SMALL BUSINESS
INNOVATION
RESEARCH PROGRAM
(SBIR)

ANNUAL REPORT - FY 1995
Honorable Christopher S. Bond  
Chairman  
Committee on Small Business  
United States Senate  
Washington, DC 20510

Honorable James M. Talent  
Chairman  
Committee on Small Business  
House of Representatives  
Washington, DC 20515

Dear Mr. Chairmen:

I am pleased to provide you with the 13th year results of the Small Business Innovation Development Act of 1982. (Public Laws 102-564, 99-443, and 97-219)

Along with facts and figures on the progress of the Small Business Innovation Research (SBIR) program, this report contains information on the achievement of small business goals in Federal research, research and development awards and the commercialization of SBIR efforts.

During fiscal year 1995, small business concerns received over $864 million in obligated funding and successfully competed for 4,348 SBIR awards from the participating Federal agencies.

Copies of this report have been provided to the Office of Federal Procurement Policy and the General Accounting Office. The review and analysis were made by the Office of Technology of this Agency.

Sincerely,

Aida Alvarez  
Administrator

Enclosure
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Overview

This is the 13th in a series of annual reports on the Small Business Innovation Research (SBIR) Program. The Small Business Administration prepared the report pursuant to the requirements of the Small Business Innovation Development Act of 1982. The SBA is directed by the Act to set SBIR Program policy and to monitor, evaluate and report on the program's progress. This report reflects and summarizes, along with other information, SBIR Program results and activities for FY 1995.

The Small Business Innovation Development Act of 1982 was signed into law on July 22, 1982. Congress reauthorized it to continue in FY 1986 and again in FY 1993, extending the SBIR Program until October 1, 2000. The latter mandate also increased the percentage of research and development funds that the federal-agency participants must direct to small business.

When considering the legislation to extend the program to October 1, 2000, Congress concluded that technological innovation creates jobs, increases productivity and economic growth, and serves as a valuable counterforce to inflation and the nation's balance-of-payments deficit. Congress also noted that while small business is the nation's principal source of significant innovations, large businesses, universities and government laboratories historically have conducted the vast majority of federally funded research and development.

The SBIR Program has proven again in FY 1995 that with focused program support from the federal government, the nation's small high-tech enterprises can convert basic ideas and research into commercial products that enhance the nation's productivity and help maintain its competitive leadership in the international marketplace. By any measure, this partnership of government and the private sector has been a resounding success.

In its 13 years, the SBIR Program has directed over 37,000 awards worth over $5 billion to thousands of small high-tech companies. These enterprising concerns have transformed their ingenuity and inventiveness into profitable commercial successes in a wide range of industries and technologies from the familiar to the exotic.

Highlights and accomplishments of the SBIR Program since it began operations in FY 1983 include the following:

- In response to 175 solicitations by the 11 participating federal agencies, 240,365 proposals have been received from small high-tech firms. These proposals have resulted in 37,319 awards worth more than $5 billion.

- The increasing number of successes in commercial sales associated with the program have come from a wide range of technologies and industries, from laser manufacture to medical research to robotics to military decision-making, to name a few.

- The new products and techniques emerging from the SBIR awards are assisting America's competitive stance worldwide and improving the lives of people here and abroad.
Despite the talent, determination and entrepreneurial spirit that exist among small high-tech businesses many enterprises could not have turned their ideas into profitable commercial products without the assistance of the SBIR Program. As the company profiles and statistics in this report illustrate, an ever-increasing number of program participants are succeeding in commercializing their new products, processes and services. Surveys by the SBA and the General Accounting Office report that a minimum of one in four SBIR participants has recorded the commercial success of its SBIR-supported product(s) within four years of receiving its Phase II award.

Another encouraging statistic involves small firms headed by minorities. Businesses in this classification are winning an increasing number of SBIR awards, testifying to their technical innovation and business talents. In FY 1994, minority/disadvantaged-owned firms received 621 awards; in FY 1995, the number increased to 672.

In administering and supervising the SBIR Program, the SBA and its Office of Technology continue to encourage more small high-tech enterprises to respond to solicitations from the agencies participating in the program. A number of participating small businesses are winning multiple awards, an understandable development that reflects their continuing spirit of innovation.
Introduction

The Rationale

The rationale for creation of the Small Business Innovation Act was to give small, innovative enterprises a greater role in federally-funded research and development. The goal was to help develop the nation's base for creative technical achievement, as well as enlarge the markets for ideas generated in the laboratories and research facilities, and on the factory floors of America's small high-tech businesses.

The designers of the original statute, Public Law 97-219, realized that small businesses -- especially technically oriented small businesses -- were responsible for most of our new products, processes and technologies, and were particularly adept at turning research and development activity into viable commercial products. In many cases, the only ingredient these firms needed for success was financial assistance to conduct the research and development of their ideas. SBIR Program history is full of such successes, and many more are anticipated. These accomplishments have created many new jobs, expanded the nation's tax base, and bolstered America's economic viability and productivity.

Findings and Purposes of the Act

Beginning in FY 1983, each agency that has established an SBIR Program has set aside a specific percentage of its extramural research or research and development budget for award to small businesses. Through a four-year phase-in process, civilian agencies were required to increase the percentage of their R&R&D set-asides, from 0.2 percent in FY 1983 to 1.25 percent in FY 1986. The Department of Defense was allowed five years to phase in their increase from 0.01 percent in FY 1983 to 1.25 percent in FY 1987.

In 1992 Congress extended the life of the SBIR Program to October 1, 2000, as part of the Small Business Research and Development Enhancement Act (Public Law 102-564). This legislation also increased by increments the percentage of annual extramural R&D funds that the participating federal agencies must direct to small high-tech firms from 1.25 percent to 2.5 percent. Additionally, the Act raised the ceiling of Phase I awards from $50,000 to $100,000 and Phase II awards from $500,000 to $750,000.

