example, that the deficit is temporarily overstated because of the savings and loan bailout. What's more, they say, the deficit is still manageable; in fact, not much more of a burden than a \$3,000 a month mortgage is to a family earning \$85,000 a year. The problem is that the deficit, the mortgage, is rising, and the national income isn't.

That makes the deficit equal to 4 percent of the G.N.P., roughly the annual average for the 1980's, but well below the 2 percent or less that prevailed from 1950 until 1975, when the deficit suddenly shot up to 3.5 percent of G.N.P and became a national issue.

\* \* \* \* \*

## INTERNATIONAL MONETARY FUND FORECASTS

The following information compiled by the International Monetary Fund compares real GNP increases, inflation and the trade balance of the U.S., Japan and West Germany.

|                 | Real GNP, %<br>increase over<br>previous year |     |     | Inflation<br>% |     |     | Current-<br>balance,<br>\$bn |        |        |
|-----------------|-----------------------------------------------|-----|-----|----------------|-----|-----|------------------------------|--------|--------|
|                 | 1988                                          | 89  | 90  | 88             | 89  | 90  | 88                           | 89     | 90     |
| U.S.            | 4.4                                           | 2.9 | 2.1 | 3.3            | 4.5 | 4.6 | -126.5                       | -125.1 | -138.7 |
| Japan           | 5.7                                           | 4.9 | 4.7 | 0.4            | 1.8 | 1.3 | 79.6                         | 72.0   | 89.7   |
| West<br>Germany | 3.6                                           | 4.0 | 3.0 | 1.5            | 2.5 | 2.5 | 48.6                         | 53.4   | 56.8   |

# U.S. DEFICIT

## INTERPRETING U.S. PERFORMANCE

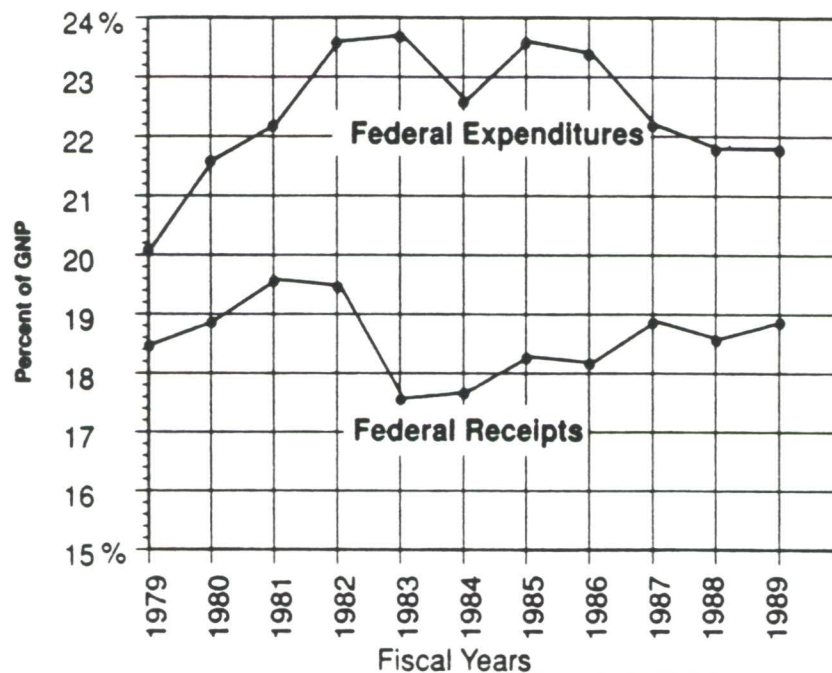
Perspectives '91; American Productivity & Quality Center

By Carl G. Thor

Everything is related to everything else, or so the economists seem to say. But at least everything is related to the dual deficits--federal budget and trade. The chart below presents the federal deficit as a percent of GNP. The receipts part is fairly flat for the last decade and is lower for 1989 than for the peak of 1981-82. But expenditures have not been constrained to fit within or even near the receipts. A steady climb to the mid 80's has been followed by three years of comparative restraint, but the banking crisis and Mideast military activity will now send expenditures up again.

U.S. citizens' personal savings have been insufficient to make up the budget deficit; thus the U.S. has become dependent on willing foreign investors to provide the shortfall. These foreign investors are not being charitable. They need an acceptable interest rate given their assessment of the risks involved. We now find ourselves in the position of needing more foreigners to fill the deficit with a higher risk premium needed due to our questionable banks and political discipline. This dictates a higher interest rate, which is emphatically not what is needed as the nation slips into recession!

### Federal Receipts and Expenditures as Percent of GNP



Source: Department of Commerce



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Governor John Engler  
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Governor Bob Miller  
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Governor Barbara Roberts  
Governor Charles 'Buddy' Roemer  
Governor Roy R. Romer  
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Congressman Newt Gingrich  
Congressman William H. Gray  
Congressman Robert H. Michel

"CORRESPONDENCE TRACKING"

TYPE: INFORMATION

DOCUMENT NUMBER: 9122651

ORIGINATOR: 02

STATUS C

DIRECTORATE STATUS

\*\*\*\*\*

FROM: WHEELER, Daniel S.: THE AMERICAN LEGION MAGAZINE

TO: DR. D.A. BROMLEY

DATE OF  
CORRESPONDENCE: 07/19/91

SUBJECT: A THANK YOU FOR GRANTING THE MAGAZINE AN INTERVIEW,  
"HI-TECH: CAN AMERICA MAINTAIN ITS EDGE?" AND COPIES  
OF THE ISSUE.

\*\*\*\*\*  
DIRECTORATE STAFF  
ASSIGNED: ASSIGNED:

ACTION STAFF  
REQUIRED: ACTION:

\*\*\*\*\*  
SENDER'S DUE DATE:  
OSTP DUE DATE: STAFF DUE DATE  
DATE COMPLETED: DATE COMPLETED/DEPT:

\*\*\*\*\*

COPIES TO: D. Allan Bromley  
Sarah Keegan  
INDUSTRIAL

\*\*\*\*\*

WHITE HOUSE TRACKING #: CONTACT PERSON:  
PHONE: EXT:  
REMARKS: *Enclosures to all.*

**CLOSED**

OSTP RECEIVED: 07/23/91  
DEPT RECEIVED:

FILE: P-DAB-EDITORIAL\*P-IND-ECON COM





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OFFICE OF THE PUBLISHER/EDITOR IN CHIEF

July 19, 1991  
97-7

The Honorable D. Allan Bromley  
Assistant to the President  
Office of Science & Technology Policy  
Old Executive Office Building  
17th & Pennsylvania Streets, N.W.  
Washington, D.C. 20506

Dear Mr. Bromley:

Enclosed are three copies of our most recent issue containing your interview, "Hi-Tech: Can America Maintain Its Edge?," which was conducted by James N. Sites. We're sure our readers will find it most informative.

Thank you for taking time from your busy schedule to grant us the interview, and please extend our appreciate to your staff for their cooperation in getting all the material finalized.

Sincerely yours,

DANIEL S. WHEELER  
Editor in Chief

Enclosures (3)

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DIRECTOR

91 JUL 23 P 2:45

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THE AMERICAN  
**LEGION**

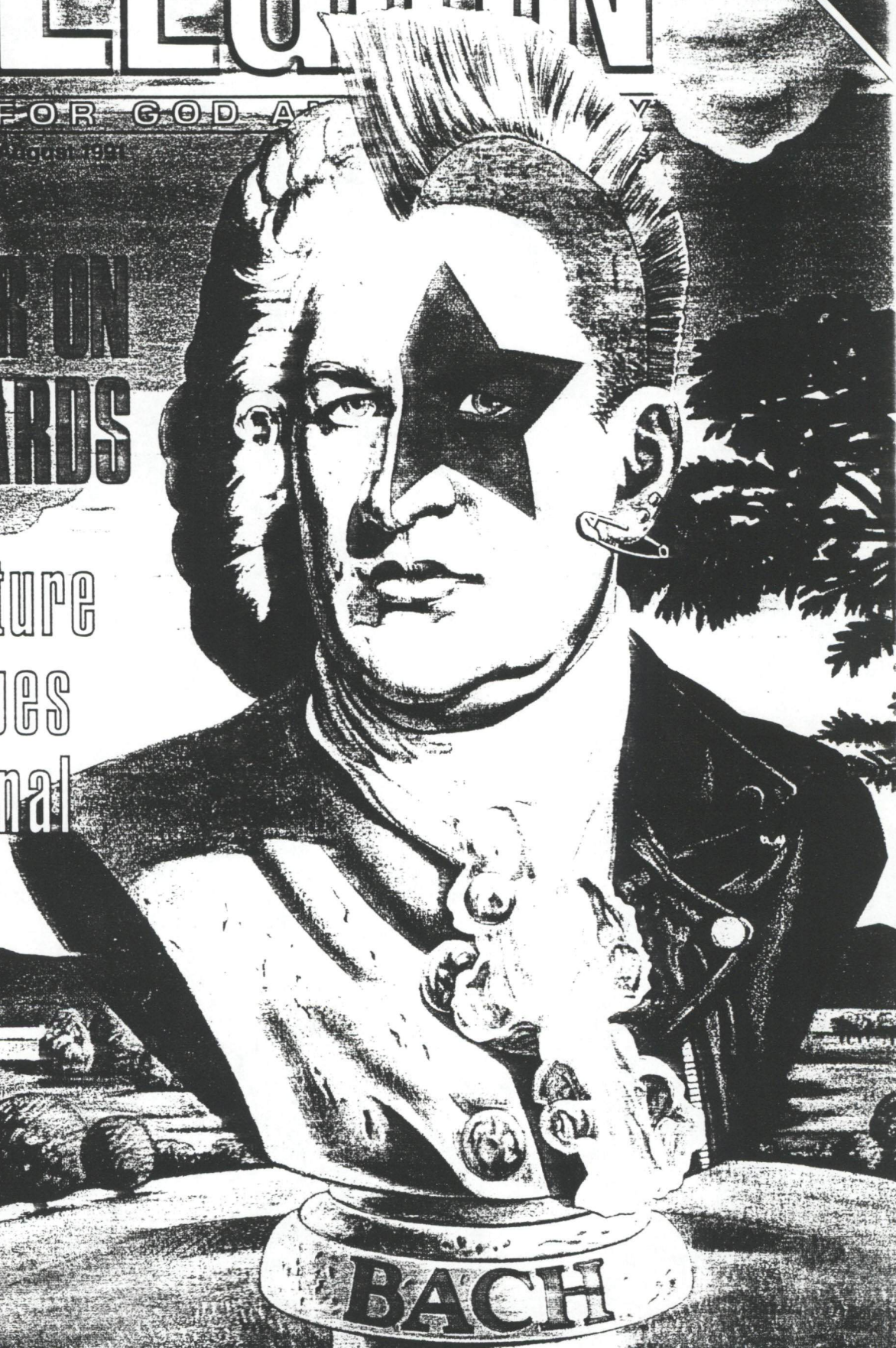
FOR GOD AND COUNTRY

August 1992

1992  
VA BUDGET  
Page 18

**THE WAR ON  
STANDARDS**

Pop Culture  
Challenges  
Traditional  
Values





"CORRESPONDENCE TRACKING"

TYPE: ACTION DOCUMENT NUMBER: 9122056  
ORIGINATOR: 02 STATUS I DIRECTORATE STATUS  
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FROM: BALESTRERO, Gregory: INSTITUTE OF INDUSTRIAL ENGINEERS

TO: DR. D.A. BROMLEY

JUL 11 1991

DATE OF  
CORRESPONDENCE: 07/03/91

SUBJECT: AN OFFER OF COOPERATION AND ASSISTANCE OF THE  
INSTITUTE OF INDUSTRIAL ENGINEERS IN DR. BROMLEY'S  
ROLE AS SCIENCE ADVISOR.

\*\*\*\*\*  
DIRECTORATE STAFF  
ASSIGNED: INDUSTRIAL ASSIGNED:

ACTION STAFF  
REQUIRED: AS NECESSARY ACTION:

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SENDER'S DUE DATE:  
OSTP DUE DATE: 07/25/91 STAFF DUE DATE  
DATE COMPLETED: DATE COMPLETED/DEPT:

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COPIES TO: D. Allan Bromley

\*\*\*\*\*  
WHITE HOUSE TRACKING #: CONTACT PERSON:  
PHONE: EXT:

REMARKS: *Dr. P. wrote letter for DAB's signature. 7/22.*

**CLOSED**

OSTP RECEIVED: 07/11/91 FILE: P-INDUSTRIAL-CRITICAL TECH.  
DEPT RECEIVED:

THE WHITE HOUSE  
WASHINGTON

July 23, 1991

Dear Dr. Balestrero:

Many thanks for the kind comments on our meeting of June 25. My Associate Directors and I considered it a privilege to meet with you and your colleagues and to exchange views on issues that we both consider important.

I am very aware of the key role played by industrial engineers in the product delivery cycle. I fully expect to call on IIE as appropriate issues arise.

Sincerely,

A handwritten signature in black ink, appearing to read "D. Allan Bromley". The signature is fluid and cursive, with the first name "D. Allan" and the last name "Bromley" clearly distinguishable.

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

Dr. Gregory Balestrero  
Executive Director  
Institute of Industrial Engineers  
P.O. Box 6150  
Norcross, GA 30091-6150





## INSTITUTE OF INDUSTRIAL ENGINEERS

HEADQUARTERS: 25 TECHNOLOGY PARK / ATLANTA, NORCROSS, GEORGIA 30092 (404) 449-0480  
MAILING ADDRESS: P.O. BOX 6150, NORCROSS, GEORGIA 30091-6150, USA FAX #404-263-8532

2052  
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ALL: 27

GREGORY BALESTRERO  
EXECUTIVE DIRECTOR

OFFICE OF THE  
DIRECTOR

July 3, 1991

D. Allan Bromley, Director  
Office of Science and Technology Policy  
358 Old Executive Office Building  
17th & Pennsylvania Avenue, NW  
Washington, DC 20506

Dear Dr. Bromley:

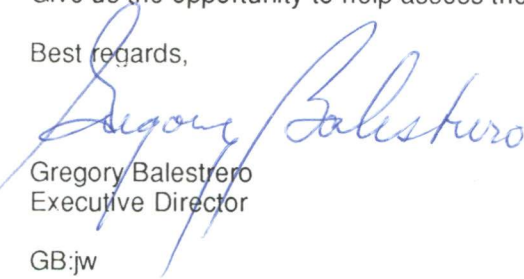
Many thanks for your contribution to the 1991 Convocation of Professional Engineering Societies held at the National Academy of Engineering on Tuesday, June 25. Your candid remarks and evident clear vision were not only refreshing but encouraging. Never before have I felt that the President had an advisor who understood the critical scientific and technical issues challenging the future of the United States.

I am writing to you to offer the cooperation and assistance of the Institute of Industrial Engineers in your difficult role as Presidential advisor. As you are aware, industrial engineers are key players in organizational change to make companies more responsive to technological change and consumer demand, in short, reducing the time to go from theory to practice, giving the company the edge over their competitor.

The contributions made by IE's in TQM, concurrent engineering, system simulation, and design for manufacturing and assembly are documented and well known. In particular, IE's are best noted for their keen and unique skill to best utilize and motivate employees at all levels within an organization. It is in these critical areas where we would like to offer our help. More than half of the critical technologies addressed by the National Critical Technologies Panel are mainstream to Industrial Engineers. Yet, we were not called upon as a Private Sector Organization to help.

Give us the opportunity to help assess the critical technology issues facing the U.S. in the future.

Best regards,

  
Gregory Balestrero  
Executive Director

GB:jw

cc: Myron Wilson  
D. Scott Sink  
James Tompkins  
Leland Blank

"CORRESPONDENCE TRACKING"

TYPE: INFORMATION DOCUMENT NUMBER: 9121964  
ORIGINATOR: 02 STATUS C DIRECTORATE STATUS  
\*\*\*\*\*

FROM: KUHN, Thomas R.: EDISON ELECTRIC INSTITUTE

TO: DR. D.A. BROMLEY

DATE OF  
CORRESPONDENCE: 06/28/91

SUBJECT: THE LETTER EXPRESSES THE APPRECIATION OF THE  
ELECTRIC UTILITY INDUSTRY AND THOMAS KUHN STATES  
THAT HE LOOKS FORWARD TO SEEING DR. BROMLEY.

\*\*\*\*\*  
DIRECTORATE STAFF  
ASSIGNED: ASSIGNED:

ACTION STAFF  
REQUIRED: ACTION:

\*\*\*\*\*  
SENDER'S DUE DATE:  
OSTP DUE DATE: STAFF DUE DATE  
DATE COMPLETED: DATE COMPLETED/DEPT:

\*\*\*\*\*  
COPIES TO: D. Allan Bromley  
INDUSTRIAL  
Steve Olson

\*\*\*\*\*  
WHITE HOUSE TRACKING #: CONTACT PERSON:  
PHONE: EXT:  
REMARKS:

OSTP RECEIVED: 07/02/91 FILE: p- INDUSTRIAL-ECONOMIC COMP.  
DEPT RECEIVED:



701 Pennsylvania Avenue, N.W.  
Washington D.C. 20004-2696  
Telephone 202-508-5555



**EDISON ELECTRIC  
INSTITUTE**

THOMAS R. KUHN  
President

June 28, 1991

The Honorable Allan Bromley  
Assistant to the President for  
Science and Technology  
The White House  
Washington, D.C. 20500

Dear Allan:

I recently had the pleasure of reading a short piece about you in Fortune magazine's special edition, "The New American Century."

Most impressive, and I am sure an honor to be featured with individuals who have contributed greatly to keeping America competitive. The electric utility industry certainly appreciates and values the emphasis this Administration has placed on science and technology, not to mention your personal contributions.

I look forward to the opportunity of seeing you soon.

Sincerely,

Thomas R. Kuhn

TRK:sfk

THE WHITE HOUSE  
WASHINGTON

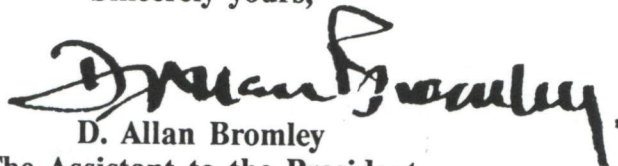
July 9, 1991

Dear Dr. Kuhn:

Many thanks for your warm note of June 28. I would certainly look forward to the possibility of chatting with you, because as an old utility director of many years standing, and as a former member of the Scientific Advisory Board of the Electric Power Research Institute in Palo Alto, I am sure that we have a number of mutual friends and are concerned about a number of the same problems. I will be out of the country for the week of the 15th of July and will be fairly well tied up for the last week in July. Perhaps if you were to call my office we might be able to arrange a mutually convenient time during the first two weeks of August. During the last two weeks I will again be out of the country. My telephone number here is 202/456-7116 and my appointment secretary is Ms. Marian Nida.