The purposes of Public Law 102-564:

- Expand and improve the SBIR Program
- Emphasize increased private-sector commercialization of technology developed through federal SBIR research and development
- Increase small business participating in federal research and development.
- Improve the federal government's dissemination of information concerning the SBIR Program with regard to participation by women-owned and socially and economically disadvantaged small businesses.

Federal Agency SBIR Participants

Under the terms of the 1982 Small Business Innovation Development Act, any federal agency with an extramural budget for research or research and development in excess of $100 million for FY 1982 or any subsequent fiscal year must
establish an SBIR program. The agency then sets aside a prescribed percentage of its extramural research or research- and-development contracting dollars for program use during each fiscal year.

Public Law 102-564 has set the funding percentage at not less than 1.5 of the agency's R&D for FY 1993 and 1994; not less than 2 percent for FY 1995 and 1996; and not less than 2.5 percent for fiscal years thereafter.

The federal agencies participating in the SBIR Program:

- Department of Agriculture (DOA)
- Department of Commerce (DOC)
- Department of Defense (DOD)
- Department of Education (ED)
- Department of Health and Human Service (HHS)
- Department of Transportation (DOT)
- Environmental Protection Agency (EPA)
- National Aeronautics and Space Administration (NASA)
- Department of Energy (DOE)
- National Science Foundation (NSF)
- Nuclear Regulatory Commission (NRC)

The Three-Phase SBIR Structure

- **Phase I:** Awards for up to $100,000 are made for research projects designed to evaluate the feasibility, as well as the scientific and technical merit of an idea.

- **Phase II:** Phase I projects with the most potential are funded for further development of the proposed idea. Phase II funding is for one or two years, at a maximum of $750,000.

- **Phase III:** No SBIR funds may be used. Private-sector investment and support bring an innovation to market. If appropriate, Phase III funds may involve follow-up production contracts with a federal agency for future use by the federal government.

**The R&R&D Goaling Program**

In addition to the SBIR Program, the Small Business Innovation Development Act also requires certain federal agencies to participate in the Research and Development Goaling Program.

The legislation stipulates that any agency with a fiscal year budget for research or research and development in excess of $20 million must establish goals for awarding R&D funding agreements to small business. An agency's annual goals cannot be lower than those achieved during the previous fiscal year. In addition to the 11 SBIR participant agencies, seven other agencies participate in the R&R&D Goaling Program:

- Department of the Interior (DOI)
- Department of Justice (DOJ)
- Department of the Treasury (TR)
- Department of Veteran Affairs (DVA)
- Agency for International Development (AID)
- Smithsonian Institution (SI)
- Tennessee Valley Authority (TVA)

**SBA Authorities and Responsibilities**

- Develop, coordinate, issue and update a policy directive for the federal-governmentwide conduct of the SBIR and R&R&D goaling programs.

- Develop and administer an information and outreach program.
- Develop and maintain a source and information file of interested small businesses.
- Develop, coordinate, publish and disseminate each SBIR Pre-Solicitation Announcement.
- Survey, monitor and report on all SBIR programs.
- Report at least annually to Congress on all SBIR and R&RD goaling programs and on the SBA’s monitoring activities.
- Coordinate private-sector commercialization of SBIR innovations.
- Obtain information on the current national critical technologies.

SBIR Program Authorities and Responsibilities for Each Participating Agency

- Determine the categories of projects to include in the agency’s SBIR Program.
- Issue SBIR solicitations in accordance with a schedule determined cooperatively with the SBA.
- Unilaterally determine research topics within each SBIR solicitation, giving special consideration to broad research topics and to topics that further one or more National Critical Technologies.
- Receive and evaluate proposals resulting from SBIR solicitations.
- Select awardees for SBIR funding agreements.
- Ensure those funding agreements under the SBIR Program include provisions setting forth the respective rights of the United States and small businesses with regard to intellectual property rights and follow-on research.
- Administer SBIR funding agreements (or delegate such administration to another agency).
- Make payments to SBIR award recipients based on progress toward or completion of the funding agreement requirements.
- Submit annual reports on the SBIR and R&RD Goaling programs to the SBA.
Program Services

In setting SBIR Program policy and in monitoring and evaluating the program, the SBA acts to keep contract award procedures simple and standardized, to keep paperwork to a minimum, and to encourage small companies owned by minorities and the disadvantaged to participate in the program. The SBA also conducts an ongoing national information-and-outreach campaign, and ensures that participating agencies conform with SBIR policy directives.

As required by law, the solicitation process minimizes regulatory burdens and mandates timely receipt and review of proposals, peer review, proprietary-information guidelines, selection of awardees, data-rights retention, title to government property, cost-sharing and cost principles.

Pre-Solicitation Announcements

The SBA's SBIR Pre-Solicitation Announcement to small businesses presents basic program solicitation information in a succinct and understandable manner. Each quarterly announcement provides complete information on all SBIR activity for that quarter, eliminating the need for small businesses to track the activities of each participating agency. In addition to mailings, the announcements are available from the SBA's electronic bulletin board SBA OnLine, and on the Internet. (Other SBIR information available from the bulletin board includes SBIR award winners from the latest available fiscal year, as well as the SBIR Proposal Preparation Handbook. Bulletin-board information is updated on the first day of each quarter.) The announcements provide small businesses with --

- a brief statement of each research topic, listed by participating agency
- the opening and closing dates of each solicitation
- an estimate of the number of awards to be made under each solicitation
- the party to contact for a copy of the agency's solicitation, and
- a master schedule of solicitation opening and closing dates for all participating agencies.

SBIR Outreach

During FY 1995, the SBA cooperated with numerous organizations that conducted SBIR seminars and conferences by providing information, materials and speakers. SBA field representatives, and public and private organizations play a significant role in part of the information-dissemination process.

The SBA continues to publish a special SBIR Program pamphlet, which provides program information and serves as a mechanism for developing the SBIR mailing list. SBA field offices have been furnished a supply of the pamphlets for speakers throughout the country.

Another form of outreach involves briefing officials of foreign governments. During FY 1995, foreign interest in the SBIR Program continued to grow. SBIR-type programs are in place in the United Kingdom and other European countries.
Commercialization Matching System

A major goal of the SBIR Program is to bring the results of research and development to the marketplace. The program encourages more research and development, as well as commercialization by offering the possibility of economic reward for innovations successfully marketed by SBIR firms. At each stage of a small firm's progress through the program, there are policies and incentives to promote research work with commercial potential and to encourage the availability of the completed research in the marketplace.

Recognizing that most small firms with innovative products have difficulty finding the financing required for the final development, manufacture and marketing of their product, the SBA has developed the Commercialization Matching System. The system maintains information on all SBIR awards, including the recipient company's name and address, the name of the principal investigator, and the innovation to be commercialized. The system also includes information on the financing sources that have requested inclusion and the types of investments they are seeking.

From this data base, the Commercialization Matching System provides possible investors with technical abstracts of SBIR projects, and SBIR firms with information on sources of investment capital for their innovations. Matching selections from the data base are made on the basis of technology and industry preferences, geographic preferences and dollar thresholds.
## SBIR Program Data

### Fiscal Year 1995 SBIR Agency Obligations Summary (dollars in thousands)

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### Fiscal Year 1995 Award Profile (dollars in thousands)

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<td>413</td>
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<td>93</td>
<td>62</td>
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### Fiscal Year 1995 Agency Solicitation Profile

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<td>27</td>
<td>20</td>
<td>575</td>
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<td>9</td>
<td>19</td>
<td>239</td>
<td>194</td>
<td>5</td>
<td>73</td>
<td>1,263</td>
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*Note: Dollars obligated can include modifications to previous year's awards. DOB $29,333K, HHS $157, NASA $350K, NSF $31K.*

8
Program Data

Reporting Requirements for SBIR and R&R&D Coaling

Each agency required by Sections 4(f) and 4(h) of Public Law 97-219 to establish an SBIR program for research and research and development is also required to report annually to the SBA on the number of grants, contracts, and cooperative agreements awarded that exceed $10,000, and on the dollar value of all such awards. The agencies are also required to compare the number and amount of SBIR awards with awards to other than small business.

To properly monitor and report on the participating agencies' SBIR programs, the SBA has established a reporting base to compare against each agency's budget data. To determine extramural R&R&D obligations as a base for the size of each agency's SBIR Program, the Small Business Innovation Development Act provides a definition of research and development identical to that in the Office of Management and Budget Circular A-11, "Preparation and Submission of Budget Estimates."

Each year federal agencies submit to the National Science Foundation their total R&R&D obligations broken down in to intramural and extramural R&R&D obligations, which are then published in "Federal Funds for Research and Development." The SBA reviews the NSF data on agencies with SBIR programs, then uses the amount determined by the agency to be its extramural budget as the extramural base for the SBIR Program. A distinction between intramural and extramural is not made for agencies participating in the R&R&D Coaling Program, since each agency's goal is based upon total R&R&D budget obligations.

A three-year budget cycle is used for establishing extramural R&R&D obligations. Within any given year, a participating agency's initial estimate can change due to congressional action on that agency's R&R&D budget. To ensure proper implementation of the program, each agency establishes an estimated budget and proceeds during the year on that budget. The SBA uses a system of deficits and credits to make the necessary adjustments during the course of the budget cycle. In this way, SBIR agencies ultimately achieve the percentages specified by law.

FY 1995 SBIR Summary

The 11 agencies participating in the SBIR Program in FY 1995 released a total of 16 Phase I solicitations. The Department of Defense released 4 solicitations; the Department of Health and Human Services released three solicitations; the other nine agencies released one each. (See Table 1)

In response, the participating agencies received 20,185 Phase I proposals from small high-tech enterprises. The agencies subsequently distributed a total of 3,085 Phase I awards, which represented 15 percent of the proposals received. A total of 2,856 Phase II proposals were received, resulting in 1,263 new awards. These awards represented 44 percent of all Phase II proposals received. The combined number of Phase I and Phase II proposals received in FY 1995 was 23,041. There were 4,348 awards, representing 19 percent of the total.

The number of SBIR proposals received has increased steadily over the years -- a trend that illustrates past award successes and the ever-growing awareness and acceptance of the SBIR Program within the small business community. (Table 2 immediately following)
### Table 2: Number of SBIR Awards—FY 1983 through FY 1995

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<tr>
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<td>27,909</td>
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There also have been year-to-year increases in the dollar value of awards. During FY 1995, the 11 participating SBIR agencies awarded $864.6 million through the SBIR Program, which represented a 20 percent increase over the approximately $717.6 million obligated in FY 1994. FY 1995 Phase I awards were worth $223 million; Phase II awards, $602 million. The overall total included $30 million in modifications to non-FY 1995 awards. (See Table 3)

In FY 1995, minority/disadvantaged-owned firms received 473 Phase I awards worth $34.1 million and 199 Phase II awards worth $113.4 million.

In awarding two-year funding agreements under Phase II, agencies utilize various acquisition methods of obligation and funding. For purposes of consistency, the acquisition data in this report reflect only actual obligations during FY 1995.

### Table 3: Value of SBIR Awards—FY 1983 through FY 1995

<table>
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<tr>
<th>Fiscal Year</th>
<th>Phase I</th>
<th>Phase II</th>
<th>Totals</th>
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<td>101.9</td>
<td>248.9</td>
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<td>154.0</td>
<td>490.7</td>
<td>644.7*</td>
</tr>
<tr>
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<td>220.4</td>
<td>473.6</td>
<td>717.6*</td>
</tr>
<tr>
<td>95</td>
<td>232.2</td>
<td>601.9</td>
<td>834.1*</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>$1,559.8</td>
<td>$3,852.4</td>
<td>$5,412.2*</td>
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</table>

FY 1996 EST: - $900+
*includes award modifications

As in prior years, the SBA continued in FY 1995 to use a system of deficits and credits to evaluate agency SBIR budgets against actual amounts obligated.