I shall look forward to hearing from you and to getting together. With all best wishes,

Sincerely yours,

A handwritten signature in dark ink, appearing to read "D. Allan Bromley". The signature is fluid and cursive, with a large initial "D" and a long, sweeping underline.

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

Dr. Thomas R. Kuhn  
Edison Electric Institute  
701 Pennsylvania Avenue, N.W.  
Washington, D.C. 20004-2696





EDISON ELECTRIC  
INSTITUTE

THOMAS R. KUHN  
President

June 28, 1991

The Honorable Allan Bromley  
Assistant to the President for  
Science and Technology  
The White House  
Washington, D.C. 20500

Dear Allan:

I recently had the pleasure of reading a short piece about you in Fortune magazine's special edition, "The New American Century."

Most impressive, and I am sure an honor to be featured with individuals who have contributed greatly to keeping America competitive. The electric utility industry certainly appreciates and values the emphasis this Administration has placed on science and technology, not to mention your personal contributions.

I look forward to the opportunity of seeing you soon.

Sincerely,

A handwritten signature in blue ink, appearing to read 'Tom', is written above the printed name.

Thomas R. Kuhn

TRK:sfk

"CORRESPONDENCE TRACKING"

TYPE: ACTION

DOCUMENT NUMBER: 9121433

\*\*\*\*\*

FROM: COUNCIL ON COMPETITIVENESS

TO: DR. BROMLEY

DATE OF  
CORRESPONDENCE: 05/13/91

SUBJECT: REQUEST TO SERIOUSLY CONSIDER THE RECOMMENDATIONS  
CONTAINED IN THE COUNCIL'S NEW REPORT, " GAINING NEW  
GROUND: TECHNOLOGY PRIORITIES FOR AMERICA'S FUTURE".

\*\*\*\*\*

ASSIGNED TO: INDUSTRIAL

ACTION REQUIRED: FOR DAB SIGNATURE

\*\*\*\*\*

SENDER'S DUE DATE:

OSTP DUE DATE:

05/29/91

DATE COMPLETED:

--6/5/91--

\*\*\*\*\*

COPIES TO: D. Allan Bromley

\*\*\*\*\*

WHITE HOUSE TRACKING #:

CONTACT PERSON:

REMARKS:

DATE RECEIVED: 05/15/91

P-  
FILE: INDUSTRIAL TECHNOLOGY -  
ECONOMIC COMPETITIVENESS



9121433

# Council on Competitiveness

May 13, 1991

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91 MAY 15 AM 11:58

OFFICE OF THE  
DIRECTOR

The Honorable D. Allan Bromley  
Assistant to the President for  
Science and Technology Policy  
The White House  
Washington, DC 20500

To the Honorable D. Allan Bromley:

We are writing you in our role as National Affiliates of the Council on Competitiveness to urge that you consider seriously the recommendations contained in the Council's new report, Gaining New Ground: Technology Priorities for America's Future.

This report is the result of a two-year effort by top technology experts around the country to identify the critical generic technologies driving America's economic performance. It asks one basic question: Do our current national policies and priorities adequately address the commercial technology challenge facing the United States? It concludes that they do not and warns that unless America shores up its technological strength in the decade ahead, U.S. jobs, standard of living and, ultimately, national security will be at risk.

Gaining New Ground spells out where we are ahead, where we are behind and, more importantly, what we as a nation must do to strengthen our technological leadership. It represents the first time that the U.S. private sector has reached a consensus on these issues. In addition to proposals for industry and universities, the report spells out four recommendations for government action:

- o Make research on generic industrial technology a national R&D priority;
- o Create a U.S. economic climate more conducive to manufacturing, innovation and investment in technology;
- o Communicate the priority of technology and competitiveness to the American public and involve key policymaking bodies more closely in the issue; and
- o Develop policies and programs to ensure that America has a world-class technology infrastructure.

Each of these recommendations is backed up with discussion of specific government programs and policies that can make a difference. We urge you to consider them carefully in your deliberations of U.S. science and technology policies.

Sincerely,

William Laidlaw, Jr.  
Executive Vice President  
**American Assembly of Collegiate  
Schools of Business**

Richard S. Nicholson  
Executive Officer  
**American Association for the  
Advancement of Science**

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Robert Clodius  
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Edward A. Miller  
Executive Director  
National Center for  
Manufacturing Sciences

# ABOUT THE COUNCIL

Founded in 1986, the Council on Competitiveness is a nonprofit, nonpartisan organization of chief executives from business, higher education and organized labor who have joined together to pursue a single overriding goal: to improve the ability of American companies and workers to compete more effectively in world markets.

To build consensus within the public- and private-sectors on the actions needed to help Americans compete, the Council pursues a three-part agenda: increase public awareness of the breadth and severity of America's economic problems; mobilize the political will required to set the United States on a positive economic

course; and assist in the development of specific public policies and private-sector initiatives. To that end, the Council focuses on issues in the areas of fiscal policy, science and technology, international economics and trade, and human resources.

The Council is governed by an executive committee and draws on the resources of its national affiliates — more than two dozen trade associations, professional societies and research organizations — to help analyze issues and develop consensus. The Council is privately supported through contributions from its members, foundations and other granting institutions.

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**Edgar Woolard**  
DuPont Company

**Joe B. Wyatt**  
Vanderbilt University

**Charles E. Young**  
University of California at Los Angeles

**James H. Zumberge**  
University of Southern California, University Park

THE WHITE HOUSE  
WASHINGTON

June 6, 1991

Dear Affiliates:

Thank you for your letter of May 13th regarding the Council on Competitiveness report Gaining New Ground: Technology Priorities for America's Future.

It is important and significant that individuals of the private sector, and of the caliber of those involved in the Council's study, invest the time and effort to address the national competitiveness issues that, as citizens, concern all of us. I consider the Council's analysis and recommendations to be a significant contribution to reaching a national consensus on appropriate industry, university and government roles in achieving our national goals.

Sincerely,

A handwritten signature in dark ink, reading "D. Allan Bromley". The signature is fluid and cursive, with the first name "D. Allan" and last name "Bromley" clearly distinguishable.

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

National Affiliates of the  
Council on Competitiveness  
900 17th Street, N.W.  
Suite 1050  
Washington, D.C. 20006



"CORRESPONDENCE TRACKING"

TYPE: INFORMATION

DOCUMENT NUMBER: 9121358

\*\*\*\*\*

FROM: WATKINS, James D.: THE SECRETARY OF ENERGY

TO: DR. BROMLEY

DATE OF  
CORRESPONDENCE: 05/07/91

SUBJECT: MEMORANDUM FOR THE HONORABLE NICHOLAS F. BRADY, RE:  
THE ECONOMIC POLICY COUNCIL WORKING GROUP ON SCIENCE  
AND TECHNOLOGY

\*\*\*\*\*

ASSIGNED TO:

ACTION REQUIRED:

\*\*\*\*\*

SENDER'S DUE DATE:

OSTP DUE DATE:

DATE COMPLETED:

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\*\*\*\*\*

COPIES TO: D. Allan Bromley  
INDUSTRIAL

\*\*\*\*\*

WHITE HOUSE TRACKING #:

CONTACT PERSON:

REMARKS:

DATE RECEIVED:

FILE: INDUSTRIAL-ECONOMY *COMPETITIVENESS*



9121358

**The Secretary of Energy**  
Washington, DC 20585

May 7, 1991

RECEIVED

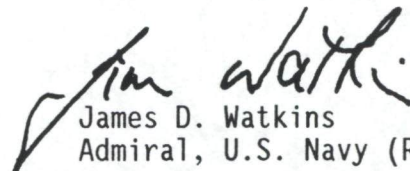
91 MAY 7 P5:14

OFFICE OF THE  
DIRECTOR

MEMORANDUM FOR THE HONORABLE NICHOLAS F. BRADY  
SECRETARY OF THE TREASURY

SUBJECT: Economic Policy Council Working Group on  
Science and Technology

Thank you for inviting representation from the Department of Energy on the Economic Policy Council Working Group on Science and Technology. Linda G. Stuntz, Deputy Under Secretary for Policy, Planning, and Analysis, will serve as the Department's representative to the Working Group, with support from the Department's technical organizations as appropriate.

  
James D. Watkins  
Admiral, U.S. Navy (Retired)

cc: The Honorable D. Allan Bromley



"CORRESPONDENCE TRACKING"

TYPE: ACTION

DOCUMENT NUMBER: 9121289

\*\*\*\*\*

FROM: LEES, Francis A,: ST. JOHN'S UNIVERSITY

TO: DR. BROMLEY

DATE OF  
CORRESPONDENCE: 04/28/91

SUBJECT: FOUR REQUESTS REGARDING TECHNOLOGY AND INDUSTRIAL  
COMPETITIVENESS.

\*\*\*\*\*

ASSIGNED TO: INDUSTRIAL

ACTION REQUIRED: COMPLETE REQUESTS  
#3 AND #4.

\*\*\*\*\*

SENDER'S DUE DATE: OSTP DUE DATE: 05/15/91

DATE COMPLETED:

*4/5/91 sent copies jef.*

\*\*\*\*\*

COPIES TO: ADMINISTRATION

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WHITE HOUSE TRACKING #:

CONTACT PERSON:

REMARKS: Requests #1 and #2 will be completed and sent under separate  
cover.

DATE RECEIVED: 05/01/91

FILE: INDUSTRIAL - Economic  
Competitiveness

**St. John's University**  
GRAND CENTRAL AND UTOPIA PARKWAYS  
JAMAICA, NEW YORK 11439

RECEIVED

COLLEGES OF BUSINESS ADMINISTRATION

91 MAY 1 TELEPHONE:  
918 990 4161

April 28, 1991

OFFICE OF THE  
DIRECTOR

Dr. Allan Bromley  
Director, Office of Science & Technology  
The White House  
1600 Pennsylvania Ave NW  
Washington, D.C. 20500

Dear Dr. Bromley,

I am updating myself on the Administration policy position with regard to technology and industrial competitiveness. I would appreciate it if you could send me the following.

- 1) A copy of the 13 page paper on administration policy on technology. This is referred to in the April issue of Challenge, published by the Council on Competitiveness. I believe this was issued late last year.
- 2) Name of the contact person, address, phone number for the Federal Coordinating Council for Science and Engineering Technology (FCCSET).
- 3) The legislative background and authority for creating the Critical Technologies Institute.
- 4) Copy of recent listing of 22 areas of technology development considered critical to national prosperity and security.

I appreciate your assistance.

Very truly yours,

*Francis A. Lees*  
Francis A. Lees  
Department of Economics  
and Finance



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

DATE: 5/3/91

TO: Maryanne Bach  
ADDRESS: 730 Jackson Place  
\_\_\_\_\_  
\_\_\_\_\_  
Telephone Number: 395-5101  
Fax Number: 395-

FROM: Mary Sult  
\_\_\_\_\_  
\_\_\_\_\_

Telephone Number: 395-3892  
Fax Number: (202) 395-3719

Number of Pages (including cover sheet): 2

SPECIAL INSTRUCTIONS:

Maryanne-

The following piece of correspondence requests the name of a contact person, for the Federal Coordinating Council for Science and Engineering Technology (FCCSET), and the address & phone number. I will send out the information with your approval. Ann thought it would be wise to run this by you first so that you were aware of the person requesting the information. Thanks.

TRANSMISSION REPORT

THIS DOCUMENT (REDUCED SAMPLE ABOVE)  
WAS SENT

\*\* COUNT \*\*  
# 2

\*\*\* SEND \*\*\*

| NO | REMOTE STATION I. D. | START TIME     | DURATION | #PAGES | COMMENT            |
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TOTAL 0:00'53" 2

XEROX TELECOPIER 7021

"CORRESPONDENCE TRACKING"

TYPE: INFORMATION

DOCUMENT NUMBER: 9121239

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FROM: DIXON, JOHN

TO: DR. BROMLEY

DATE OF  
CORRESPONDENCE: 04/19/91

SUBJECT: A REPORT FROM NATIONAL RESEARCH COUNCIL ENTITLED  
"IMPROVING ENGINEERING DESIGN: DESIGNING FOR  
COMPETITIVE ADVANTAGE"

\*\*\*\*\*

ASSIGNED TO: D. Allan Bromley

ACTION REQUIRED:

\*\*\*\*\*

SENDER'S DUE DATE:

OSTP DUE DATE:

DATE COMPLETED: -----

\*\*\*\*\*

COPIES TO:

\*\*\*\*\*

WHITE HOUSE TRACKING #:

CONTACT PERSON:

REMARKS:

*Report was sent to Dr. Bromley*

DATE RECEIVED:

FILE: *Industrial - economic competitiveness*





UNIVERSITY OF MASSACHUSETTS  
AT AMHERST

Engineering Laboratory Building  
Amherst, MA 01003  
(413) 545-2505

Department of  
Mechanical Engineering

RECEIVED

91 APR 25 10:44 April 19, 1991

OFFICE OF THE  
DIRECTOR

Dr. Allen Bromley  
Office of Science and Technology Policy  
11 New Executive Office Building  
Washington, D.C. 20506

Dear Dr. Bromley:

I would like to call your attention to the enclosed report from the National Research Council entitled "Improving Engineering Design: Designing for Competitive Advantage."

Many causes have been advanced for the decline of many U.S. industries in international competition — and the associated loss of jobs and tax revenues. However, this is the first that gets to the heart of the matter.

Design is a driver in fixing the competitiveness of manufacturing industries. That is, it is the one thing you would fix if you could fix only one thing. Yet the U.S. engineering design infrastructure — education, research, and industrial practice — remains broken.

This NRC report explains not only what is wrong, but also how to fix it. I hope you and your staff will take time to consider its arguments and recommendations.

Sincerely,

A handwritten signature in cursive script, appearing to read "John R. Dixon".  
John R. Dixon  
Professor

JRD/dk

File

Document Originally  
Attached to  
Following Page



"CORRESPONDENCE TRACKING"

TYPE: INFORMATION

DOCUMENT NUMBER: 9121404

\*\*\*\*\*

FROM: MCCORMACK, Richard T.: DEPARTMENT OF STATE

TO: DR. BROMLEY

DATE OF  
CORRESPONDENCE: 04/05/91

SUBJECT: MEMORANDUM FOR LARRY EAGLEBURGER, RE: THE COUNCIL ON  
COMPETITIVENESS REPORT

\*\*\*\*\*

ASSIGNED TO:

ACTION REQUIRED:

\*\*\*\*\*

SENDER'S DUE DATE:

OSTP DUE DATE:

DATE COMPLETED:

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\*\*\*\*\*

COPIES TO: D. Allan Bromley  
Ken Yale  
Dr. Phillips

\*\*\*\*\*

WHITE HOUSE TRACKING #:

CONTACT PERSON:

REMARKS:

DATE RECEIVED: 05/14/91

FILE: <sup>P-</sup> INDUSTRIAL - Economic  
Competitiveness

UNDER SECRETARY OF STATE  
FOR ECONOMIC AFFAIRS

RECEIVED  
5 April 1991

TO: Dr. Allan Bromley  
The White House  
91 MAY 14 PM 2: 26  
OFFICE OF THE  
DIRECTOR

FROM: Richard T. McCormack

For your information



United States Department of State

*Under Secretary of State  
for Economic Affairs*

*Washington, D.C. 20520*

April 5, 1991

MEMORANDUM FOR LARRY EAGLEBURGER

FROM: Richard T. McCormack *cc*  
SUBJECT: The Council on Competitiveness Report

Gene McAllister has forwarded to you a summary of the report of the Council on Competitiveness that outlines some serious technological challenges facing us as a country. He recommends that you receive these people, and do a little more PR on behalf of the Department of State with the U.S. business community.

There is nothing wrong with his proposals. I would recommend that you go beyond this, and see what can be done to advance the cause outlined by the report itself.

You'll discover a lot of garment rending on the part of some people about "industrial policy" implications of the Council's report.

The fact is that we won World War II with "industrial policy". We launched our space program with "industrial policy". We are today living off the intellectual legacy of the post sputnik efforts launched by the Eisenhower/Kennedy administrations. And in my view, we need to disengage ourselves from the knee-jerk, cliché-ridden debate about "industrial policy", and consider what we can do about the problems identified by Inman and his people. This will involve budgetary considerations, but in my view, they need to be undertaken.

The first step I recommend would be a long, private conversation between you and Allan Bromley, the President's Science Advisor. Bromley is one of the ablest people of the entire administration, and you would profit from interacting with him in this matter.

bcc: Dr. Bromley (White House)  
Deputy Secretary Schnabel (Commerce)

THE WHITE HOUSE  
WASHINGTON

July 9, 1991

PLEASE FORWARD

Dear Richard:

I have not had the time to really wade through the piles for correspondence on my desk for several months because of extended travel to the Soviet Union and elsewhere.

I want in particular to thank you for your very generous comments in your memorandum for Larry Eagleburger, dated April 5. Your support in this whole matter of getting technology policy airborne without having it shot down in the guise of a dreaded industrial policy has been very much appreciated and I have enjoyed our interactions since my arrival here in Washington.

Larry has been so tied up with the aftermath of Desert Storm that it has simply not been possible to get together with him, but I shall certainly make every effort to do so.

Let me take this opportunity to wish you every success, both personal and professional, in your new endeavors. Whenever they bring you back here to Washington I would welcome the opportunity to invite you to join me for lunch at the White House Mess. Please do let us keep in touch.

With warmest best wishes,

Sincerely yours,



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

Dr. Richard T. McCormack  
Under Secretary of State for  
Economic Affairs  
U.S. Department of State  
Washington, D. C. 20520



"CORRESPONDENCE TRACKING"

TYPE: INFORMATION

DOCUMENT NUMBER: 9120990

\*\*\*\*\*

FROM: MITTELSTADT, Eric: GMFanuc Robotics Corporation

TO: DR. BROMLEY

DATE OF  
CORRESPONDENCE: 03/29/91

SUBJECT: LETTER TO THE VICE PRESIDENT CONCERNING ELEMENTS  
THAT SHOULD BE INCLUDED IN OUR INDUSTRIAL  
COMPETITIVENESS PROGRAM.

\*\*\*\*\*

ASSIGNED TO:

ACTION REQUIRED:

\*\*\*\*\*

SENDER'S DUE DATE:

OSTP DUE DATE:

DATE COMPLETED:

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\*\*\*\*\*

COPIES TO: D. Allan Bromley  
Dr. Phillips

\*\*\*\*\*

WHITE HOUSE TRACKING #:

CONTACT PERSON:

REMARKS:

DATE RECEIVED: 04/03/91

FILE: INDUSTRIAL - Economic  
Competitiveness



GMFanuc Robotics Corporation  
2000 South Adams Road  
Auburn Hills, Michigan 48326-2800

Telephone: (313) 377-7000  
Fax: (313) 377-7362

9120990

RECEIVED

91 APR 3 P3:16

OFFICE OF THE  
DIRECTOR

Eric Mittelstadt  
President and  
Chief Executive Officer

March 29, 1991

The Honorable J. Danforth Quayle  
Vice President of the United States  
The White House  
Washington, D.C. 20500

Dear Vice President:

The Roundtable you held in the Detroit area last year focused much needed attention on the industrial competitiveness of the United States. I continue to be deeply concerned about our country's competitive position, but I believe you and the President have an unprecedented opportunity to move this critically important issue forward, especially now in light of our recent success in the Persian Gulf.

At no other time in modern history has a President enjoyed support as broad and deep as President Bush does today. This support results not only from the triumph of Operation Desert Storm, but, equally important, from the President's success in assembling a coalition of varied interests to accomplish a single unified objective. That same unity of purpose could put the country well on the road to reaching our goals of industrial competitiveness.

Leadership from the top -- from President Bush and yourself -- is essential, and it must come now while our national pride and confidence can be marshaled to solve problems and achieve results. It can be the key to seizing the initiative on a full agenda of domestic issues.

In the attached white paper I have elaborated on elements I believe should be included in our industrial competitiveness program. I am at your disposal or that of anyone else in the Administration to explore these ideas further, and to do whatever I can to help our country be successful in the "theater of economic competition," just as it was in the "theater of the Gulf."

Respectfully,

Eric Mittelstadt

attachments

cc: (see attached list)

Detroit • Düsseldorf • Toronto • Paris • Coventry • Los Angeles • Milan



## A COALITION FOR COMPETITIVENESS

A key to the brilliant success of Operation Desert Storm was President Bush's ability to build a coalition among 28 nations with divergent interests, historical relationships and political ambitions. That same kind of collective effort is now needed within our country to improve the ability of U.S. companies to compete effectively in global markets.

In my view there are four major themes that pertain to the competitiveness issue -- themes that can be related to the recent success in the Persian Gulf.

### Theme #1

Competitiveness requires the highest level of quality from all Americans whether they are production workers or educators, managers or clerics, sales people or government employees. Quality, in turn, begins with pride in what we do.

As Americans, we are currently experiencing the greatest wave of national pride since the end of World War II. While that pride is directed at our troops, their leaders and the technology that made them successful, we have an opportunity to capitalize on it domestically. Let's spread the focus on our patriotic pride and energy to include the accomplishments of citizens in all professions and walks of life, as well as how we interact with one another.

President Bush is in a unique position to assemble a coalition to support this approach and to provide its leadership.

### Theme #2

Our quest for quality must also embody a spirit of concern for one another, an extension, if you will, of the "thousand points of lights" to every citizen.

We must be concerned not only with competitiveness from an international economic point of view, but also in terms of how we handle the pressing problems of the environment, the poor, the elderly, the under-educated, the homeless and many others in need in our country and throughout the world.

### Theme #3

The benefits of global competitiveness extend far beyond the business and labor communities to every individual citizen. Because each of us is a consumer, we all have a vested interest in making and keeping the country competitive. It assures us of the kind of quality, price and selection we must have in order to maintain and improve our standard of living. Simply stated, improved competitiveness means more goods, higher quality, better prices, greater job security and higher wages, as well as a stronger economy, higher tax collections at all levels of

## A COALITION FOR COMPETITIVENESS

Page 2.

government, and the resulting improvement in our ability to afford the many pressing problems mentioned in Theme #2.

Once the public understands that everyone has a stake in this issue, I am convinced there will be a ground swell of demand for appropriate action in such areas as research and development, regulatory rationalization, and tax policies. I am also convinced that demand will come as strongly from non-industrial states such as Wyoming as it does from more industrialized states, like Michigan. Again, the President's ability to build and lead a broad-based constituency can be of enormous influence here.

### Theme #4

This initiative costs nothing. No new taxes are required, no new agencies or legislation are needed. All that is required is the President's leadership in harnessing pride and patriotism to move the country forward. It is an opportunity to articulate a vision for this country, to issue a "call to arms" to the pride that lies in every American.

In addition to costing nothing, this approach builds on our American tradition of individual pride, creativity and work ethic. It can make everyone in this country feel more like part of the solution, instead of the problem. It focuses on the overall positives of what we can do as individuals, instead of the negatives of our differences.

The euphoria generated by Operation Desert Storm can be a tremendously positive force in the domestic arena, or it can be a perishable force of which we fail to take advantage. If the pride that currently energizes this country can be channeled into a national competitiveness policy, we can have every confidence that the United States will prevail in the global economic competition that faces the next generation.

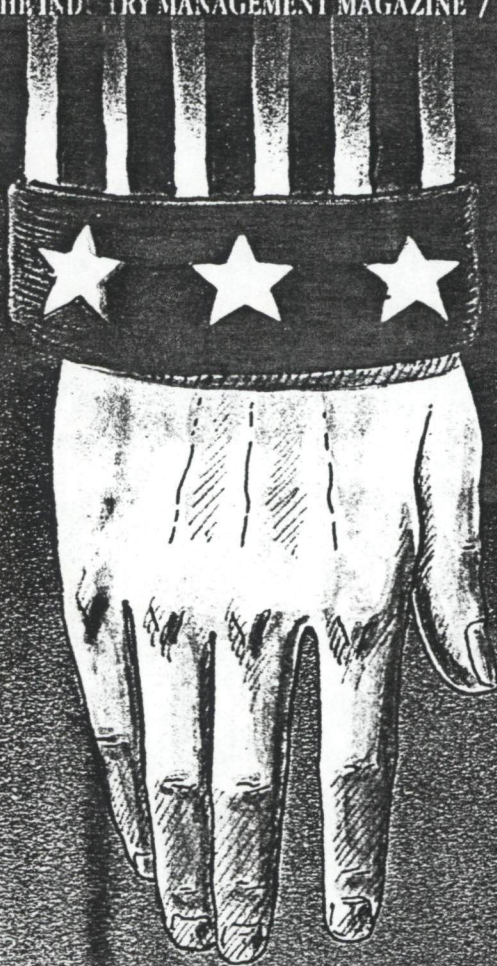
To that end, I propose a "Pride USA" campaign to focus patriotism and national pride on economic competition. It will call upon the vast majority of Americans who are ready to contribute and do their part, no matter what their calling. By starting in this way, we can mobilize the support of the American public for the necessary difficult decisions and everyday actions that need to be made by all of us to assure economic success.

Finally, this need not be limited to the federal level -- state and local leaders can and should make the same points, to lead their constituency toward being part of the solution.



# INDUSTRYWEEK

THE INDUSTRY MANAGEMENT MAGAZINE / A PENTON PUBLICATION / MARCH 18, 1991



## A NATIONAL INDUSTRIAL POLICY

*NOW*  
DO WE NEED ONE?

Page 56

WE ALREADY HAVE ONE.  
WHAT WE NEED  
IS A *BETTER* ONE.

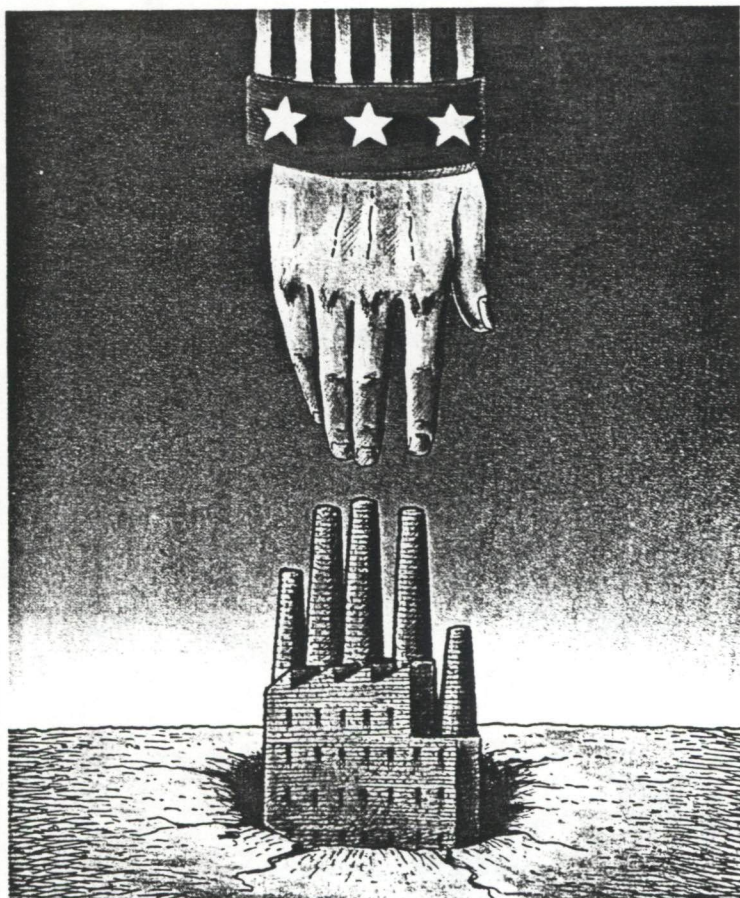
Page 5





# NOW Do We Need A

There's good reason to be concerned about



JEAN-FRANÇOIS ALLAUX

By JOHN S. McCLENAHEN

**E**ven after spending much of the last decade sculpting leaner and meaner companies, the managers of American industry have good reason to remain worried about U. S. competitiveness. Relative to charges in other "rich" nations, the U. S. cost of capital is high. Tens of thousands of people annually enter the U. S. workforce unskilled and stay underskilled. American quality too often is still less than world-class. The country's commitment to microelectronics, telecommunications, and other technologies

“  
To say the  
matter is  
complicated  
is to grossly  
understate  
the reality.  
”

critical to preserving national economic security is loose at best.

Indeed, two benchmark measures of U. S. competitiveness in a global context offer managers precious little basis for cheer:

- U. S. labor productivity growth (in manufacturing) lags well behind rates being posted in other economically advanced countries. America's 2.6% increase in 1989, the most recent year for which comparative data are available, was anemic compared with Japan's 5.8% growth, the U. K.'s 5.1%, Germany's 4.5%, and France's 4.7%. What's more, though U. S. manufacturing workers posted a 3% productivity gain in 1990, overall nonfarm business productivity fell 0.8% last year, its worst showing in eight years.

- The U. S. merchandise trade deficit with the rest of the world nearly septupled between 1981 and 1987, reaching a record \$152.1 billion in 1987. Now around the \$100 billion mark, it's still four times the level of a decade ago. Alarming, the U. S. has not posted a merchandise trade surplus since 1975—in sharp contrast to the solid decade of surpluses recorded during the 1960s.

There's good reason to be concerned about U. S. competitiveness. That's clear. However, it's far from certain that a national industrial policy would be the right rescue.

Two hundred years after Alexander Hamilton first proposed the notion, when, and how, and to what degree the federal government should interfere with "free" markets through persuasion, capitalization, and legislation remains a matter of heated debate.

As was the case back in 1791, the idea of the Feds doing anything like picking America's industrial win-



# NATIONAL INDUSTRIAL POLICY?

U. S. competitiveness. But disagreement about the best rescue method runs deep.

ners and losers today is variously regarded as folly, wisdom, or largely irrelevant.

Incidentally, Congress, which today counts such market interventionists as Sen. Jeff Bingaman (D, N. Mex.) among its numbers, two centuries ago rejected Treasury Secretary Hamilton's industrial-policy proposal.

To say the matter is complicated is to grossly understate the reality. *Passion* is another word that can apply. INDUSTRY WEEK invites you to take your own measure of the strongly held views of Michael Hora, Robert Reich, William Best, and Eric Mittelstadt—and to examine the Bush Administration's contradictory record on industrial policy.



**ABSOLUTELY  
NOT!**

Maybe it's because of his geographical proximity to the University of Chicago, a bastion of conservative economic principles. Or perhaps it's just a philosophical coincidence. Whatever the reason, Michael Hora, a vice president of A. T. Kearney, Chicago, is about as free a free-marketer as you're ever going to meet.

Therefore, it should be no big surprise that Mr. Hora is vehemently opposed to Washington's picking industrial winners and losers. "Absolutely not," he says succinctly. "We ought to compete in the global marketplace on our wits. Our government has demonstrated over and over again its inability to

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We've got  
some really  
fine  
companies in  
this country  
that  
routinely  
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innovation  
without  
anything  
other than  
what  
[policy]  
currently  
exists.”  
”

do anything right, and to the extent we can avoid trusting government with any of our economics . . . we're a lot better off."

Indeed, believes Mr. Hora, the strongest case against allowing Washington to pick industrial winners and losers is the "patchwork mess" it has made of existing tax policy, antitrust regulation, and all the other elements of what is a kind of de facto industrial policy, he says.

For instance, Mr. Hora sees no need for heavy-handed antitrust regulation. "I'm less concerned about trusts and collusion than I ever was," he says. "Consumers are pretty smart. And companies have decided it's in their own best interest to serve the needs of their customers."

Still, couldn't government be a valued partner with U. S. industry in exploiting promising technologies—as it has been in Europe and Japan? "You don't have to look very far to find companies that do pretty good on their own: IBM, Boeing, AT&T, 3M," responds Mr.

Hora. "We've got some really fine companies in this country that routinely demonstrate innovation without anything other than what [policy] currently exists."

What's more, the Kearney management consultant discounts the notion that much high-tech research and development is beyond the financial capability of any single firm—even a "rich" one. "I'm hard-pressed to think of a technology that U. S. companies haven't been able to step up to and invest in," he says. "Maybe the space program [of the 1960s] is an example of a technology that no U. S. company chose to step up to. On the other hand, the U. S. government didn't put it out in the marketplace. They didn't say: 'We want a company to put us on the moon.' They said: 'We're going to put us on the moon.'"

Testing his own analysis, Mr. Hora suggests taking a look at medical technology—"terribly expensive stuff," he terms it. "And yet in the face of what the medical industry will call severe government restrictions on properly pricing



Hora: "We ought to compete in the global marketplace on our wits."



their services, [companies] continue to come up with better and better ways to make us all last longer."

He pauses. He's trying to find fault with his reasoning. . . .

"I guess no matter how I look at it, I come back negative" on the idea of the federal government one way or another picking winners and losers, he finally says. "I know this is pretty corny, but American grit and determination, when we choose to accomplish something, usually win. And I trust *that* a hell of a lot more than I trust any government policy."



## AGENT OF THE WORKFORCE

**H**alf an hour before he's off to a faculty seminar, Robert Reich sits in his book-lined office at Harvard University's Kennedy School of Government and, in effect, asks Kearney's Mr. Hora: "What are you talking about?"

Then, in a significant shift of personal direction, the man who in the late-1970s began worrying in public about America's declining industrial base asserts that Washington ought now to be less concerned about saving U. S. industry and more focused on boosting the productive abilities of American workers.

"Government can have an enormously constructive role in stimulating economic and technological development," insists Prof. Reich, who teaches political economics at the Kennedy School. "You have only to look at three of this nation's major export industries to see industrial policy in action. Agriculture, aerospace, and pharmaceuticals are three areas in which this nation continues to do extremely well—and each has an elaborate industrial policy behind it."

Conducting a quick historical tour, Prof. Reich traces agriculture's "industrial" policy back to the early 19th century and ties

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Agriculture,  
aerospace,  
and  
pharmaceuti-  
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in which this  
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well—and  
each has an  
elaborate  
industrial  
policy  
behind it.”



Reich: "Government can have an enormously constructive role. . . ."

aerospace's to government-directed production during World War II. "Pharmaceuticals is a product, in part, of the National Institutes of Health [NIH] and the enormous, constructive role that NIH has played in developing not only new pharmaceuticals, but also a cadre of researchers, technicians, and specialists," he relates.

Prof. Reich endorses the concept of U. S. industry and the federal government joining forces in so-called industry-led initiatives to boost competitiveness—so long as "the government's role is to accelerate economic development in the direction the market already seems to be moving." Indeed, Prof. Reich contends that's the kind of apparently successful industrial policy which Japan, Germany, and South Korea have been pursuing.

Significantly, Prof. Reich emphasizes he brooks no case for an industry-led industrial policy that finds the federal government bowing to the demands of a U. S. industry. "The problem is self-evident: The industry's goals may not match the public's goals," he stresses.

"Moreover, as American industry becomes ever more global, there is less and less guarantee that what is good for General Motors *is* good for

America in terms of jobs and skills."

Indeed, stresses the one-time policy chief for the Federal Trade Commission, it's time for Washington to start looking after the interests of American workers—and stop acting as a promoter or protector of U. S. industry.

Eventually, believes Prof. Reich, Americans will come to realize that there is no "American corporation" and no "American economy"—that the U. S. is only a region of a global economy and that "the only factors of production that are rooted within our borders are our people and the infrastructure they have.

"But here, the irony," he states. "If we can no longer rely on the American corporation to make investments in the economy, then almost by default we have to rely on government. And yet we don't trust government."

To ensure that American workers learn to do such "complicated things" as advanced fabrication, design engineering, and manufacturing engineering, new leadership will be critical, Prof. Reich states.

Specifically, the country needs a new generation of political leaders who won't point the finger of blame "at the Japanese, or welfare cheats, or the super rich, or government



bureaucrats," he states. Rather, the country requires leaders who share his own world economic view and who "are going to help Americans roll up their sleeves and get on with the business of rebuilding the capacities of Americans."

For example, America's new leaders should move to improve the competitive capacity of U. S. workers by shifting public-policy gears and extending federal research-and-development subsidies to any "global corporation which agrees to utilize those subsidies in the United States [for] training Americans," he says. Present practice is just the reverse of what it needs to be, he argues: U. S. companies get the subsidies without any training strings attached; foreign firms can't even qualify for the largesse.

Recognizing that many people might consider his vision of rebuilding America an impossible dream, Prof. Reich recalls that the U. S. accomplished something of the same sort after each world war. "Indeed, after [World War II] we rebuilt Western Europe and Japan. And if we rebuilt Western Europe and Japan with an economy that was a quarter of what it is right now, we can certainly rebuild America," Prof. Reich says optimistically.



## BACKWARD

**F**ourteen hours and 6,791 miles from Washington, Tokyo-based William Best, an A. T. Kearney vice president, believes the U. S. has its industrial policy backward. U. S. trade quotas protecting steel, textiles, and autos already constitute an industrial policy—albeit one that props up industries that have lost world-class competitiveness rather than promotes industries of the future, he asserts.