Through its SBIR Policy Directive, the SBA requires each participating agency to list the number of Phase I awards made both within six months and beyond six months of the closing date of its solicitation announcement. Table 4 (immediately following) provides this information for FY 1995.
Table 4: FY 1995 Phase I Time Frame

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<tr>
<th>Agency</th>
<th>FY95 Phase I Awards</th>
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<th>Number More Than Six Months After Solicitation Close</th>
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<td>20</td>
<td>19</td>
<td>1</td>
</tr>
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<td>27</td>
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<td>8</td>
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<tr>
<td>EPA</td>
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<td>47</td>
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<td>413</td>
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</tr>
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<td>NRC</td>
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<td>NSF</td>
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R&R&D Goaling Agencies

The SBA requires all annual reports for the R&R&D Goaling Program to include the following information:

- current fiscal-year achievement of the singular small business R&R&D goal and the dollars obligated through prime funding agreements in the following categories: small business, minority and disadvantaged small business, and women-owned small business; and

- total number and dollar value of R&R&D awards to small business for contracts, grants and cooperative agreements over $10,000, and a comparison of such awards to awards made to non-small businesses for the same categories. (See Table 14 and Table 15.)

To evaluate each agency's R&R&D Goaling Program, the SBA uses a final budget report from OMB entitled Conduct of R&D by Agency. This report details each agency's total R&R&D obligations for the reported fiscal year and provides R&D budget estimates for future years. The SBA then computes each agency's total R&R&D obligations to small business, as reported to SBA, to determine the actual percentage of the R&R&D obligations awarded to small business.

In FY 1995 as in prior years, there was some difference between each agency's total R&R&D obligations as reported to the SBA and to OMB. Since the SBA uses the OMB data as the base, the percentage of an agency's awards that was given to small business may be higher or lower in this report than the percentage reported by the agency to the SBA.

In FY 1995, over $655 million was awarded to small business under the R&R&D Goaling Program. This represented 2.8 percent of the total R&D obligations for the 18 reporting agencies.

R&R&D awards to minority/disadvantaged-owned firms totaled $145,400 million in fiscal 1995, representing 22 percent of all agency R&R&D obligations to small businesses.
Highlights of Cumulative Data

The SBIR Program continues to receive national acceptance and international recognition for quality performance. Following are highlights of accomplishments since the SBIR Program began:

- Over $5 billion has been awarded to small businesses.

- Minority/disadvantaged-owned firms have received 4,564 awards, representing 12 percent of all SBIR awards; the value of these awards has totaled $653.5 million, which is 12 percent of all dollars awarded under the program.

- The participating agencies received 218,141 Phase I proposals and 22,197 Phase II proposals in response to 175 SBIR solicitations. There has been a total of 27,927 Phase I and 9,410 Phase II awards.

- Awards have been made to firms in all 50 states, Puerto Rico and the District of Columbia.

- Several participating agencies have allocated more for this program than required by law. In accordance with the law, each participating agency will continue to award not less than 2 percent of its R&D extramural budget in fiscal years 1995 and 1996, and not less than 2.5 percent thereafter.
### Table 5: R&R&D Goaling Data - FY 1995
**(dollars in thousands)**

<table>
<thead>
<tr>
<th>Agency</th>
<th>Agency Goal FY 95</th>
<th>Total R &amp; D Budget</th>
<th>$ Goal</th>
<th>Agency Reported $ To Small Business</th>
<th>Agency % Awarded To Small Business</th>
<th>% Awarded To Minority/Disadvantaged</th>
<th>% Awarded To Minority/Disadvantaged</th>
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*NR = Not Reported*
Table 6: R&R&D Goaling Data - FY 1995 (continued)

(dollars in thousands)

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<th>Agency</th>
<th>Number of Contracts Awarded</th>
<th>Dollar Amount of Contracts</th>
<th>Number of Grants Awarded</th>
<th>Dollar Amount of Grants</th>
<th>Number of Co-op Agreements</th>
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<th>Number of Grants Awarded</th>
<th>Dollar Amount of Grants</th>
<th>Number of Co-op Agreements</th>
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NR = Not Reported
Success Stories

Schwartz Electro-Optics, Inc.

Schwartz Electro-Optics, Inc. (SEO), Orlando, Florida, has benefited substantially from the SBIR Program by developing commercial products from SBIR-sponsored research. This has been accomplished over an eight-year period beginning in 1987 by utilizing company funds to carry product development and marketing through Phase II, and has resulted in significant product sales beginning in 1989 that have now totaled approximately $22 million.

SEO has received 89 Phase I and II awards totaling $15.5 million. Of these 89 awards, 63 have been Phase I and 26 Phase II. These awards have involved contracts from a variety of federal agencies and departments, including DOD, NASA, HHS, DOT, DOC, NSF, and DOE, with the majority, 53, being from DOD, followed by 19 from NASA and 11 from HHS.

A commercialization summary of all Phase II awards indicates that 18 of 26 contracts have been completed. Of those 18 completed contracts (totaling $8.2 million), 13 involved research that had significant commercial product potential. As a result of this research, SEO has completed the development of 13 new products and currently has under development an additional seven products. Furthermore, out of the eight remaining incomplete Phase II SBIR awards (totaling $38 million), SEO considers five to have good commercial potential.

In order to develop these products, SEO has spent $3.3 million of company funds and has realized $21.7 million in sales and orders as of September 1995. It is significant to note that all but two of these new products have been introduced since 1990 and, therefore, significant sales and orders have occurred in the past five years. This is due to the time it takes to complete Phases II and III and to obtain product market acceptance. Also, 90 percent of the sales have come from five of the 13 products that have been introduced, which is not unusual as not all new products can be winners. This emphasized the importance of introducing a number of new products, and since 1990, SEO has introduced new products resulting from SBIR research at an average rate of two per year.

The products developed to date have a broad market range that includes scientific, medical, aviation, agricultural, transportation, mapping and atmospheric monitoring applications. SEO produces five different laser devices that are used in scientific research; lasers for medical applications including tattoo removal, angioplasty and orthopedic surgery; laser altimeters and rangefinders for airplanes and helicopters; lasers that help control agricultural spraying of herbicides and fertilizers; lasers used for traffic management and data collection; rangefinding lasers useful in a variety of situations including robotics guidance, obstacle warning and aerial surveying; and lasers used to detect atmospheric aerosols and turbulence.

Also, eight patents have been awarded to SEO covering products and technology resulting from SBIR-sponsored research.

SAVI TECHNOLOGY

Savi Technology, Inc., Mountain View, California, was founded in 1988 and is now the leader in wide area asset tracking and transportation logistics. In 1989 the U.S. Navy awarded Savi a Phase I SBIR contract of $49,833 to enter into the development of a radio frequency identification tag system with potential application to the control of DOD worldwide material. By the
conclusion of its 1991 Phase II SBIR award valued at $2,376,700. Savi had created a tagging system using radar and interferometric techniques to provide range and direction with resolutions less than 1 foot and less than 10 degrees respectively!

This is the only system capable of identifying and monitoring thousands of items in transit and stored over a wide area automatically and simultaneously in minutes.

A GAO report subsequent to Desert Storm high-lighted the need for more sophisticated inventory and in transit control of military spare parts. It estimated spare parts excesses of $3.4 billion in that offensive. The SaviTags (trademark) are small business innovation research's answer to this finding! In 1994 (only 5 years after the company was founded and four years after its initial developmental contract) Savi was awarded a $70 million DOD contract for the tags -- the largest ever in the radio frequency identification industry.

The DOD estimates that had the system been available, the use of SaviTags in the material control aspect of the Gulf War would have saved a minimum of $300 million and potentially as much as $1.5 billion. This sophisticated technology is a major contribution to the efficiency of our military logistical support in Bosnia.

The company was acquired by Texas Instruments, Inc., Dallas, Texas on November 3, 1995. Savi operates as TI's wholly-owned subsidiary and remains in its Mountain View, California location. Commercialization options are apparent, e.g., UPS, USPS, FedEx as well as international shipping, containerization and warehousing operations.

**Aurora Flight Sciences Corporation**

Another example of early SBIR conversion of research into products is Aurora Flight Sciences Corporation, Manassas, Virginia, which was founded in early 1989 and received an NSF award in 1990. It was for research to design an innovative unmanned aircraft. "Theseus: A New Platform for High Altitude Atmospheric Science." Another related project was also funded to develop a "Lightweight Dropwindsonde System for Unmanned Aircraft." Both projects were technical successes and attracted $4.5 million additional venture capital following an initial startup investment of $200,000.

Product sales to date already total $30 million. The company is expecting additional sales of $50 to $100 million in a year or two from outstanding proposals for aircraft use in such areas as communications, defense, atmospheric sciences and remote sensing, the latter based on proposal requests from foreign countries.

The success of Theseus led to DOD funding a larger plane called Perseus and purchases by NASA and DOE and others for a total of $21 million.

Aurora employment has increased from 3 at the time of the NSF proposals to 94. Aurora says that NSF credibility, in addition to the critical value of the early SBIR funding, has been important to their success everywhere they have gone, particularly in marketing their technology in the United States and internationally.
Distribution of Awards

The geographic distribution listing shows the distribution of FY 1995 SBIR awards (Phase I and Phase II combined) by state. The listing contains state-by-state breakdown of all Phase I and Phase II awards.

Exhibit One provides a more detailed look at the geographical distribution of SBIR awards, since it shows the amount of funding by metropolitan area (as defined by the Census Bureau). The metropolitan areas are listed in descending order by population (column I). The next two columns, respectively, show the total FY 1995 SBIR funding and number of awards made to each metropolitan area. The last two columns contain the cumulative funding and SBIR awards for each metropolitan area.

Most SBIR awards (historically and in FY 1995) have gone to large metropolitan areas. However, small towns in rural settings are major participants in the SBIR program. Totals of $395 million (Phase I) and $661 million (Phase II) have been awarded to communities with populations under 125,000. Taken as a group, these communities would rank first in the top five of all metropolitan areas in terms of cumulative dollars awarded.

The metropolitan areas have also been ranked by their combined Phase I and Phase II funding levels and number of awards for FY 1995, as well as cumulatively from FY 1983-95. Exhibit Two contains the top 50 metropolitan areas. Large metropolitan areas dominate the ranking of the first 25 have populations greater than 1 million. The ranking is similar to that in FY 1994. The biggest gains were achieved by Detroit-Ann Arbor, MI (from 16th to 13th place); Albany-Schenectady, NY (from 34th to 31st place); Madison, WI (from 46th to 41st place); and Portland, OR, Poughkeepsie, NY, and Sacramento, CA, which did not make the top 50 last year.

In Exhibit Three the metropolitan areas have been ranked in descending order by the cumulative number of their awards. If localities not part of a standard metropolitan statistical area (that is, localities generally with populations under 500,000) were listed, they would rank sixth in total SBIR awards received. Many of the communities with large numbers of SBIR awards are located near major universities or government laboratories.

The technology-investment policies of SBIR participating agencies are reflected in the level of funding they provide for awards in the various technology areas. These areas are listed in Exhibit Four.

Exhibit Five summarizes the FY 1995 funding each participating agency provided in each technology area. The accompanying graph in Exhibit Six illustrates the distribution of FY 1995 funds by technology for all agencies combined. Exhibit Seven and Exhibit Eight show corresponding distributions for the entire program from FY 1983 through FY 1995.

Advanced materials received the most funds and showed the most significant increase in funding in FY 1995. With regard to cumulative funding, advanced materials surpassed optical devices as the highest-funded technology area in the SBIR Program.
Administrative Issues

Publications Update

During FY 1995, all publicly distributed SBIR documents were updated and are available on the SBA's electronic bulletin board, SBA OnLine. The bulletin board can be accessed 24 hours a day via modem or the Internet, eliminating the printing, mailing and storage costs previously incurred for SBIR publications. Information is published on the bulletin board at the same time it is available in hard copy.