"As a result, we [Americans] are driving the competitive spiral down, rather than accelerating up as Japan does with its industrial policy," says Mr. Best.

Indeed, with the guidance of its famed Ministry of International

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”



Best: "The President must recognize and involve himself in the issues."

Trade & Industry (MITI), Japan is, for example, assembling a future-oriented aerospace industry. Work on a hypersonic-transport engine is underway. Weather-observation satellites are being readied for launch later in this decade. And a space shuttle is being developed.

At the same time, also under MITI's auspices, the Japanese are phasing out or forcing mergers in declining industries such as coal, shipbuilding, and shipping, Mr. Best points out.

"MITI is clearly at the top [in terms of influential government agencies], and it attracts the absolute best and brightest brains in Japan," he says. "Those are the people who work on picking the [winning and losing] industries."

But the U. S. would be making a serious mistake to conclude that the answer to its competitiveness problems lies in simply creating an American MITI, he warns. For one thing, Japan's MITI has made its share of mistakes—including the classic blunder in the 1950s of advising its infant auto industry to concentrate on the Japanese market and forget about exports.

What's more, "some of the tac-

tics that MITI used in the past to accelerate Japan's development are really no longer acceptable in the increasingly globalized marketplace," says Mr. Best. Obtrusive protection of domestic producers, systematic support for infant industries, and extensive subsidies won't cut it. "Japan is causing tremendous distortions in world trade because of the hangover from 40 years of those trade policies," notes Mr. Best. "So to just copy MITI—to create a U. S. Dept. of International Trade & Industry and adopt those policies—is something we can't do."

"You've got to somehow balance the industrial policy [of picking winners and losers] with increasing the competitiveness of U. S.-based companies through such things as research-and-development tax credits, capital-gains taxes that promote long-term investments, tax incentives for savings (which will reduce the cost of capital) and other growth incentives, and greater support for education—particularly to provide the kinds of skills that business needs to grow."

The Kearney consultant suggests a coalition of business and government to move the U. S. forward. "It



will take the commitment of top businessmen and respected government officials to form such a coalition," says Mr. Best. "This coalition must be given high visibility, and the agenda it develops for America must be given serious consideration by the Congress."

He's not advocating another Grace Commission (the Reagan-appointed advisory panel headed by W. R. Grace & Co. Chairman and CEO J. Peter Grace that was charged with ferreting out waste in the federal government). That group documented a lot of waste and "got a few things going, but missed capturing the bulk of the opportunities," says Mr. Best.

"The President must recognize and involve himself in the issues—I don't believe he has done this and may not until there is a crisis—and perhaps appoint some recently retired top business executive to implement [the agenda]. And I mean a *real* executive—not some executive-turned-TV-personality." In short, we need substance, not form.



## CHANGE THE MINDSET

**E**ric Mittelstadt is a man with a mission, a very ambitious mission. The president and CEO of GMFanuc Robotics, Auburn Hills, Mich., is out to change America's mindset on competitiveness.

He'd trash the term *national industrial policy* altogether. "Let's call it a *national competitiveness policy* and stop fooling around with what unfortunately has gotten a reputation of picking winners and losers," says the chief of a nine-year-old joint venture between General Motors Corp. and Japan's Fanuc Ltd. "I think we have to change the definition so that people understand that [picking winners and losers] is not the problem. In fact, that is one of the least of the problems."

The central issue, in Mr. Mittelstadt's mind, is improving the

ability of all companies in the country—not just industrial, but service firms as well—to compete effectively in global markets. And that, he's convinced, will require the building of a broad-based constituency in this country for competitiveness.

"To me, the first step is for this country's leadership to get the entire country—every citizen—to realize that U. S. competitiveness is important to them," says Mr. Mittelstadt. "It's not just a 'help business' kind of thing. Not even 'help business and help labor.' We need to get everybody to understand that everyone is a consumer and if we are not competitive, we as consumers suffer." If the U. S. is not competitive, all Americans lose on quality, price, and service, he argues.

Competitiveness needs to be as important to the constituents of the Congressional delegation from a nonindustrial state such as Wyoming as it is to the constituents of the senators and House members from a more industrialized state like Michigan, Mr. Mittelstadt believes. "Without that, we don't have the slightest chance of getting a competitiveness policy or actions that will help it," he contends.

How to proceed? He suggests success won't come just with a Presidential commission putting its im-

primatur on such items as tax incentives and cooperative research-and-development efforts. Or by business running to Washington with a list of legislative demands. These things—and others—to improve the business environment need to be done, but Mr. Mittelstadt believes they won't be done without prompting from the public—people who believe they have a stake in the outcome.

"And here's where the country's leaders come in—from President Bush on down to local leaders," stresses Mr. Mittelstadt. "They need to lead every citizen to understand their personal stake in competitiveness—along with other key things like the environment."

A major obstacle to achieving success, both in industry and government, is the mindset of the traditional approach, emphasizes Mr. Mittelstadt. "Everyone wants a big hit. They want one system to be installed now to solve everything, and/or they want legislation passed now," he says, adding that it's just not that simple.

For his part, Mr. Mittelstadt has taken part in a round table with Vice President Dan Quayle, who chairs the White House Council on Competitiveness, and the GMFanuc Robotics chief followed up on that meeting with a letter to Mr. Quayle outlining his argument for building

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them.”



Mittelstadt: "Everyone wants one system to be installed to solve everything."



a competitiveness constituency.

Mr. Mittelstadt is advancing his argument also in a group called the National Coalition for Advanced Manufacturing. He's urging Michigan Gov. John Engler and state legislators to repeat the message that improved U. S. competitiveness means more goods, higher quality, better prices, greater job security, and higher wages.

But perhaps as important, Mr. Mittelstadt is trying to communicate the competitiveness message to GMFanuc Robotics' employees. It's as formal as a profit-sharing program—and as personal as saying: "We don't want our customers feeling the way we do when we go into a retail store and a clerk treats us as if we're interrupting their day."



## THE INCONSISTENT ADMINISTRATION

And where does this continuing debate fit into the political realities of Washington, D. C., 1991? Quite simply, the Bush White House, even more so than Ronald Reagan's, is biased against intervening in the workings of the market.

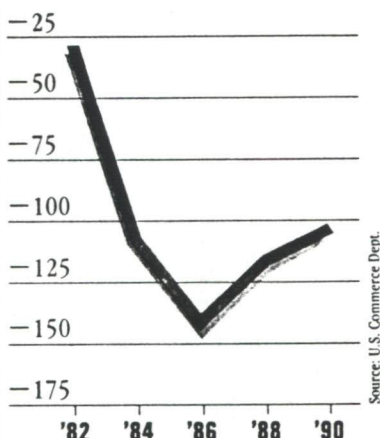
Take industrial technology, for example. "While the government plays a critical role in establishing an economic environment to encourage innovation, the private sector has the principal role in identifying and utilizing technology for commercial products and processes," stresses the White House Office of Science & Technology Policy. It's a lesson that U. S. Commerce Secretary Robert A. Mosbacher learned the hard way about 18 months ago.

Mr. Mosbacher is not speaking publicly about the episode these days, but a case study prepared for class discussion at Harvard Business School outlines the situation:

Relatively early in 1989, the Bush Administration's first year, Mr. Mosbacher seized on a govern-

### U.S. INDUSTRY STUCK IN DISTRESS

(U.S. trade deficit, billions of dollars)



Source: U.S. Commerce Dept.

ment-aided initiative as a way to boost America's sagging high-tech fortunes. He believed that if Washington joined with industry to develop the technology for flat-screen displays—so-called high-definition television (HDTV)—a number of industrial crises might be solved, including the loss of U. S. competitiveness in semiconductors. But by the late summer of 1989 a promised Commerce Dept. report on HDTV wasn't forthcoming, and Secretary Mosbacher announced there would be no initiative with industry.

It seems that John Sununu, White House chief of staff, along with Michael Boskin, the President's chief economic advisor, and Richard Darman, the budget director, told the secretary to back off. "Mosbacher's plan, according to the men from the White House, smacked too much of industrial policy," explains the Harvard outline.

On the other hand, while saying it is opposed to picking winners and losers, the Bush Administration has also been laying down some heavy bets:

In its budget proposal for fiscal 1991, the Administration wagered nearly \$9 billion in research-and-development funds for just six categories: \$3.6 billion for biotechnology; \$2.45 billion for energy; \$1.53 billion for transportation; \$469 million for high-performance computing; \$215 million for superconductivity; and \$537 million for semiconductors. **IW**

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Small Business Administration  
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Chief of Staff  
The White House  
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Mr. Leo Reddy  
President  
National Coalition for Advanced Manufacturing  
1331 Pennsylvania Avenue SW, Suite 1500 North  
Washington, DC 20004

"CORRESPONDENCE TRACKING"

TYPE: INFORMATION

DOCUMENT NUMBER: 9120556

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FROM: WINCE-SMITH, Deborah L.: DEPARTMENT OF COMMERCE

TO: DR. BROMLEY

DATE OF  
CORRESPONDENCE: 02/26/91

SUBJECT: INDUSTRIAL DESIGN: A STRATEGIC ELEMENT IN US  
COMPETITIVENESS.

\*\*\*\*\*

ASSIGNED TO:

ACTION REQUIRED:

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SENDER'S DUE DATE:

OSTP DUE DATE:

DATE COMPLETED:

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COPIES TO: D. Allan Bromley  
Dr. Phillips

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WHITE HOUSE TRACKING #:

CONTACT PERSON:

REMARKS:

DATE RECEIVED: 02/27/91

FILE: INDUSTRIAL Economic Competitiveness





9120556

**Assistant Secretary  
for Technology Policy**

DATE: 2/26/91

FROM THE DESK OF:

**Deborah L. Wince-Smith**

TO: Dr. Allan Bromley

- ☐ Per our conversation.
- ☒ For your information.
- ☐ For appropriate action.
- ☐ For draft of an appropriate reply for my signature.
- ☐ Please answer directly.
- ☐ Let's discuss.
- ☐ Please return with your comments.

# Industrial Design: A Strategic Element in US Competitiveness

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91 FEB 27 P 4: 02

OFFICE OF THE  
DIRECTOR



By Deborah L. Wince-Smith  
Assistant Secretary for Technology Policy,  
US Department of Commerce

Deborah L. Wince-Smith is the principal officer in the Department of Commerce for developing, coordinating and advocating policies that increase the role of technology in contributing to the nation's competitiveness and economic well-being. She works closely with other federal agencies, the private sector, state and local governments and educational institutions on a wide range of technology initiatives. Prior to assuming her current duties, Ms. Wince-Smith served in the White House Office of Science and Technology Policy as assistant director for international affairs and global competitiveness. Trained as a classical archaeologist, she received her Master's from Cambridge University and graduated from Vassar as a member of Phi Beta Kappa.

Never before has industrial design been more important to the US economy. The accelerated pace of technological change and the growing strength of foreign competition have put a premium on speed to market, high quality, competitive prices, production flexibility and customer satisfaction. Industrial design contributes substantially to all of these competitiveness goals. It can make the difference between product success and product failure. No US manufacturer or user of manufactured products can afford to have second-rate design.

Hundreds of thousands of high-quality jobs are on the line, not only in manufacturing but also in the growing service economy. The design integrity of a product affects the integrity of all other products with which it interacts.

Design and quality are merging. Standards of quality, which have been set quantitatively in the past, are undergoing big changes. As pacesetters in manufacturing, the Japanese are pioneering a new dimension to quality and design, with a focus on the senses—touch, hearing, seeing and even smell. Industrial designers have advocated this advance for years.

The industrial designer is a systems integrator, drawing together engineering, manufacturing, purchasing/supply and customer needs. The way designers think is an advantage in this regard. Most of us who have been trained as deductive analysts simplify a problem and break it down into its component parts. In contrast, industrial designers think holisti-

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No US manufacturer  
or user of manufactured  
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cally. They can help eliminate artificial communication barriers within a firm, and thereby reduce the time from product conception to market entry. Only CEOs can provide the company-wide commitment necessary to take full advantage of industrial design's integrating characteristics. Companies that have made that commitment have reaped the rewards.

In September, my office and the National Endowment for the Arts (NEA) sponsored an industrial design seminar to highlight and examine the contribution of industrial design to US competitiveness. This event focused on: industrial design in other countries; examples of US designs that have achieved success in the marketplace—the final arbiter of design excellence; how industrial designers work; and the multiple roles they play in companies.

At the end of the seminar, the leading industrial design experts advocated: stronger links between designers and the laboratory community in technology transfer arrangements; new awards for industrial designers, especially for increasing product competitive-

ness; incorporating design teaching principles in our engineering and business schools; and measures to enhance business and the general public's awareness of the important and growing role that industrial design plays in this country's economy.

Industrial designers' potential to improve product quality, lower product costs and improve marketability makes this a cutting-edge profession in meeting the nation's competitiveness challenge. Business, academia and government need to take greater advantage of their skills. It is encouraging to see the leadership role taken by the NEA toward these ends as it is the only federal agency that supports strengthening this profession.



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FROM: BAYBAK, Michael: MICHAEL BAYBACH AND COMPANY, INC.

TO: DR. BROMLEY

DATE OF  
CORRESPONDENCE: 02/18/91

SUBJECT: A PROFILE ON A SMALL U.S. COMPANY THAT IS BUSILY  
REVERSING THE TREND OF JAPANESE DOMINANCE IN  
LEADING-EDGE TECHNOLOGIES.

\*\*\*\*\*

ASSIGNED TO: Dr. Phillips

ACTION REQUIRED:

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SENDER'S DUE DATE:

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COPIES TO: D. Allan Bromley  
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CONTACT PERSON:

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DATE RECEIVED: 03/01/91

FILE: ~~TECHNOLOGY~~ Industrial Technology - Economic Competitiveness

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

May 7, 1991

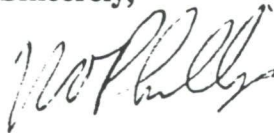
Dear Mr. Baybak:

Thank you for your recent letter to Dr. Bromley with information about Aura Systems, Inc. He has asked me to reply.

Our office has recently participated in a panel of government and private sector members to determine which technologies are most critical to U.S. national security and economic prosperity. One of the panel's conclusions was that technology can make an important contribution to the future of U.S. national interests, but only if we learn to utilize it more effectively. Thus, U.S. industry needs to improve the commercial exploitation of leading-edge technologies which the U.S. has in abundance.

We appreciate your support of U.S. technology and your interest in the activities of our office.

Sincerely,



William D. Phillips  
Associate Director for Industrial Technology

Mr. Michael Baybak  
President  
MICHAEL BAYBAK AND COMPANY, INC.  
Penthouse  
9033 Wilshire Boulevard  
Beverly Hills, CA 90211



"CORRESPONDENCE TRACKING"

TYPE: ACTION

DOCUMENT NUMBER: 9120590

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FROM: BAYBAK, Michael: MICHAEL BAYBACH AND COMPANY, INC.

TO: DR. BROMLEY

DATE OF  
CORRESPONDENCE: 02/18/91

SUBJECT: A PROFILE ON A SMALL U.S. COMPANY THAT IS BUSILY  
REVERSING THE TREND OF JAPANESE DOMINANCE IN  
LEADING-EDGE TECHNOLOGIES.

\*\*\*\*\*

ASSIGNED TO: Dr. Phillips

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5/7/91  
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Thomas Ratchford  
Dr. Wong

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CONTACT PERSON:

REMARKS:

DATE RECEIVED: 03/01/91

FILE: TECHNOLOGY

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

May 7, 1991

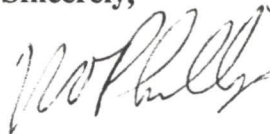
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William D. Phillips  
Associate Director for Industrial Technology

Mr. Michael Baybak  
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Corporate Public Affairs  
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February 18, 1991

OFFICE OF THE  
DIRECTOR

D. Allan Bromley  
Office of Science and Technology  
The White House  
1600 Pennsylvania Avenue NW  
Washington, DC

Dear Dr. Bromley,

I read with interest the L.A. Times piece on you and your work.

With all the concern about the dominance of Japan in leading-edge technologies, I thought you might take some satisfaction from learning of one small U.S. company that is busily reversing the trend by having major Japanese firms steadily knocking at its door for certain seminal technologies in HDTV and electromagnetics.

The company is AURA SYSTEMS INC. I'm enclosing a profile of it. They deserve to be a factor of some type, I am sure, on your agenda.

Yours truly,



Michael Baybak  
President  
MICHAEL BAYBAK AND COMPANY, INC.

MB:et  
enclosure

Corporate Public Affairs  
Financial Relations  
Market Planning  
Counsel

CONTACT: George Duggan  
Michael Baybak & Co., Inc.  
(213) 276-4660  
FAX (213) 276-5426

AURA SYSTEMS, INC.

CORPORATE PROFILE

January 1991:

Aura Systems, Inc. (NASDAQ: AURA), a Los Angeles-based company, is bringing new and universally-applicable electromagnetic technologies to the world. Like earlier breakthroughs - the electric motor, radio and television - Aura's technologies are far-reaching, will benefit all people and all industries worldwide and are being assimilated rapidly. Based on contracts with the largest corporations, major commercial uses are commencing in 1991. Most citizens of industrialized countries will know about and benefit from Aura's technologies by 1993.

Aura has discovered new ways to control the movement and productivity of mechanical devices by manipulating magnetic fields. This includes breakthroughs in linear force, rotary force and combinations of the two, including very precise control of objects within magnetic fields from a distance. These advances are expected to increase the efficiency and effectiveness of a high percentage of functioning parts in the whole broad world of mechanics. While Aura is clearly involved with high tech, it is a basic tech story -- with basic industrial and medical applications that provide immediate advances in manufacturing efficiencies, and improvements in quality of life, unmatched since perhaps the advent of the computer itself.

Company Overview

Aura Systems, Inc. is a public company which was formed in February 1987 by Zvi Kurtzman and Arthur Schwartz, Ph.D. The Company has three facilities in California comprising 63,000 square feet and employs 120 staff, including several Ph.D.'s and M.S.'s in physics and the other sciences. In research or development at Aura are 26 magnetics, 3 optics, 3 advanced computing and 12 microelectronics projects. 19 contracts have been signed and initiated with major corporations, and another 100 contracts are in negotiation.

The Company is listed on NASDAQ, trading symbol AURA, and has 22.5 million shares outstanding. Management projects \$0.25 per share earnings for fiscal year-ending February 1992, based on projected revenues of \$30 million. Revenues are expected to move up rapidly from there with present development contracts expanding into production orders.

9033 Wilshire Boulevard  
Penthouse  
Beverly Hills, California 90211  
Telephone (213) 276-4660  
FAX (213) 276-5426



## AURA'S TECHNOLOGIES

Early uses of electromagnetic advances by Aura will transform the world in three ways.

1. Aura dramatically improves the planet's energy equation by generating mechanical productivity without friction. This is done by rotating machinery shafts in frictionless magnetic fields, called magnetic bearings, instead of within bearing casings. A simple retrofit can be done to most gas and electric motors, alternators, pumps, turbines and compressors. This advance produces an immediate 10%+ gain in energy efficiency, reduces maintenance significantly, extends machinery life, replaces lubrication and its systems and allows long-distance monitoring of mechanical performance. Present development contracts include the U.S. Navy, General Motors, utility and oil companies and others.

The same technology in new equipment extends earlier bounds to mechanical productivity by permitting higher speed rotation, less heat and less noise -- without lubrication. Because of the greater speed, more work is performed by lighter, smaller, less complex and less expensive equipment.

2. Mechanical parts that "think" will re-define mechanical applications at all levels of transportation, industry and the home. Aura's computerized, electromagnetic actuator is a mechanical device. It replaces basic things -- switches, pulleys, shocks, speaker drivers, locks, latches, hydraulic systems, and far more. Aura's actuator provides an unprecedented amount of force at an unprecedented speed in one direction, with a far lower energy requirement than present systems. Importantly, since Aura's actuator is computerized, these very basic functions can now be performed "intelligently" with an active desired response to external forces. The same device is not fixed in its motion but can function in several different ways automatically, adjusting to environmental changes or user needs. The extent of the economic uses of Aura's actuator has not been fathomed, though it is clearly in the thousands of applications across all industries.

Several applications of Aura's actuators in automobiles will be the first uses that will affect most of us. Aura's production contracts include General Motors (several operating divisions), Toyota, Caterpillar, Itek (a division of Litton), Texaco, Ball, T & N (a major British conglomerate), the U.S. Air Force, the U.S. Navy, Boeing and others. First applications include active suspension systems, vibration-isolating engine mounts, plus improvements to power steering, alternators, windshield wipers, engine timing devices, transmissions, locks, power windows, power brakes and more.

One application, Aura's actuated automobile engine valve, allows infinitely variable timing of fuel and air intake and exhaust valves. This use alone has been shown to increase fuel efficiencies by 15%, while reducing emissions by 15%. Laboratory tests have also shown that a combination of Aura's actuator technologies and the Company's magnetic bearings applied to state-of-the-art electric cars can double the efficiency of these cars. This is being pursued by electric car developers.

3. Surgery without pain or incisions, with a quantum gain in effectiveness.

When Aura engineers and scientists learned to control the movement of a tiny, spinning metal bit, called a Magnabit, within a magnetic field from a distance, with a precision several hundred times as accurate as a surgeon's hand, it became the basis for potentially the greatest advance in health care yet to come. Today, with cataract surgeries on animals being perfected to a routine using Aura's magnetically-assisted surgical techniques, the company's 60%-owned subsidiary, Aura Medical Systems Inc., has contracted with Alcon Surgical Inc. (the world's largest eye care company) to bring Magnabit cataract surgery to the public.

Longer-term, many surgeons believe that Aura's magnetically-assisted surgical techniques will enable most operations to be done by injecting a Magnabit into the patient's blood stream and directing it to perform the exact work needed, without pain or incisions.

Of course, precise control of objects from a distance using magnetics also has far-reaching industrial applications, several of which are in development now.

4. Aura - Other Technologies

a. Aura's Electro-Optics Division has developed the digital TV and movie projector technology which management believes will help to expand two large new industries in the 1990's. The first to generate revenues will be film-less, electronic distribution of movies to theaters. While there are any number of procedures for distributing a movie without film (by satellite or telephone, for example), the industry has not had a movie projector which could use these transmissions to provide a high standard of resolution and light intensity when projected to theater-screen size. Aura's digital movie projector technology -- developed by Aura to make scene generators for the U.S. Air Force for testing of aircraft sensors -- will provide exceptional definition and color and light intensity far beyond present movie-goers' standards. Movie distribution in the U.S. is an approximate \$300 million to \$500 million per year industry. The AuraScope projector and distribution system have received high



interest from the Movie-Producing Artists Association and the National Association of Theater Operators, with first viewings scheduled for late-1991.

b. The same technology solves a substantive problem facing high-definition television (HDTV). HDTV - with approximately 1100 horizontal and 1900 vertical lines of information per screen, instead of the present 330 horizontal and 470 vertical lines of information - is widely expected to provide the next generation in quality for television. Other technologies for projecting the television picture onto the screen lack adequate light and color intensity. Aura's technology, using light itself instead of cathode rays, solves both problems. First viewings are scheduled for late-1991; Aura management believes it will become a major picture-tube manufacturer for HDTV.

c. Aura is also a leader in computerized telemetry systems with its Linkage software and hardware. Linkage is a new way of connecting standard and complex external processes to human operators via computer in order to monitor, diagnose and control the system. Applications of Linkage, thus far, have been principally in the aerospace industry, monitoring and interpreting data from satellites, spacecraft and missiles for NASA, the U.S. Air Force and commercial satellite builders. With Linkage's low-cost hardware, users can extend the power of the human operator to grasp and understand what is occurring in an environment that shoots far more data at him than he could otherwise possibly assimilate.

Linkage is not a special-purpose system, like its competitors' systems. Rather, it is applicable to practically all high-volume telemetry applications. As an example of its advances compared with its aerospace competitors, the Linkage operator is monitoring schematics of the external systems, with data already evaluated and color-keyed to each area; competitor systems provide "waterfalls" of unevaluated numbers and symbols which need human translation to determine even if systems are okay or whether an emergency exists. The numbers of people needed to monitor Linkage data are dramatically reduced. With continuing revisions to systems, intensive interfacing, repairs, tighter budgeting and increasingly greater power requirements, the aerospace industry is gradually recognizing Aura's software and hardware solutions, which are modular, open architected for ease in using commercial boards and can be customized by the user to suit his needs.

Aura's Linkage telemetry systems are also now being developed for commercial applications starting with the monitoring, analysis and control of underground tunneling machinery in Japan. By establishing itself at the high-end in terms of precision and standards, management believes it can gain success with commercial applications in oil fields, utilities, banking, factory automation, flood control, fault monitoring and other industries in the years to come.

## THE ECONOMICS OF AURA'S TECHNOLOGIES

As the developer and international patent-holder of widely applicable electromagnetic technologies, with numerous additional patents pending, Aura Systems' financial future may have a growth potential that is second-to-none. The company is in the process of shifting its revenue base from government research and development, much of which was completed in 1990, to commercial development and production. In the fourth quarter of 1990 the Company realized its first sales of equipment for commercial uses and further development. It projects a steep growth curve into the Nineties.

### AURA MAGNETIC STATUS/ JAN. 7, 1991

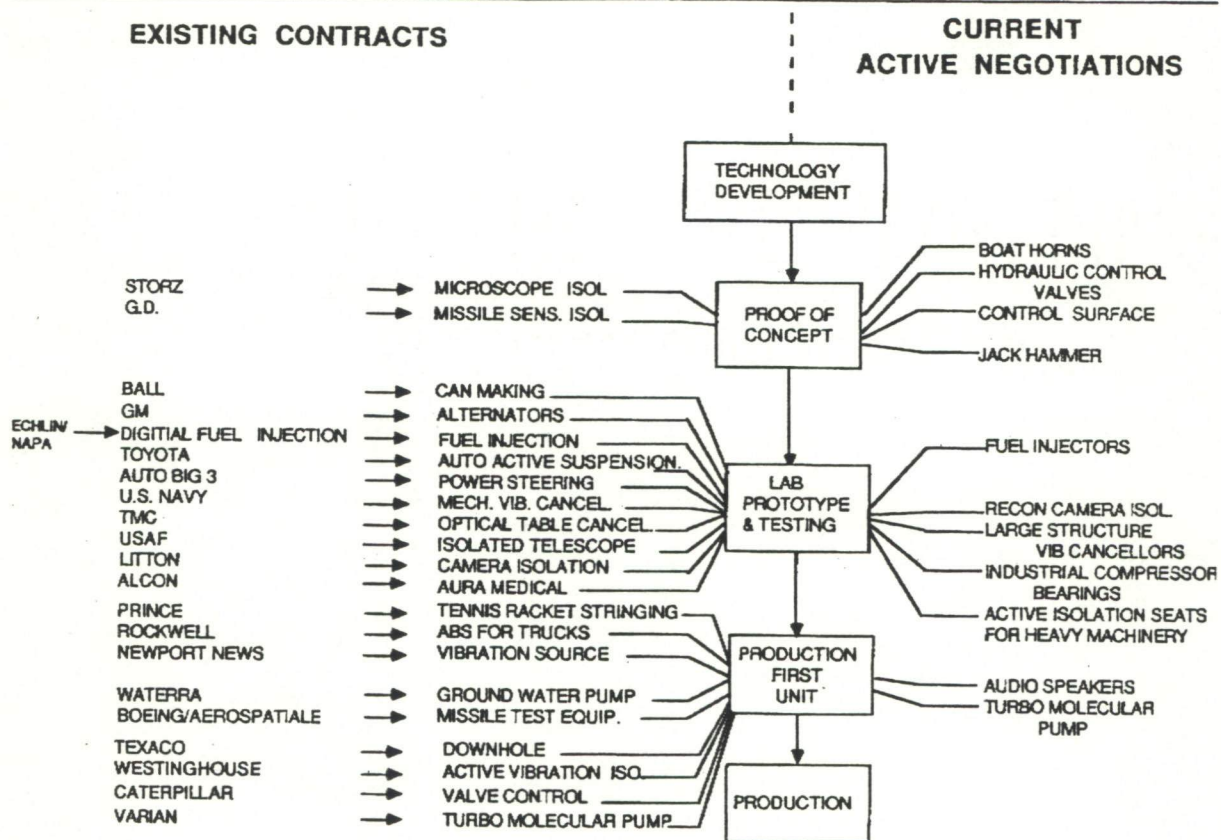


Figure 1 is a table summarizing many of the business activities in Aura's Magnetics Division. A milestone in Aura's development is that many new contracts are now entering the list at either the laboratory prototype or first-production stage, reducing the lead time from initial contract to full production.



Company revenues derive from four types of contracts: proof-of-concept, laboratory prototype and testing, first-units-of-production and production. From inception in 1987, contracts have progressed toward the production type, with each new level providing an exponential jump in terms of revenues. With a backlog of \$50 million in contracts, many of which are first production contracts with far larger orders pending successful utilization, the Company is experiencing strong growth.

For comparison, the Company is expected to generate \$10 million in revenues in fiscal year-ending February, 1991. This is up strongly from the two prior years of research and development. Revenues for the fiscal year that ends in February 1992 are projected to reach \$30 million, with \$0.25 per share earnings.

As the developer of these technologies, Aura has very substantial room to grow. Management targets three major markets for their magnetics technologies with sales potentials on a scale approaching those of the computer hardware and software markets worldwide: machinery (magnetic bearings), transportation (actuator technology) and medical (magnabit technology). And an additional three major markets with cumulative sales potentials in the hundreds of millions of dollars: industrial and domestic markets for actuators, HDTV picture tube production and movie distribution to theaters in conjunction with the Movie-Producing Artists Association (MPAA) and the National Association of Theater Operators (NATO).

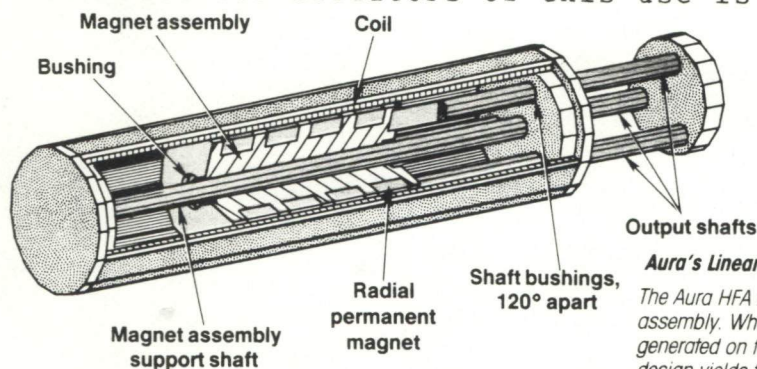
#### AURA'S ELECTROMAGNETIC ACTUATOR "Mechanical Parts That Think"

An actuator is a simple device that impels a force in a direction for a certain distance. A car door latch, a power window, a washing-machine's on-off switch, a stamping machine - these are examples of actuators. Most hydraulic, pneumatic and ball-screw systems serve actuator functions -- controlled linear force.

Aura's computerized, electromagnetic actuators provide several advantages which are starting their sweep with transportation and industrial applications. Light-weight, low-energy, low-cost, high-speed and adaptable in terms of force delivered and distance covered, Aura's actuators bring computerized electronics to the mechanical realm.

Aura's active suspension system for automobiles is an example. Aura's actuator counters vibrations not absorbed by shocks in micro-seconds, so the vibrations do not reach the passenger compartment. As the driver turns off a paved road onto a gravel-and-dirt road, for example, the mechanical resilience in the shocks remains the same, however the actuator adjusts to provide the same smooth ride. The

force and distance of the actuator's counter-thrust, which isolates vibrations to the suspension, are automatically adjusted by increased electrical current to counter the force of greater bumps. So, rather than performing the same, mechanical function, like a shock absorber, the electromagnetic actuator is programmed to adjust to always serve the driver with an adaptable mechanical service which responds according to external changes to provide a smooth ride. Aura's first contract for actuators of this use is with Toyota.



**Aura's Linear High Force Actuator**

*The Aura HFA is made up of two basic assemblies, the inner magnetic assembly and the outer coil assembly. When current is applied to the coil attached to the outer housing, a perpendicular force is generated on the magnet assembly that is transferred to the output shafts. This patented magnet design yields the highest forces and longest stroke lengths of any linear actuator available today.*

Another basic industrial use for Aura's actuator is the stamping machine, used to make cans, boxes and other objects, and to label all of these. In this case, it is the speed, low-cost and adaptability of the actuator which replaces the mechanical or electrical stamping machine - yielding a doubling of productivity. Aura's first contract is with Ball Manufacturing, the world's third-largest can manufacturer.

Aura's management is now actively negotiating contracts with major companies from several industries for numerous other large-scale applications of their actuator technology.

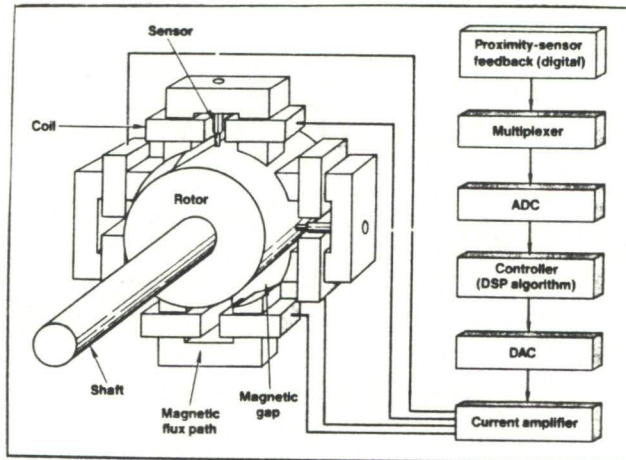
### AURA'S MAGNETIC BEARINGS Rotary Motion Without Friction

Most mechanical work is performed by linear force or rotary force. The Aura actuator makes breakthroughs using linear force, and the Company is making major advances with rotary force as well. Aura extends the frontier of mechanics with basic, new technologies in both areas, providing whole new efficiencies and capabilities for devices that function either linearly or by rotation.

Levitation using magnetic forces to balance an object within magnetic fields has been a long-term postulate. However, the speed required of sensors, processors and field current drivers to maintain balance when the field is being thrown out of balance at every moment has not been possible until the present era of digital electronics and micro-computers. Aura's digital controls measure and adjust the position of the rotor in the field 5,000 times per second. Since an electro-



magnet's field is proportional to the current, these adjustments keep the rotor in the middle of the field. Because moving parts do not touch anything, friction does not occur. Lubrication and lubrication systems are not used. Moving parts wear very minimally.



The first commercial application of Aura's magnetic bearing is expected to be turbo-molecular pumps contracted by Varian for 1991 delivery. These high-speed pumps are used throughout industry to produce high-purity vacuum conditions. Aura is retrofitting the pumps, replacing bearing casings with magnetic bearings and adding electronic control systems. The length of time between repairs is projected to extend from the present 4 months to 3 to 4 years. Cost and time of repairs will plummet because standard boards will be replaced instead of entire bearing casings. Varian customers are expected to realize an appreciable gain in factory productivity.

Automobile alternators are a second prime commercial application. Without mechanical bearings, the alternator shaft can spin at a higher speed, generating the same or more electrical power from a smaller, lighter, less expensive alternator. Aura's development contract is with General Motors, targetting 1992 or 1993 for first commercial uses.

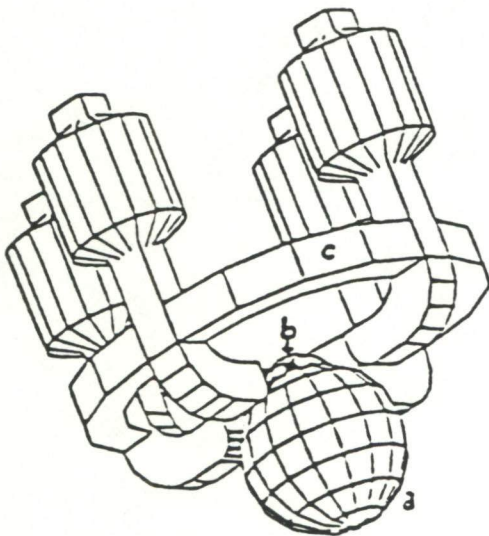
Utilities, oil companies and motor manufacturers are also recognizing the power of this technology. Their acceptance level is further indication of the magnitude and economics of magnetic bearings. Oil companies, with massive machinery and bearings under constant assault from sand and wind in remote desert conditions, provide exceptional opportunities for early production units of all sizes. Performance of all units can be monitored from great distance, a further advance.

Considering the pervasiveness of motors, pumps, compressors, engines and turbines in the industrialized world, Aura's magnetic bearing technology will impact the world's energy equation.