National Conferences

The Department of Defense and the National Science Foundation sponsored SBIR conferences in FY 1995 in Washington, DC; San Jose, CA and Chicago, IL.

General Information

The SBA has offices located throughout the United States. For the one nearest you, look under "U.S. Government" in your telephone directory, or call the SBA Answer Desk at (800) 8-ASK-SBA. To send a fax to the SBA, dial (202) 205-7064. For the hearing impaired, the TTD number is (704) 344-6640.

To access the agency's electronic public information services, you may call the following:

- **SBA Online**: electronic bulletin board - modem and computer required:

  (800) 697-4636 (limited access)

  (900) 463-4636 (full access)

  (202) 401-9600 (D.C. metro area)

- **Internet**: using uniform resource locators (URLs)

  - SBA Home Page: http://www.sba.gov
  - SBA gopher: gopher://gopher.sba.gov
  - Telnet: telnet://sbaonline.sba.gov

You also may request a free copy of The Resource Directory for Small Business Management, a listing of for-sale publications and videotapes, from your local SBA office or the SBA Answer Desk.
## Total SBIR Awards for Fiscal Year 95

<table>
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<th>State</th>
<th>Phase 1 Awards</th>
<th>Phase 1 Dollars ($)</th>
<th>Phase 2 Awards</th>
<th>Phase 2 Dollars ($)</th>
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All $ amounts in thousands

Sequence: State Name
## Total SBIR Awards for Fiscal Year 95

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<th>State</th>
<th>Phase 1 Awards</th>
<th>Phase 1 Dollars $</th>
<th>Phase 2 Awards</th>
<th>Phase 2 Dollars $</th>
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All $ amounts in thousands
### EXHIBIT ONE

**DISTRIBUTION of SBIR FUNDING by METROPOLITAN AREAS (ordered by population)**

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<tr>
<th>Metropolitan Area</th>
<th>Population</th>
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<th>FY95 No. of Awards</th>
<th>FY 83-95 ($k)</th>
<th>FY83-95 No. of Awards</th>
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## Exhibit One

**Distribution of SBIR Funding by Metropolitan Areas** (ordered by population)

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<th>Metropolitan Area</th>
<th>Population</th>
<th>FY95 ($k)</th>
<th>FY95 No. of Awards</th>
<th>FY 83-95 ($k)</th>
<th>FY 83-95 No. of Awards</th>
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## EXHIBIT ONE

### DISTRIBUTION of SBIR FUNDING by METROPOLITAN AREAS (ordered by population)

<table>
<thead>
<tr>
<th>Metropolitan Area</th>
<th>Population</th>
<th>FY95 ($k)</th>
<th>FY95 No. of Awards</th>
<th>FY 83-95 ($k)</th>
<th>FY83-95 No. of Awards</th>
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<td>FY95 No. of Awards</td>
<td>FY83-95 ($k)</td>
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# EXHIBIT ONE

**DISTRIBUTION of SBIR FUNDING by METROPOLITAN AREAS** (ordered by population)

<table>
<thead>
<tr>
<th>Metropolitan Area</th>
<th>Population</th>
<th>FY95 ($k)</th>
<th>FY95 No. of Awards</th>
<th>FY83-95 ($k)</th>
<th>FY83-95 No. of Awards</th>
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<tbody>
<tr>
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### EXHIBIT TWO

**SBIR AWARDS by METROPOLITAN AREAS (ordered by total dollars, FY 83-95)**

<table>
<thead>
<tr>
<th>Metropolitan Area</th>
<th>Population</th>
<th>FY95 ($k)</th>
<th>FY95 No. of Awards</th>
<th>FY83-95 ($k)</th>
<th>FY83-95 No. of Awards</th>
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## EXHIBIT TWO

**SBIR AWARDS by METROPOLITAN AREAS (ordered by total dollars, FY 83-95)**

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<th>Metropolitan Area</th>
<th>Population</th>
<th>FY95 ($k)</th>
<th>FY95 No. of Awards</th>
<th>FY83-95 ($k)</th>
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## EXHIBIT TWO

**SBIR AWARDS by METROPOLITAN AREAS (ordered by total dollars, FY 83-95)**

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<th>Metropolitan Area</th>
<th>Population</th>
<th>FY95 ($k)</th>
<th>FY95 No. of Awards</th>
<th>FY83-95 ($k)</th>
<th>FY83-95 No. of Awards</th>
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### EXHIBIT TWO

**SBIR AWARDS by METROPOLITAN AREAS** (ordered by total dollars, FY 83-95)

<table>
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<tr>
<th>Metropolitan Area</th>
<th>Population</th>
<th>FY95 ($k)</th>
<th>FY95 No. of Awards</th>
<th>FY83-95 ($k)</th>
<th>FY83-95 No. of Awards</th>
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### EXHIBIT TWO

**SBIR AWARDS by METROPOLITAN AREAS** (ordered by total dollars, FY 83-95)

<table>
<thead>
<tr>
<th>Metropolitan Area</th>
<th>Population</th>
<th>FY95 ($k)</th>
<th>FY95 No. of Awards</th>
<th>FY83-95 ($k)</th>
<th>FY83-95 No. of Awards</th>
</tr>
</thead>
<tbody>
<tr>
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<td>76,900</td>
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</table>
**EXHIBIT THREE**