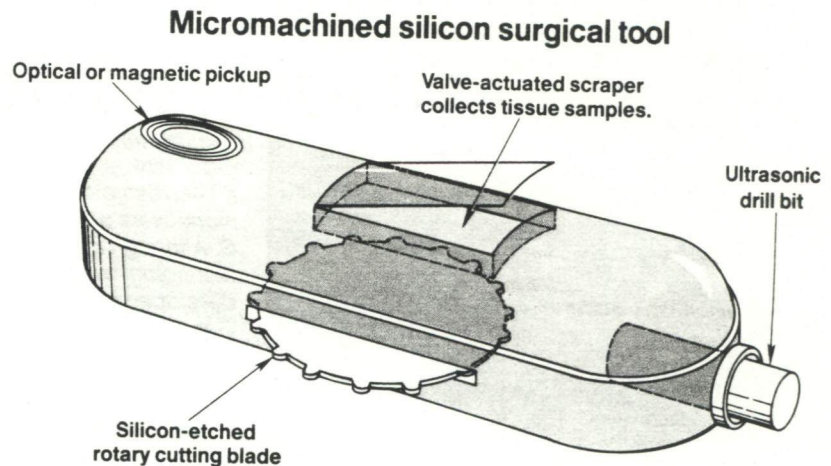
## MAGNETICALLY-ASSISTED SURGICAL TECHNIQUES Surgery Without Pain Or Incisions

Aura's magnetically-assisted surgical techniques realize another broadly-postulated goal of mankind. They offer the prospect of surgery without pain or heavy drugs, with accelerated recovery. They make life-extending, new surgical procedures possible, without the misery or unconsciousness. They make internal-specific medicines and treatments possible without side-effects throughout the body. They make out-patient clearing of arteries possible. Strokes, atherosclerosis, some types of heart attacks and cancers can become early targets for prevention.

These radical advances are all made possible by precision control of tiny magnetized particles within magnetic fields. The magnabit is directed by a magnetic control device, consisting of a magnetic yoke, a computer-controlled motion system, optical camera sensors and position sensors. These are relatively low tech, low capitalization and are not difficult to comprehend compared with most medical advances.



Aura Medical System's Approach to Cataract Surgery: (a) Eye (b) Magnabit (c) Magnetic Yoke.



*Future magnabit, micromachined from silicon, might deploy rotary cutting blades, ultrasonic drill bits, and valve-actuated scrapers to collect tissue samples. Optical or electromagnetic pickups would provide communication channels between surgeon and tool.*

Aura Medical Systems Inc. was organized specifically to develop the potential of this technology for just one of these areas, cataract surgery. Three million cataract surgeries are performed annually -- more than any other operation. Each of these operations involves a minimum six millimeter incision to the front portion of the eye. It is the size of the incision itself which prevents optimum healing. The patient loses the ability to focus clearly. Healing is slow.



The size of the incision using Aura's magnetically-assisted surgical techniques is one millimeter. Because of the small size of the Magnabit, and the precise control of its position by magnetics, the affected area is minimized and collateral damage is greatly reduced. The natural focusing ability of the eye by the tensing of muscles continues intact after the operation. This has been tested and proven with laboratory surgeries.

Aura Medical Systems Inc. is a joint venture formed by Aura Systems Inc. (60%), Charles D. Kelman, M.D. (30%) and investors (10%), including Alcon Surgical, Inc., a division of Nestle. Dr. Kelman has a worldwide reputation in ophthalmology. He pioneered phacoemulsification, the technique most used presently for cataract surgeries worldwide. He is also phacoemulsification's greatest critic, and the developer of the exact procedures for cataract surgery using Aura magnetic technologies, known as KELMAST.

Dr. Kelman, Aura Medical and Alcon will be performing cataract surgeries on animals in late-1991. Within five years the company hopes to gain a 27% market share of cataract surgeries worldwide, with approximate revenues of \$100 million annually. This includes the time for the approval process in the U.S. and other countries.

Other medical procedures presently in development by Aura include a local, internal, drug-delivery system and a local, heat-delivery system for cancer and tumor cells.

#### AURA'S DIGITAL TV AND MOVIE PROJECTOR TECHNOLOGY

##### The Future of Television

##### The Future of Movie Distribution

High-definition television is still ten years in the future for most of us, but it is already the subject of intense competition among several large electronics companies. High-definition television (HDTV) posits intense picture clarity and color from approximately 1100 horizontal and 1900 vertical lines of information on the screen compared to today's 330 horizontal and 470 vertical lines.

HDTV is bogged at the international standards-setting level, with relative equilibrium among several political and power factions on several criteria. Standards in just the US are not scheduled to be established by the FCC until 1993. When standards are set, HDTV will still require new production equipment and transmission equipment at all networks, television stations, advertising production companies and satellite transmission facilities internationally. This is a substantial recapitalization. All this, plus a gradual turnover to new and more expensive television sets by consumers worldwide.

One US company does hold a powerful key in this gradually emerging industry - Aura Systems. With no need to participate in the "issues," Aura may gain the lion's share of picture-tube production for these large electronic firms because of its internationally patent-protected projection technology.

Aura's UMTV projection technology -- named after Dr. Gregory Um, the inventor and Aura's vice president, Electro-Optics Division -- has a very significant advantage over competing HDTV projection technologies: light and color intensity.

UMTV technology uses actual light as its source, not electrons, as are used in cathode-ray tubes in today's television and most other HDTV projection technologies. HDTV requires a far stronger light source than conventional television because of the increased detail of information on the screen at every moment. Also, for the human eye to take advantage of the improved resolution, the size of the screen is increased, thus adding to the intensity needed to keep the image bright. If the source of this light is an electron gun or cathode ray tube, the viewer may be exposed to a dangerous level of x-rays. A further issue involves the weak intensity of light and color obtained by other HDTV projection technologies. They can achieve an intensity adequate for small screen clarity, but start to fade with larger screens and can not approach the intensity necessary for big-screen HDTV.

Aura management, along with several HDTV experts, believes that UMTV technology, and Aura picture tubes, will be an integral and necessary part of the HDTV revolution. Utilizing automated production techniques, Aura believes that the cost of their displays will be in the commercially affordable range, a key advantage. This may well become Aura's largest, direct "name-recognition" relationship with the greater consumer public.

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In the meantime, Aura's UMTV projection technology has a more immediate and similarly huge marketplace -- the distribution of movies to theaters, first, nationally, then internationally. The distribution of movies to theaters is a key concern to both producers and exhibitors as represented by the Movie-Producing Artists' Association (MPAA) and the National Association of Theater Operators (NATO). Both sides have searched for the past twenty years for a better way to distribute movies. Despite today's satellite transmission and telephone transmission capabilities, movies are still actually distributed the old way: in cans of film by physical transport, movie house to movie house, screen room to screen room.



It is an approximate \$300 million to \$500 million per year industry - dominated by the cost of film base, which is dominated by Kodak, and various kinds of labor, transportation and facilities. The process is profligately wasteful. On the one hand, producers generally cannot take advantage of audience demand in a timely manner. On the other hand, many theater owners are frozen out of first run shows due to print demand in more lucrative markets. To deliver product when and where desired becomes possible with the distribution system developed by Aura's subsidiary, Aura Distribution Systems, Inc.

One duplicate of today's average movie costs \$1,500 to \$2,000 to make. It weighs 140 pounds, consisting of seven cans of film at 20 pounds per can. 90% of the duplicates are not useable after six months because of lack of demand and because they are damaged by use and mishandling. The connections of film between each of the cans are newly spliced together into one roll, called a platen, at each screen they are used, and cut apart again before being moved.

The fact that illegal duplications might be made between 3AM and 7AM each day throughout the country, for shipment outside the U.S., adds insult to injury and millions of dollars in lost revenues for the members of MPAA and their employees and performing artists. Keeping track of the physical location of some 190,000 prints a year requires much effort as well and is not always successfully achieved.

Two problems have remained unsolvable over the twenty years: light intensity and resolution at the theater big-screen level, plus capturing the demand when the demand is there. Both are solved by the AuraScope projector and its companion distribution system. An informal letter from MPAA to Aura after several meetings with both the major, individual production studios and the major theater-chain owners is testimony to the prospect of Aura's control of the movie distribution system in the US over the coming four to five years. Extensive studies show that the AuraScope projector and its companion distribution system are expected to reduce annual movie distribution costs by 21%, or between \$80 million and \$100 million per year.

The next step, and the most crucial, is the viewing of Aura's proof-of-concept projectors by MPAA and NATO members, scheduled for late-1991. It is the same step which is Aura's next move into the HDTV industry. The same projector provides proof-of-concept for HDTV picture tubes. Well into the development, Aura management is confident of their schedule and quality of research.

# # #

## AURA SYSTEMS, INC.

### Key Personnel

#### **Zvi (Harry) Kurtzman, President and Director**

From 1982 to 1988, Mr. Kurtzman served as president and director of IIS (Innovative Information Systems, Inc.) and CMI (Cypher Master, Inc.), forerunners of Aura Systems. He also served as senior scientist at Science Applications International Corporation from 1984 to 1985, and held a similar position at Hughes Aircraft Company from 1983 to 1984. Prior to then, he consulted for major defense subcontractors in the fields of computers, automation and engineering. He received a New Technology Utilization Award from Rockwell International for his work on the space shuttle, and commendation letters from TRW and Hughes for his consulting work at those organizations. Mr. Kurtzman obtained his B.S. and M.S. degrees in Physics from California State University, Northridge, and completed course work towards a Ph.D. in theoretical Physics at the University of California at Riverside.

#### **Arthur J. Schwartz, Ph.D., Executive Vice President and Director**

Dr. Schwartz served as Executive Vice President and a director of CMI since 1984. In addition, Dr. Schwartz was appointed President of IIS in 1988 after having served as its Executive Vice President since 1984, and has been a director of IIS since 1984. Dr. Schwartz obtained his M.S. degree in physics from the University of Chicago in 1971 and a Ph.D. in physics from the University of Pittsburgh in 1987. He was employed as Technical Director with Science Applications International Corp. from 1983 to 1984 and was a senior physicist with Hughes Aircraft Company from 1980 to 1984. While at Hughes, Dr. Schwartz was responsible for advanced studies and development where he headed a research and development effort for new technologies to process optical signals detected by space sensors.

#### **Neal B. Kaufman, Senior Vice President, Director**

Mr. Kaufman, appointed as a director in 1989, is Senior Vice President in charge of Software Development for Aura, where he has served since 1988. He earlier served as President and Vice President of CMI, since 1984 and 1988, respectively. He has also been a director of CMI since 1984. Mr. Kaufman graduated from the University of California, Los Angeles, in 1967 where he obtained a B.S. in engineering. He was



employed as a software project manager with Abacus Programming Corp. from 1975 to 1985 where he headed a team of software specialists on the Gas Centrifuge Nuclear Fuel Enrichment Program for the United States Department of Energy and developed software related to the Viking and Mariner projects for the California Institute of Technology Jet Propulsion Laboratory in Pasadena, California.

**Cipora Kurtzman, Senior Vice President, Director**

Ms. Kurtzman was appointed Vice President in charge of Marketing and Contracts for the Company in 1988, was appointed a director of the Company in 1989, and advanced to Senior Vice President in 1990. She was the Director of Contracts and Marketing for CMI, where she served from 1985 to 1988. Ms. Kurtzman received her B.S. degree in business administration from California State University, Northridge in 1983.

**Francis T. Phalen, Senior Vice President, Chief Financial Officer, Director**

Mr. Phalen has been the Company's Chief Financial Officer since November 1988 and has been a director of the Company since 1989. From August 1987 until Mr. Phalen joined the Company he was Associate Director, Corporate Finance, for Bear Stearns & Co. in Los Angeles. From October 1986 through November 1987 Mr. Phalen served as Vice President and Treasurer of Carter Hawley Hale Stores, Inc. For the three years prior, he was a partner in the public accounting firm of Deloitte & Touche.

**C. Rogers Saxon, Ph.D., Vice President**

Dr. Saxon was appointed Vice President in charge of Advanced Computing for Aura in 1988. Prior to this, he was a Program Manager for CMI where he had served since 1986. Dr. Saxon received his B.S. degree in mathematics from Harvey Mudd College in 1966, an M.A. degree in operations research from Claremont Graduate School in 1977, and M.A. and Ph.D. degrees in cognitive psychology from the University of California, Irvine in 1982 and 1985, respectively. From 1984 to 1986, Dr. Saxon worked for Abacus Programming Corp. on the Space Shuttle Project. His services for Abacus were performed at Rockwell International and included leading the team that developed an expert system for Space Shuttle electrical cable configuration and routing.

### **Keith Stuart, Vice President and Manager of the Magnetics Division**

In 1986, Mr. Stuart was the Program Manager of Aura's (then Innovative Information System) first magnetic bearing contract, and was instrumental in the development of the basic technology used in all of Aura's magnetic bearing products. From 1987 to the present, Mr. Stuart has been a Vice President for Aura, responsible for all of Aura's work in magnetics. As inventor of the patented high force actuator, Mr. Stuart extended Aura's product line to include commercial applications such as automotive active suspension, electronic valve lifting and highly efficient motors, among many others. Before joining Aura, Stuart was a technical manager at Hughes Aircraft Company. He received his Masters of Science degree in Electrical Engineering from UCLA in 1980.

### **Gregory Um, Ph.D., Vice President**

Gregory Um, Ph.D., was appointed Vice President in charge of the Electro-Optic Systems Division for Aura in 1988. He earlier served as Chief Scientist of IIS during 1987 and worked for CMI during 1986. He was the principal inventor of Aura's scene projectors and holds numerous patents. Dr. Um received his B.S. degree in physics from the University of California, Berkeley in 1970 and his Ph.D. in physics from the State University of New York in 1976. From 1983 to 1986, Dr. Um worked for Hughes Aircraft Company as a senior scientist where he was involved in sensor system engineering, signal processing algorithms, wavefront sensors, thermal analysis and electro-optical sensor modelling and simulation.

### **Michael Wilde, Director**

Mr. Wilde has served as director since inception and President of Delphi Inc., a wholly-owned subsidiary of Aura, since March 1987. From 1971 to 1984, Mr. Wilde was employed with M/A COM Omni Spectra, most recently as Business Center Manager, primarily responsible for administrative, engineering and financial affairs. From 1984 to March, 1986, Mr. Wilde was employed with E.W. Components as Vice President. Mr. Wilde has a Bachelor of Science degree in Electronic Technology.



AURA SYSTEMS INC.

Corporate Information

Aura Systems, Inc., was formed in February 1987 by a group of scientists and engineers to develop magnetics and related technologies.

Company financial performance:

| <u>Fiscal Year</u><br><u>Ending 2/28</u> | <u>Revenues</u> | <u>EPS</u>   |
|------------------------------------------|-----------------|--------------|
| 1989                                     | \$ 2.9M         | (\$0.09)     |
| 1990                                     | \$ 9.1M         | (\$0.16)     |
| 1991 (E)                                 | \$ 10.0M (E)    | (\$0.15) (E) |
| 1992 (E)                                 | \$ 30.0M (E)    | \$0.25 (E)   |

| <u>Shares Outstanding</u> | <u>Market Cap</u>                          | <u>Capitalization</u>   |
|---------------------------|--------------------------------------------|-------------------------|
| 22.7M                     | \$35.0M<br>(based on 1 3/4<br>share price) | (in millions 8/31/90)   |
|                           |                                            | Short-term debt \$0.27  |
|                           |                                            | Long-term debt 0.27     |
|                           |                                            | Convertible debt 6.85   |
|                           |                                            | Shareholder Equity 5.91 |
|                           |                                            | <u>\$13.30</u>          |

Directors

|                           |                 |
|---------------------------|-----------------|
| Zvi Kurtzman              | Neal B. Kaufman |
| Arthur J. Schwartz, Ph.D. | Cipora Kurtzman |
| Francis T. Phalen         | Norman Reitman  |
| Peter C. Jaquith          |                 |

Officers

|                           |                                             |
|---------------------------|---------------------------------------------|
| Zvi Kurtzman              | President                                   |
| Arthur J. Schwartz, Ph.D. | Executive Vice President                    |
| Neal B. Kaufman           | Senior Vice President-Software Development  |
| Cipora Kurtzman           | Senior Vice President-Marketing & Contracts |
| Francis T. Phalen         | Senior Vice President, Chief Financial Off. |
| Joseph F. Bevacqua        | Vice President-Chief Accounting Officer     |
| Rogers Saxon, Ph.D.       | Vice President-Advanced Computing           |
| Keith O. Stuart           | Vice President-Hardware Development         |
| Gregory Um, Ph.D.         | Vice President-Electro-Optics Systems       |

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Contact

Cipora Kurtzman  
Senior Vice President  
213-643-5300  
or  
George Duggan  
Michael Baybak & Co., Inc.  
213-276-4660



"CORRESPONDENCE TRACKING"

TYPE: ACTION

DOCUMENT NUMBER: 9120590

\*\*\*\*\*

FROM: BAYBAK, Michael: MICHAEL BAYBACH AND COMPANY, INC.

TO: DR. BROMLEY

DATE OF  
CORRESPONDENCE: 02/18/91

SUBJECT: A PROFILE ON A SMALL U.S. COMPANY THAT IS BUSILY  
REVERSING THE TREND OF JAPANESE DOMINANCE IN  
LEADING-EDGE TECHNOLOGIES.

\*\*\*\*\*

ASSIGNED TO: Dr. Phillips

ACTION REQUIRED:

\*\*\*\*\*

SENDER'S DUE DATE:

OSTP DUE DATE: 03/20/91

DATE COMPLETED:

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\*\*\*\*\*

COPIES TO: D. Allan Bromley  
Thomas Ratchford  
Dr. Wong

\*\*\*\*\*

WHITE HOUSE TRACKING #:

CONTACT PERSON:

REMARKS:

DATE RECEIVED: 03/01/91

FILE: TECHNOLOGY

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

May 7, 1991

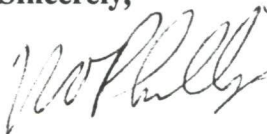
Dear Mr. Baybak:

Thank you for your recent letter to Dr. Bromley with information about Aura Systems, Inc. He has asked me to reply.

Our office has recently participated in a panel of government and private sector members to determine which technologies are most critical to U.S. national security and economic prosperity. One of the panel's conclusions was that technology can make an important contribution to the future of U.S. national interests, but only if we learn to utilize it more effectively. Thus, U.S. industry needs to improve the commercial exploitation of leading-edge technologies which the U.S. has in abundance.

We appreciate your support of U.S. technology and your interest in the activities of our office.

Sincerely,



William D. Phillips  
Associate Director for Industrial Technology

Mr. Michael Baybak  
President  
MICHAEL BAYBAK AND COMPANY, INC.  
Penthouse  
9033 Wilshire Boulevard  
Beverly Hills, CA 90211



7205 X0  
*Michael Baybak and Company, Inc.*

Corporate Public Affairs  
Financial Relations  
Market Planning  
Counsel

MAR - 1 1991

February 18, 1991

TO: DIRECTOR

D. Allan Bromley  
Office of Science and Technology  
The White House  
1600 Pennsylvania Avenue NW  
Washington, DC

Dear Dr. Bromley,

I read with interest the L.A. Times piece on you and your work.