**SBIR AWARDS by METROPOLITAN AREAS (ordered by FY 83-95 decreasing # of awards)**

<table>
<thead>
<tr>
<th>Metropolitan Area</th>
<th>Population</th>
<th>FY95 ($K)</th>
<th>FY95 No. of Awards</th>
<th>FY83-95 ($K)</th>
<th>FY 83-95 No. of Awards</th>
</tr>
</thead>
<tbody>
<tr>
<td>BOSTON, LAWRENCE, SALEM, LOWEL, MA</td>
<td>4,055,700</td>
<td>$132,226</td>
<td>579</td>
<td>$801,471</td>
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</tr>
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<td>13,074,800</td>
<td>76,867</td>
<td>351</td>
<td>482,306</td>
<td>3,351</td>
</tr>
<tr>
<td>BAY AREA (SF)</td>
<td>5,534,200</td>
<td>79,325</td>
<td>329</td>
<td>486,319</td>
<td>3,345</td>
</tr>
<tr>
<td>WASHINGTON, DC-MD-VA</td>
<td>3,565,000</td>
<td>71,771</td>
<td>304</td>
<td>443,110</td>
<td>3,182</td>
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<tr>
<td>SAN DIEGO, CA</td>
<td>2,201,300</td>
<td>34,181</td>
<td>171</td>
<td>238,504</td>
<td>1,685</td>
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<td>44,902</td>
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<td>197,764</td>
<td>1,377</td>
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<td>197,711</td>
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<td>DENVER-BOULDER-LONGMONT, CO</td>
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<td>30,189</td>
<td>144</td>
<td>163,544</td>
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<td>42</td>
<td>72,390</td>
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<td>70,810</td>
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<td>18,569</td>
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<td>73</td>
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<td>77</td>
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<td>51,979</td>
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<td>SANTA BARBARA-SANTA MARIA, CA</td>
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<tr>
<td>Metropolitan Area</td>
<td>Population ($k)</td>
<td>FY95 No. of Awards</td>
<td>FY95 ($k)</td>
<td>FY83-95 ($k)</td>
<td>FY 83-95 No. of Awards</td>
</tr>
<tr>
<td>-----------------------------------------</td>
<td>-----------------</td>
<td>------------------</td>
<td>----------</td>
<td>-------------</td>
<td>-----------------------</td>
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<td>Population</td>
<td>FY95 ($k)</td>
<td>FY95 No. of Awards</td>
<td>FY83-95 ($k)</td>
<td>FY 83-95 No. of Awards</td>
</tr>
<tr>
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<td>------------</td>
<td>-----------</td>
<td>-------------------</td>
<td>-------------</td>
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<td>ALLENTOWN-BETHLEHEM, PA-NJ</td>
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<td>3,169</td>
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<tr>
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<td>67</td>
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<tr>
<td>TOLEDO, OH</td>
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<td>10</td>
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## EXHIBIT THREE

**SBIR AWARDS by METROPOLITAN AREAS (ordered by FY 83-95 decreasing # of awards)**

<table>
<thead>
<tr>
<th>Metropolitan Area</th>
<th>Population</th>
<th>FY95 ($k)</th>
<th>FY95 No. of Awards</th>
<th>FY83-95 ($k)</th>
<th>FY 83-95 No. of Awards</th>
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<tbody>
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</tbody>
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## EXHIBIT THREE

**SBIR AWARDS by METROPOLITAN AREAS** (ordered by FY 83-95 decreasing # of awards)

<table>
<thead>
<tr>
<th>Metropolitan Area</th>
<th>Population</th>
<th>FY95 ($k)</th>
<th>FY95 No. of Awards</th>
<th>FY83-95 ($k)</th>
<th>FY 83-95 No. of Awards</th>
</tr>
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## EXHIBIT THREE

**SBIR AWARDS by METROPOLITAN AREAS (ordered by FY 83-95 decreasing # of awards)**

<table>
<thead>
<tr>
<th>Metropolitan Area</th>
<th>Population</th>
<th>FY95 ($k)</th>
<th>FY95 No. of Awards</th>
<th>FY83-95 ($k)</th>
<th>FY 83-95 No. of Awards</th>
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EXHIBIT FOUR -- Technology Areas

1000 COMPUTER, INFORMATION PROCESSING ANALYSIS

1100 Computer and communication systems
   1110 Computer systems technology
   1120 Communications and control systems
   1130 Networks and architectures
   1140 Computer security

1200 Information processing and management
   1210 Data and information processing
   1220 Artificial intelligence
   1230 Computer software
   1240 Robotics and automation
   1250 Man-machine interface

1300 Signal and image processing
   1310 Signal processing
   1320 Image processing
   1330 Navigation, guidance, positioning

1400 Systems studies
   1410 General studies
   1420 Operations and systems analysis
   1430 Safety systems, health and risk analysis

1500 Mathematical sciences
   1510 Math fundamentals
   1520 Numerical modeling
   1530 Math modeling

2000 ELECTRONICS

2100 Microelectronics
   2110 Microelectronics: materials, concepts, processing
   2120 Compound semiconductors
   2130 Photovoltaics
   2140 Optoelectronics

2200 Electronics device performance
   2210 Electronic device performance, packaging, reliability
   2220 Radiation damage and hardening
   2230 Testability

2300 Electronic equipment and instrumentation
   2310 Electronic equipment and systems
   2320 Data-and information-processing equipment
   2330 Sensors, transducers, instrumentation

2400 Electromagnetic radiation/propagation
   2410 RF technology
   2420 Electronic warfare
   2430 Target detection
   2440 Metal and mine detection

2500 Microwave and millimeter wave electronics
   2510 Microwave electronics
   2520 Millimeter wave electronics
## EXHIBIT FOUR – Technology Areas

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| 3430 | Repair                                          |
| 3440 | Nondestructive evaluation                      |

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EXHIBIT FOUR - Technology Areas

4500 Control
4510 Control concepts
4520 Vehicle/weapon motion control
4530 Structural controls

4600 Mechanical measurements
4610 Mechanical measurements (pressure, velocity, etc.)

5000 ENERGY CONVERSION AND USE
5100 Transport sciences
5110 Fluid mechanics
5120 Flow/fluid measurement and enhancement
5130 Heat transfer
5140 Refrigeration/cryogenics

5200 Propulsion/combustion technology
5210 Propulsion systems
5220 Propellants, fuels, explosives
5230 Combustion
5240 Fire detection
5250 Exhaust gases and gas analysis

5300 Large scale energy usage
5310 Industrial energy processes and utilization
5320 Physics, nuclear physics, fusion and plasma
5330 Energy use in buildings

5400 Energy conversion/electric power
5410 Batteries, fuel cells, electrochemistry, energy storage
5420 Alternative energy conversion
5430 Electric power technology

6000 ENVIRONMENT AND NATURAL RESOURCES
6100 Ocean science
6110 Ocean science and instrumentation

6200 Atmospheric science
6210 Atmospheric science and monitoring
6220 Remote sensing
6230 Chemical and biological measurement
6240 Particulates and aerosols
6250 Pollution abatement and environment control

6300 Water management
6310 Water monitoring and characterization
6320 Water treatment
6330 Water management and utilization
6340 Ice, snow, frost detection

6400 Earth sciences
6410 Earth sciences
6420 Soil measurement and manipulation

6500 Environment protection
6510 Nuclear, chemical, biological waste management
6520 CBR defense

7000 LIFE SCIENCES
7100 Medical instrumentation
7110 Medical measurements
7120 Measurements/techniques for radiation/imagery
7130 Medical devices
7140 Devices/systems for physically impaired
EXHIBIT FOUR – Technology Areas

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### EXHIBIT FIVE

**FY 95 PHASE I and II AWARDS by TECHNOLOGY AREA AND AGENCY**

(dollars in thousands)

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#### 1000 Computer, Information Processing, Analysis

| 1100 Computer And Communication Systems | 12576.8 | 9958 | 20.998 | 40.469 | 73.18 | 30.53 | 130 | 37.5 | 20.07 | 59.3 | 1794 | 212464 |
| 1200 Information Processing And Management | 58.316 | 6021 | 9134 | 25.886 | 230.4 | 29.46 | 0 | 23.7 | 169.3 | 662 | 1146 | 108346 |
| 1300 Signal And Image Processing | 52932.3 | 3253 | 4893 | 15162 | 2271 | 1565 | 0 | 0 | 489 | 2259 | 1095 | 83849 |
| 1400 Systems Studies | 7125 | 750 | 600 | 1076 | 0 | 300 | 0 | 149 | 0 | 0 | 0 | 10000 |
| 1500 Mathematical Sciences | 2719 | 0 | 2549 | 92 | 250 | 0 | 62 | 0 | 0 | 0 | 0 | 6672 |

#### 2000 Electronics

| 2100 Microelectronics | 56057 | 6991 | 15957 | 2967 | 2886 | 630 | 65 | 0 | 0 | 0 | 749 | 86302 |
| 2200 Electronics Device Performance | 116302 | 70696 | 40.422 | 33.422 | 27.016 | 2092 | 3247 | 0 | 2024 | 4062 | 3337 | 302518 |
| 2300 Electronic Equipment And Instrumentation | 43218 | 2657 | 11354 | 7408 | 2448 | 0 | 193 | 375 | 0 | 2042 | 500 | 70396 |
| 2400 Electromagnetic Radiation/propagation | 84178 | 48125 | 30847 | 7714 | 18916 | 1792 | 2338 | 50 | 1774 | 4162 | 3288 | 203194 |
| 2500 Microwave And Millimeter Wave Electronics | 3745 | 2225 | 140 | 239 | 194 | 0 | 0 | 0 | 0 | 0 | 0 | 6603 |
| 2600 Optical Devices And Lasers | 106559 | 17115 | 24371 | 18403 | 3648 | 500 | 260 | 0 | 0 | 164 | 1589 | 172617 |

#### 3000 Materials

| 3100 Advanced Materials | 137384 | 70586 | 38280 | 31292 | 26382 | 3176 | 3182 | 50 | 2024 | 4280 | 3537 | 320185 |
| 3200 Materials Processing And Manufacturing | 33300 | 3900 | 2869 | 3558 | 3145 | 0 | 0 | 0 | 0 | 0 | 0 | 299 |
| 3300 Coatings, Corrosion And Surface Phenomena | 27771 | 4388 | 7957 | 4386 | 3126 | 644 | 260 | 0 | 0 | 178 | 700 | 49436 |
| 3400 Materials Performance | 16499 | 2052 | 2008 | 3349 | 300 | 768 | 0 | 0 | 27 | 0 | 0 | 26002 |
| 3500 Fundamentals And Instrumentation | 5353 | 0 | 3531 | 3121 | 900 | 0 | 0 | 375 | 0 | 0 | 250 | 13529 |

#### 4000 Mechanical Performance Of Vehicles, W i e s

| 4100 Hydrodynamics | 169 | 0 | 0 | 0 | 65 | 0 | 0 | 0 | 0 | 0 | 0 | 234 |
| 4200 Aerodynamics | 61148 | 670 | 18222 | 962 | 681 | 0 | 65 | 0 | 0 | 55 | 50 | 81862 |
| 4300 Acoustics | 5180 | 150 | 668 | 699 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6696 |
| 4400 Mechanical Performance Of Structures And Equipment | 46611 | 4527 | 8818 | 3731 | 918 | 50 | 0 | 54 | 650 | 35182 |
| 4500 Control | 16482 | 4126 | 1751 | 10747 | 1225 | 352 | 0 | 50 | 0 | 0 | 450 | 35182 |
| 4600 Mechanical Measurements | 30516 | 5157 | 9163 | 5607 | 365 | 702 | 195 | 188 | 0 | 2042 | 400 | 64334 |

multiple technology areas assigned to awards
## EXHIBIT FIVE

### FY 95 PHASE I and II AWARDS by TECHNOLOGY AREA AND AGENCY

(dollars in thousands)

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Multiple technology areas assigned to awards
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In millions of dollars

*Multiple technology areas assigned to awards*
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*In millions of dollars

(multiple technology areas assigned to awards)
## EXHIBIT SEVEN

**FY 1983-95 PHASE I and II AWARDS by TECHNOLOGY AREA and AGENCY**

*(dollars in thousand)*

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*multiple technology areas assigned to awards*
## EXHIBIT SEVEN

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(dollars in thousand)

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Multiple technology areas assigned to awards
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*In millions of dollars*

(multiple technology areas assigned to awards)
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In millions of dollars

50

(multiple technology areas assigned to awards)