With all the concern about the dominance of Japan in leading-edge technologies, I thought you might take some satisfaction from learning of one small U.S. company that is busily reversing the trend by having major Japanese firms steadily knocking at its door for certain seminal technologies in HDTV and electromagnetics.

The company is AURA SYSTEMS INC. I'm enclosing a profile of it. They deserve to be a factor of some type, I am sure, on your agenda.

Yours truly,



Michael Baybak  
President  
MICHAEL BAYBAK AND COMPANY, INC.

MB:et  
enclosure

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AURA SYSTEMS, INC.

CORPORATE PROFILE

January 1991:

Aura Systems, Inc. (NASDAQ: AURA), a Los Angeles-based company, is bringing new and universally-applicable electromagnetic technologies to the world. Like earlier breakthroughs - the electric motor, radio and television - Aura's technologies are far-reaching, will benefit all people and all industries worldwide and are being assimilated rapidly. Based on contracts with the largest corporations, major commercial uses are commencing in 1991. Most citizens of industrialized countries will know about and benefit from Aura's technologies by 1993.

Aura has discovered new ways to control the movement and productivity of mechanical devices by manipulating magnetic fields. This includes breakthroughs in linear force, rotary force and combinations of the two, including very precise control of objects within magnetic fields from a distance. These advances are expected to increase the efficiency and effectiveness of a high percentage of functioning parts in the whole broad world of mechanics. While Aura is clearly involved with high tech, it is a basic tech story -- with basic industrial and medical applications that provide immediate advances in manufacturing efficiencies, and improvements in quality of life, unmatched since perhaps the advent of the computer itself.

Company Overview

Aura Systems, Inc. is a public company which was formed in February 1987 by Zvi Kurtzman and Arthur Schwartz, Ph.D. The Company has three facilities in California comprising 63,000 square feet and employs 120 staff, including several Ph.D.'s and M.S.'s in physics and the other sciences. In research or development at Aura are 26 magnetics, 3 optics, 3 advanced computing and 12 microelectronics projects. 19 contracts have been signed and initiated with major corporations, and another 100 contracts are in negotiation.

The Company is listed on NASDAQ, trading symbol AURA, and has 22.5 million shares outstanding. Management projects \$0.25 per share earnings for fiscal year-ending February 1992, based on projected revenues of \$30 million. Revenues are expected to move up rapidly from there with present development contracts expanding into production orders.

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## AURA'S TECHNOLOGIES

Early uses of electromagnetic advances by Aura will transform the world in three ways.

1. Aura dramatically improves the planet's energy equation by generating mechanical productivity without friction. This is done by rotating machinery shafts in frictionless magnetic fields, called magnetic bearings, instead of within bearing casings. A simple retrofit can be done to most gas and electric motors, alternators, pumps, turbines and compressors. This advance produces an immediate 10%+ gain in energy efficiency, reduces maintenance significantly, extends machinery life, replaces lubrication and its systems and allows long-distance monitoring of mechanical performance. Present development contracts include the U.S. Navy, General Motors, utility and oil companies and others.

The same technology in new equipment extends earlier bounds to mechanical productivity by permitting higher speed rotation, less heat and less noise -- without lubrication. Because of the greater speed, more work is performed by lighter, smaller, less complex and less expensive equipment.

2. Mechanical parts that "think" will re-define mechanical applications at all levels of transportation, industry and the home. Aura's computerized, electromagnetic actuator is a mechanical device. It replaces basic things -- switches, pulleys, shocks, speaker drivers, locks, latches, hydraulic systems, and far more. Aura's actuator provides an unprecedented amount of force at an unprecedented speed in one direction, with a far lower energy requirement than present systems. Importantly, since Aura's actuator is computerized, these very basic functions can now be performed "intelligently" with an active desired response to external forces. The same device is not fixed in its motion but can function in several different ways automatically, adjusting to environmental changes or user needs. The extent of the economic uses of Aura's actuator has not been fathomed, though it is clearly in the thousands of applications across all industries.

Several applications of Aura's actuators in automobiles will be the first uses that will affect most of us. Aura's production contracts include General Motors (several operating divisions), Toyota, Caterpillar, Itek (a division of Litton), Texaco, Ball, T & N (a major British conglomerate), the U.S. Air Force, the U.S. Navy, Boeing and others. First applications include active suspension systems, vibration-isolating engine mounts, plus improvements to power steering, alternators, windshield wipers, engine timing devices, transmissions, locks, power windows, power brakes and more.

One application, Aura's actuated automobile engine valve, allows infinitely variable timing of fuel and air intake and exhaust valves. This use alone has been shown to increase fuel efficiencies by 15%, while reducing emissions by 15%. Laboratory tests have also shown that a combination of Aura's actuator technologies and the Company's magnetic bearings applied to state-of-the-art electric cars can double the efficiency of these cars. This is being pursued by electric car developers.

3. Surgery without pain or incisions, with a quantum gain in effectiveness.

When Aura engineers and scientists learned to control the movement of a tiny, spinning metal bit, called a Magnabit, within a magnetic field from a distance, with a precision several hundred times as accurate as a surgeon's hand, it became the basis for potentially the greatest advance in health care yet to come. Today, with cataract surgeries on animals being perfected to a routine using Aura's magnetically-assisted surgical techniques, the company's 60%-owned subsidiary, Aura Medical Systems Inc., has contracted with Alcon Surgical Inc. (the world's largest eye care company) to bring Magnabit cataract surgery to the public.

Longer-term, many surgeons believe that Aura's magnetically-assisted surgical techniques will enable most operations to be done by injecting a Magnabit into the patient's blood stream and directing it to perform the exact work needed, without pain or incisions.

Of course, precise control of objects from a distance using magnetics also has far-reaching industrial applications, several of which are in development now.

4. Aura - Other Technologies

a. Aura's Electro-Optics Division has developed the digital TV and movie projector technology which management believes will help to expand two large new industries in the 1990's. The first to generate revenues will be film-less, electronic distribution of movies to theaters. While there are any number of procedures for distributing a movie without film (by satellite or telephone, for example), the industry has not had a movie projector which could use these transmissions to provide a high standard of resolution and light intensity when projected to theater-screen size. Aura's digital movie projector technology -- developed by Aura to make scene generators for the U.S. Air Force for testing of aircraft sensors -- will provide exceptional definition and color and light intensity far beyond present movie-goers' standards. Movie distribution in the U.S. is an approximate \$300 million to \$500 million per year industry. The AuraScope projector and distribution system have received high



interest from the Movie-Producing Artists Association and the National Association of Theater Operators, with first viewings scheduled for late-1991.

b. The same technology solves a substantive problem facing high-definition television (HDTV). HDTV - with approximately 1100 horizontal and 1900 vertical lines of information per screen, instead of the present 330 horizontal and 470 vertical lines of information - is widely expected to provide the next generation in quality for television. Other technologies for projecting the television picture onto the screen lack adequate light and color intensity. Aura's technology, using light itself instead of cathode rays, solves both problems. First viewings are scheduled for late-1991; Aura management believes it will become a major picture-tube manufacturer for HDTV.

c. Aura is also a leader in computerized telemetry systems with its Linkage software and hardware. Linkage is a new way of connecting standard and complex external processes to human operators via computer in order to monitor, diagnose and control the system. Applications of Linkage, thus far, have been principally in the aerospace industry, monitoring and interpreting data from satellites, spacecraft and missiles for NASA, the U.S. Air Force and commercial satellite builders. With Linkage's low-cost hardware, users can extend the power of the human operator to grasp and understand what is occurring in an environment that shoots far more data at him than he could otherwise possibly assimilate.

Linkage is not a special-purpose system, like its competitors' systems. Rather, it is applicable to practically all high-volume telemetry applications. As an example of its advances compared with its aerospace competitors, the Linkage operator is monitoring schematics of the external systems, with data already evaluated and color-keyed to each area; competitor systems provide "waterfalls" of unevaluated numbers and symbols which need human translation to determine even if systems are okay or whether an emergency exists. The numbers of people needed to monitor Linkage data are dramatically reduced. With continuing revisions to systems, intensive interfacing, repairs, tighter budgeting and increasingly greater power requirements, the aerospace industry is gradually recognizing Aura's software and hardware solutions, which are modular, open architected for ease in using commercial boards and can be customized by the user to suit his needs.

Aura's Linkage telemetry systems are also now being developed for commercial applications starting with the monitoring, analysis and control of underground tunneling machinery in Japan. By establishing itself at the high-end in terms of precision and standards, management believes it can gain success with commercial applications in oil fields, utilities, banking, factory automation, flood control, fault monitoring and other industries in the years to come.

## THE ECONOMICS OF AURA'S TECHNOLOGIES

As the developer and international patent-holder of widely applicable electromagnetic technologies, with numerous additional patents pending, Aura Systems' financial future may have a growth potential that is second-to-none. The company is in the process of shifting its revenue base from government research and development, much of which was completed in 1990, to commercial development and production. In the fourth quarter of 1990 the Company realized its first sales of equipment for commercial uses and further development. It projects a steep growth curve into the Nineties.

**AURA MAGNETIC  
STATUS/ JAN. 7, 1991**

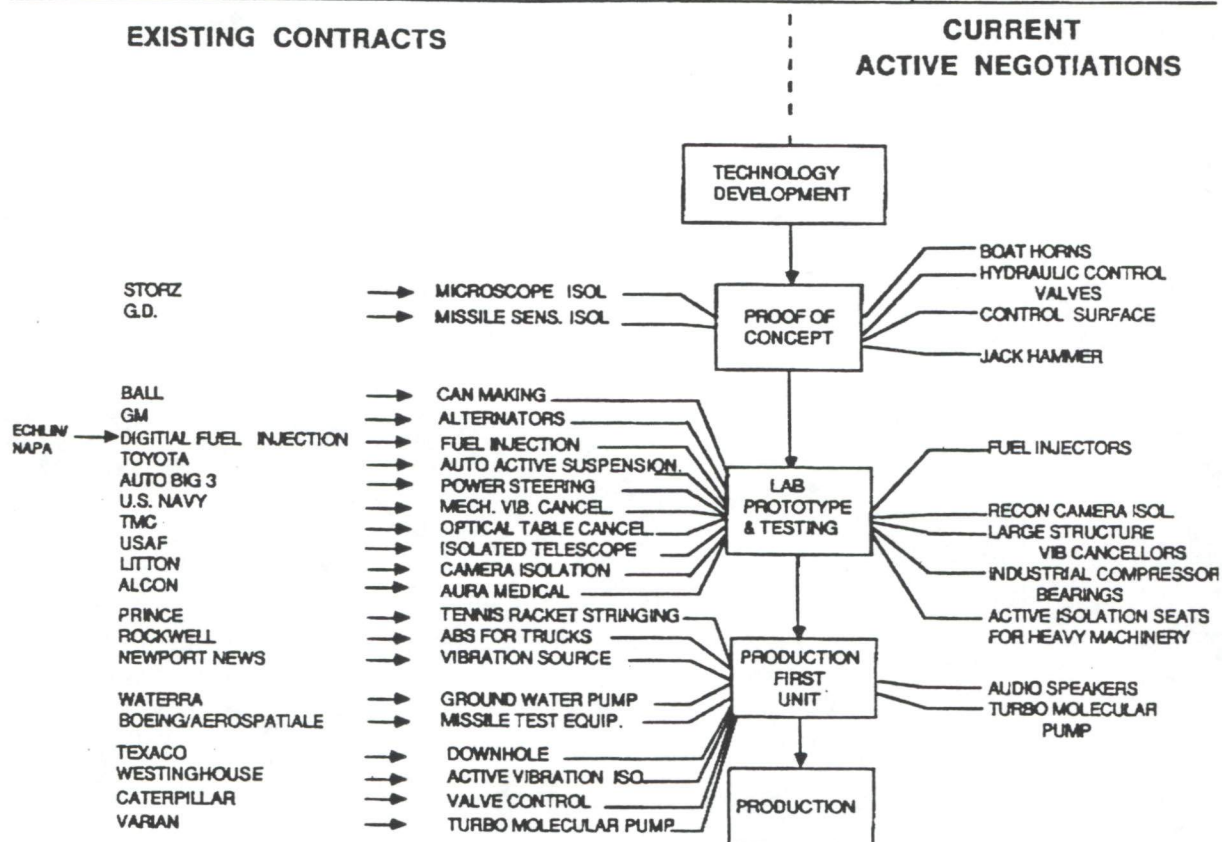


Figure 1 is a table summarizing many of the business activities in Aura's Magnetics Division. A milestone in Aura's development is that many new contracts are now entering the list at either the laboratory prototype or first-production stage, reducing the lead time from initial contract to full production.



Company revenues derive from four types of contracts: proof-of-concept, laboratory prototype and testing, first-units-of-production and production. From inception in 1987, contracts have progressed toward the production type, with each new level providing an exponential jump in terms of revenues. With a backlog of \$50 million in contracts, many of which are first production contracts with far larger orders pending successful utilization, the Company is experiencing strong growth.

For comparison, the Company is expected to generate \$10 million in revenues in fiscal year-ending February, 1991. This is up strongly from the two prior years of research and development. Revenues for the fiscal year that ends in February 1992 are projected to reach \$30 million, with \$0.25 per share earnings.

As the developer of these technologies, Aura has very substantial room to grow. Management targets three major markets for their magnetics technologies with sales potentials on a scale approaching those of the computer hardware and software markets worldwide: machinery (magnetic bearings), transportation (actuator technology) and medical (magnabit technology). And an additional three major markets with cumulative sales potentials in the hundreds of millions of dollars: industrial and domestic markets for actuators, HDTV picture tube production and movie distribution to theaters in conjunction with the Movie-Producing Artists Association (MPAA) and the National Association of Theater Operators (NATO).

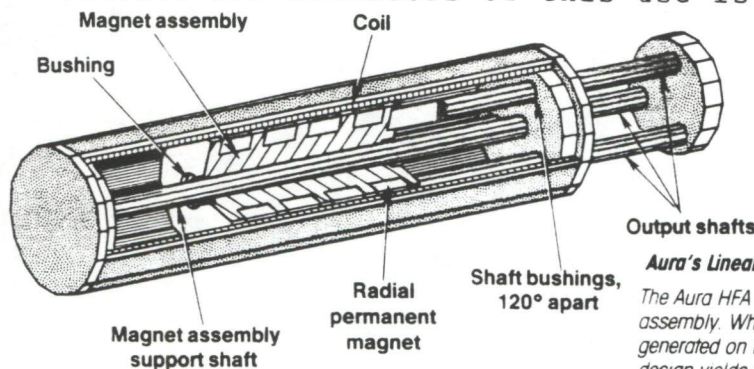
#### AURA'S ELECTROMAGNETIC ACTUATOR "Mechanical Parts That Think"

An actuator is a simple device that impels a force in a direction for a certain distance. A car door latch, a power window, a washing-machine's on-off switch, a stamping machine - these are examples of actuators. Most hydraulic, pneumatic and ball-screw systems serve actuator functions -- controlled linear force.

Aura's computerized, electromagnetic actuators provide several advantages which are starting their sweep with transportation and industrial applications. Light-weight, low-energy, low-cost, high-speed and adaptable in terms of force delivered and distance covered, Aura's actuators bring computerized electronics to the mechanical realm.

Aura's active suspension system for automobiles is an example. Aura's actuator counters vibrations not absorbed by shocks in micro-seconds, so the vibrations do not reach the passenger compartment. As the driver turns off a paved road onto a gravel-and-dirt road, for example, the mechanical resilience in the shocks remains the same, however the actuator adjusts to provide the same smooth ride. The

force and distance of the actuator's counter-thrust, which isolates vibrations to the suspension, are automatically adjusted by increased electrical current to counter the force of greater bumps. So, rather than performing the same, mechanical function, like a shock absorber, the electromagnetic actuator is programmed to adjust to always serve the driver with an adaptable mechanical service which responds according to external changes to provide a smooth ride. Aura's first contract for actuators of this use is with Toyota.



**Aura's Linear High Force Actuator**

*The Aura HFA is made up of two basic assemblies, the inner magnetic assembly and the outer coil assembly. When current is applied to the coil attached to the outer housing, a perpendicular force is generated on the magnet assembly that is transferred to the output shafts. This patented magnet design yields the highest forces and longest stroke lengths of any linear actuator available today.*

Another basic industrial use for Aura's actuator is the stamping machine, used to make cans, boxes and other objects, and to label all of these. In this case, it is the speed, low-cost and adaptability of the actuator which replaces the mechanical or electrical stamping machine - yielding a doubling of productivity. Aura's first contract is with Ball Manufacturing, the world's third-largest can manufacturer.

Aura's management is now actively negotiating contracts with major companies from several industries for numerous other large-scale applications of their actuator technology.

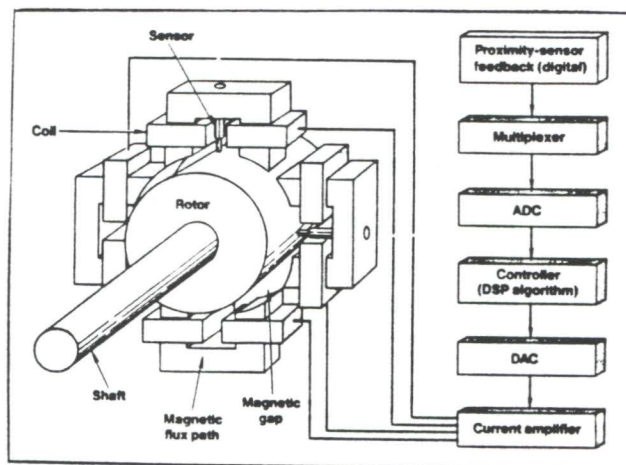
#### AURA'S MAGNETIC BEARINGS Rotary Motion Without Friction

Most mechanical work is performed by linear force or rotary force. The Aura actuator makes breakthroughs using linear force, and the Company is making major advances with rotary force as well. Aura extends the frontier of mechanics with basic, new technologies in both areas, providing whole new efficiencies and capabilities for devices that function either linearly or by rotation.

Levitation using magnetic forces to balance an object within magnetic fields has been a long-term postulate. However, the speed required of sensors, processors and field current drivers to maintain balance when the field is being thrown out of balance at every moment has not been possible until the present era of digital electronics and micro-computers. Aura's digital controls measure and adjust the position of the rotor in the field 5,000 times per second. Since an electro-



magnet's field is proportional to the current, these adjustments keep the rotor in the middle of the field. Because moving parts do not touch anything, friction does not occur. Lubrication and lubrication systems are not used. Moving parts wear very minimally.



The first commercial application of Aura's magnetic bearing is expected to be turbo-molecular pumps contracted by Varian for 1991 delivery. These high-speed pumps are used throughout industry to produce high-purity vacuum conditions. Aura is retrofitting the pumps, replacing bearing casings with magnetic bearings and adding electronic control systems. The length of time between repairs is projected to extend from the present 4 months to 3 to 4 years. Cost and time of repairs will plummet because standard boards will be replaced instead of entire casings. Varian customers are expected to realize an appreciable gain in factory productivity.

Automobile alternators are a second prime commercial application. Without mechanical bearings, the alternator shaft can spin at a higher speed, generating the same or more electrical power from a smaller, lighter, less expensive alternator. Aura's development contract is with General Motors, targetting 1992 or 1993 for first commercial uses.

Utilities, oil companies and motor manufacturers are also recognizing the power of this technology. Their acceptance level is further indication of the magnitude and economics of magnetic bearings. Oil companies, with massive machinery and bearings under constant assault from sand and wind in remote desert conditions, provide exceptional opportunities for early production units of all sizes. Performance of all units can be monitored from great distance, a further advance.

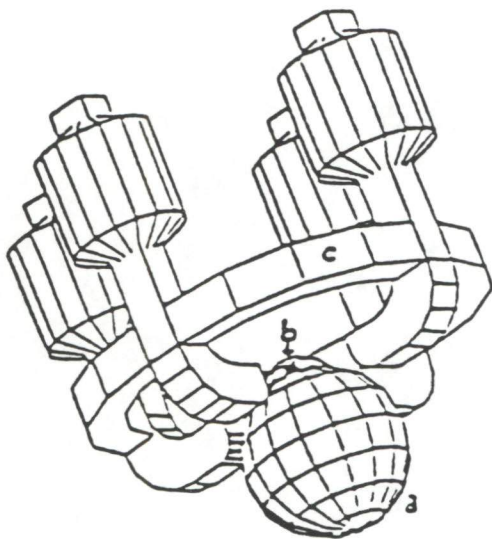
Considering the pervasiveness of motors, pumps, compressors, engines and turbines in the industrialized world, Aura's magnetic bearing technology will impact the world's energy equation.

## MAGNETICALLY-ASSISTED SURGICAL TECHNIQUES

### Surgery Without Pain Or Incisions

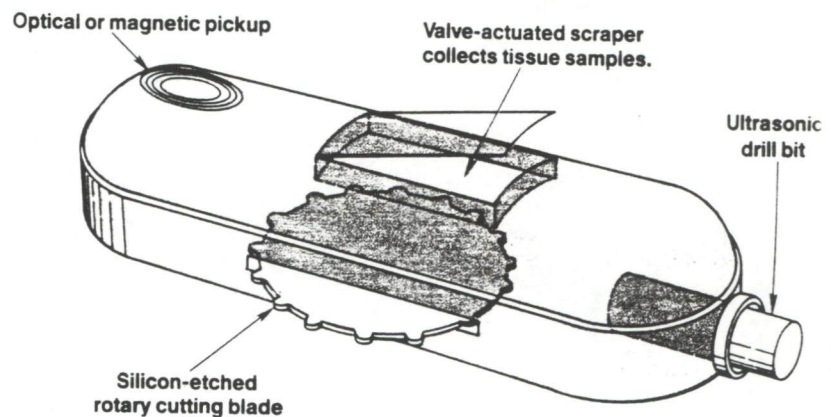
Aura's magnetically-assisted surgical techniques realize another broadly-postulated goal of mankind. They offer the prospect of surgery without pain or heavy drugs, with accelerated recovery. They make life-extending, new surgical procedures possible, without the misery or unconsciousness. They make internal-specific medicines and treatments possible without side-effects throughout the body. They make out-patient clearing of arteries possible. Strokes, atherosclerosis, some types of heart attacks and cancers can become early targets for prevention.

These radical advances are all made possible by precision control of tiny magnetized particles within magnetic fields. The magnabit is directed by a magnetic control device, consisting of a magnetic yoke, a computer-controlled motion system, optical camera sensors and position sensors. These are relatively low tech, low capitalization and are not difficult to comprehend compared with most medical advances.



Aura Medical System's Approach to Cataract Surgery: (a) Eye (b) Magnabit (c) Magnetic Yoke.

### **Micromachined silicon surgical tool**



*Future magnabit, micromachined from silicon, might deploy rotary cutting blades, ultrasonic drill bits, and valve-actuated scrapers to collect tissue samples. Optical or electromagnetic pickups would provide communication channels between surgeon and tool.*

Aura Medical Systems Inc. was organized specifically to develop the potential of this technology for just one of these areas, cataract surgery. Three million cataract surgeries are performed annually -- more than any other operation. Each of these operations involves a minimum six millimeter incision to the front portion of the eye. It is the size of the incision itself which prevents optimum healing. The patient loses the ability to focus clearly. Healing is slow.



The size of the incision using Aura's magnetically-assisted surgical techniques is one millimeter. Because of the small size of the Magnabit, and the precise control of its position by magnetics, the affected area is minimized and collateral damage is greatly reduced. The natural focusing ability of the eye by the tensing of muscles continues intact after the operation. This has been tested and proven with laboratory surgeries.

Aura Medical Systems Inc. is a joint venture formed by Aura Systems Inc. (60%), Charles D. Kelman, M.D. (30%) and investors (10%), including Alcon Surgical, Inc., a division of Nestle. Dr. Kelman has a worldwide reputation in ophthalmology. He pioneered phacoemulsification, the technique most used presently for cataract surgeries worldwide. He is also phacoemulsification's greatest critic, and the developer of the exact procedures for cataract surgery using Aura magnetic technologies, known as KELMAST.

Dr. Kelman, Aura Medical and Alcon will be performing cataract surgeries on animals in late-1991. Within five years the company hopes to gain a 27% market share of cataract surgeries worldwide, with approximate revenues of \$100 million annually. This includes the time for the approval process in the U.S. and other countries.

Other medical procedures presently in development by Aura include a local, internal, drug-delivery system and a local, heat-delivery system for cancer and tumor cells.

#### AURA'S DIGITAL TV AND MOVIE PROJECTOR TECHNOLOGY

##### The Future of Television The Future of Movie Distribution

High-definition television is still ten years in the future for most of us, but it is already the subject of intense competition among several large electronics companies. High-definition television (HDTV) posits intense picture clarity and color from approximately 1100 horizontal and 1900 vertical lines of information on the screen compared to today's 330 horizontal and 470 vertical lines.

HDTV is bogged at the international standards-setting level, with relative equilibrium among several political and power factions on several criteria. Standards in just the US are not scheduled to be established by the FCC until 1993. When standards are set, HDTV will still require new production equipment and transmission equipment at all networks, television stations, advertising production companies and satellite transmission facilities internationally. This is a substantial recapitalization. All this, plus a gradual turnover to new and more expensive television sets by consumers worldwide.

One US company does hold a powerful key in this gradually emerging industry - Aura Systems. With no need to participate in the "issues," Aura may gain the lion's share of picture-tube production for these large electronic firms because of its internationally patent-protected projection technology.

Aura's UMTV projection technology -- named after Dr. Gregory Um, the inventor and Aura's vice president, Electro-Optics Division -- has a very significant advantage over competing HDTV projection technologies: light and color intensity.

UMTV technology uses actual light as its source, not electrons, as are used in cathode-ray tubes in today's television and most other HDTV projection technologies. HDTV requires a far stronger light source than conventional television because of the increased detail of information on the screen at every moment. Also, for the human eye to take advantage of the improved resolution, the size of the screen is increased, thus adding to the intensity needed to keep the image bright. If the source of this light is an electron gun or cathode ray tube, the viewer may be exposed to a dangerous level of x-rays. A further issue involves the weak intensity of light and color obtained by other HDTV projection technologies. They can achieve an intensity adequate for small screen clarity, but start to fade with larger screens and can not approach the intensity necessary for big-screen HDTV.

Aura management, along with several HDTV experts, believes that UMTV technology, and Aura picture tubes, will be an integral and necessary part of the HDTV revolution. Utilizing automated production techniques, Aura believes that the cost of their displays will be in the commercially affordable range, a key advantage. This may well become Aura's largest, direct "name-recognition" relationship with the greater consumer public.

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In the meantime, Aura's UMTV projection technology has a more immediate and similarly huge marketplace -- the distribution of movies to theaters, first, nationally, then internationally. The distribution of movies to theaters is a key concern to both producers and exhibitors as represented by the Movie-Producing Artists' Association (MPAA) and the National Association of Theater Operators (NATO). Both sides have searched for the past twenty years for a better way to distribute movies. Despite today's satellite transmission and telephone transmission capabilities, movies are still actually distributed the old way: in cans of film by physical transport, movie house to movie house, screen room to screen room.



It is an approximate \$300 million to \$500 million per year industry - dominated by the cost of film base, which is dominated by Kodak, and various kinds of labor, transportation and facilities. The process is profligately wasteful. On the one hand, producers generally cannot take advantage of audience demand in a timely manner. On the other hand, many theater owners are frozen out of first run shows due to print demand in more lucrative markets. To deliver product when and where desired becomes possible with the distribution system developed by Aura's subsidiary, Aura Distribution Systems, Inc.

One duplicate of today's average movie costs \$1,500 to \$2,000 to make. It weighs 140 pounds, consisting of seven cans of film at 20 pounds per can. 90% of the duplicates are not useable after six months because of lack of demand and because they are damaged by use and mishandling. The connections of film between each of the cans are newly spliced together into one roll, called a platen, at each screen they are used, and cut apart again before being moved.

The fact that illegal duplications might be made between 3AM and 7AM each day throughout the country, for shipment outside the U.S., adds insult to injury and millions of dollars in lost revenues for the members of MPAA and their employees and performing artists. Keeping track of the physical location of some 190,000 prints a year requires much effort as well and is not always successfully achieved.

Two problems have remained unsolvable over the twenty years: light intensity and resolution at the theater big-screen level, plus capturing the demand when the demand is there. Both are solved by the AuraScope projector and its companion distribution system. An informal letter from MPAA to Aura after several meetings with both the major, individual production studios and the major theater-chain owners is testimony to the prospect of Aura's control of the movie distribution system in the US over the coming four to five years. Extensive studies show that the AuraScope projector and its companion distribution system are expected to reduce annual movie distribution costs by 21%, or between \$80 million and \$100 million per year.

The next step, and the most crucial, is the viewing of Aura's proof-of-concept projectors by MPAA and NATO members, scheduled for late-1991. It is the same step which is Aura's next move into the HDTV industry. The same projector provides proof-of-concept for HDTV picture tubes. Well into the development, Aura management is confident of their schedule and quality of research.

# # #

## AURA SYSTEMS, INC.

### Key Personnel

#### **Zvi (Harry) Kurtzman, President and Director**

From 1982 to 1988, Mr. Kurtzman served as president and director of IIS (Innovative Information Systems, Inc.) and CMI (Cypher Master, Inc.), forerunners of Aura Systems. He also served as senior scientist at Science Applications International Corporation from 1984 to 1985, and held a similar position at Hughes Aircraft Company from 1983 to 1984. Prior to then, he consulted for major defense subcontractors in the fields of computers, automation and engineering. He received a New Technology Utilization Award from Rockwell International for his work on the space shuttle, and commendation letters from TRW and Hughes for his consulting work at those organizations. Mr. Kurtzman obtained his B.S. and M.S. degrees in Physics from California State University, Northridge, and completed course work towards a Ph.D. in theoretical Physics at the University of California at Riverside.

#### **Arthur J. Schwartz, Ph.D., Executive Vice President and Director**

Dr. Schwartz served as Executive Vice President and a director of CMI since 1984. In addition, Dr. Schwartz was appointed President of IIS in 1988 after having served as its Executive Vice President since 1984, and has been a director of IIS since 1984. Dr. Schwartz obtained his M.S. degree in physics from the University of Chicago in 1971 and a Ph.D. in physics from the University of Pittsburgh in 1987. He was employed as Technical Director with Science Applications International Corp. from 1983 to 1984 and was a senior physicist with Hughes Aircraft Company from 1980 to 1984. While at Hughes, Dr. Schwartz was responsible for advanced studies and development where he headed a research and development effort for new technologies to process optical signals detected by space sensors.

#### **Neal B. Kaufman, Senior Vice President, Director**

Mr. Kaufman, appointed as a director in 1989, is Senior Vice President in charge of Software Development for Aura, where he has served since 1988. He earlier served as President and Vice President of CMI, since 1984 and 1988, respectively. He has also been a director of CMI since 1984. Mr. Kaufman graduated from the University of California, Los Angeles, in 1967 where he obtained a B.S. in engineering. He was



employed as a software project manager with Abacus Programming Corp. from 1975 to 1985 where he headed a team of software specialists on the Gas Centrifuge Nuclear Fuel Enrichment Program for the United States Department of Energy and developed software related to the Viking and Mariner projects for the California Institute of Technology Jet Propulsion Laboratory in Pasadena, California.

**Cipora Kurtzman, Senior Vice President, Director**

Ms. Kurtzman was appointed Vice President in charge of Marketing and Contracts for the Company in 1988, was appointed a director of the Company in 1989, and advanced to Senior Vice President in 1990. She was the Director of Contracts and Marketing for CMI, where she served from 1985 to 1988. Ms. Kurtzman received her B.S. degree in business administration from California State University, Northridge in 1983.

**Francis T. Phalen, Senior Vice President, Chief Financial Officer, Director**

Mr. Phalen has been the Company's Chief Financial Officer since November 1988 and has been a director of the Company since 1989. From August 1987 until Mr. Phalen joined the Company he was Associate Director, Corporate Finance, for Bear Stearns & Co. in Los Angeles. From October 1986 through November 1987 Mr. Phalen served as Vice President and Treasurer of Carter Hawley Hale Stores, Inc. For the three years prior, he was a partner in the public accounting firm of Deloitte & Touche.

**C. Rogers Saxon, Ph.D., Vice President**

Dr. Saxon was appointed Vice President in charge of Advanced Computing for Aura in 1988. Prior to this, he was a Program Manager for CMI where he had served since 1986. Dr. Saxon received his B.S. degree in mathematics from Harvey Mudd College in 1966, an M.A. degree in operations research from Claremont Graduate School in 1977, and M.A. and Ph.D. degrees in cognitive psychology from the University of California, Irvine in 1982 and 1985, respectively. From 1984 to 1986, Dr. Saxon worked for Abacus Programming Corp. on the Space Shuttle Project. His services for Abacus were performed at Rockwell International and included leading the team that developed an expert system for Space Shuttle electrical cable configuration and routing.

### **Keith Stuart, Vice President and Manager of the Magnetics Division**

In 1986, Mr. Stuart was the Program Manager of Aura's (then Innovative Information System) first magnetic bearing contract, and was instrumental in the development of the basic technology used in all of Aura's magnetic bearing products. From 1987 to the present, Mr. Stuart has been a Vice President for Aura, responsible for all of Aura's work in magnetics. As inventor of the patented high force actuator, Mr. Stuart extended Aura's product line to include commercial applications such as automotive active suspension, electronic valve lifting and highly efficient motors, among many others. Before joining Aura, Stuart was a technical manager at Hughes Aircraft Company. He received his Masters of Science degree in Electrical Engineering from UCLA in 1980.

### **Gregory Um, Ph.D., Vice President**

Gregory Um, Ph.D., was appointed Vice President in charge of the Electro-Optic Systems Division for Aura in 1988. He earlier served as Chief Scientist of IIS during 1987 and worked for CMI during 1986. He was the principal inventor of Aura's scene projectors and holds numerous patents. Dr. Um received his B.S. degree in physics from the University of California, Berkeley in 1970 and his Ph.D. in physics from the State University of New York in 1976. From 1983 to 1986, Dr. Um worked for Hughes Aircraft Company as a senior scientist where he was involved in sensor system engineering, signal processing algorithms, wavefront sensors, thermal analysis and electro-optical sensor modelling and simulation.

### **Michael Wilde, Director**

Mr. Wilde has served as director since inception and President of Delphi Inc., a wholly-owned subsidiary of Aura, since March 1987. From 1971 to 1984, Mr. Wilde was employed with M/A COM Omni Spectra, most recently as Business Center Manager, primarily responsible for administrative, engineering and financial affairs. From 1984 to March, 1986, Mr. Wilde was employed with E.W. Components as Vice President. Mr. Wilde has a Bachelor of Science degree in Electronic Technology.



# AURA SYSTEMS INC.

## Corporate Information

Aura Systems, Inc., was formed in February 1987 by a group of scientists and engineers to develop magnetics and related technologies.

Company financial performance:

| <u>Fiscal Year</u><br><u>Ending 2/28</u> | <u>Revenues</u> | <u>EPS</u>   |
|------------------------------------------|-----------------|--------------|
| 1989                                     | \$ 2.9M         | (\$0.09)     |
| 1990                                     | \$ 9.1M         | (\$0.16)     |
| 1991 (E)                                 | \$ 10.0M (E)    | (\$0.15) (E) |
| 1992 (E)                                 | \$ 30.0M (E)    | \$0.25 (E)   |

| <u>Shares Outstanding</u> | <u>Market Cap</u>                          | <u>Capitalization</u>   |
|---------------------------|--------------------------------------------|-------------------------|
| 22.7M                     | \$35.0M<br>(based on 1 3/4<br>share price) | (in millions 8/31/90)   |
|                           |                                            | Short-term debt \$0.27  |
|                           |                                            | Long-term debt 0.27     |
|                           |                                            | Convertible debt 6.85   |
|                           |                                            | Shareholder Equity 5.91 |
|                           |                                            | <u>\$13.30</u>          |

### Directors

Zvi Kurtzman  
Arthur J. Schwartz, Ph.D.  
Francis T. Phalen  
Peter C. Jaquith

Neal B. Kaufman  
Cipora Kurtzman  
Norman Reitman

### Officers

Zvi Kurtzman  
Arthur J. Schwartz, Ph.D.  
Neal B. Kaufman  
Cipora Kurtzman  
Francis T. Phalen  
Joseph F. Bevacqua  
Rogers Saxon, Ph.D.  
Keith O. Stuart  
Gregory Um, Ph.D.

President  
Executive Vice President  
Senior Vice President-Software Development  
Senior Vice President-Marketing & Contracts  
Senior Vice President, Chief Financial Off.  
Vice President-Chief Accounting Officer  
Vice President-Advanced Computing  
Vice President-Hardware Development  
Vice President-Electro-Optics Systems

Headquarters

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