

**REPORT OF THE
SENATE STUDY COMMISSION ON
PROMOTING AEROSPACE DEVELOPMENT, COMMERCIAL SPACE
ACTIVITIES, AND TELECOMMUNICATIONS TECHNOLOGY**

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I. INTRODUCTION

During the 1998 Session of the General Assembly, Senate Resolution 46 created the Senate Study Commission on Promoting Aerospace Development, Commercial Space Activities, and Telecommunications Technology. The purpose of the Senate Study Commission was to investigate the feasibility of the emerging

aerospace and telecommunications market niches, supporting major economic sectors of the State of Georgia with the intent to provide the foundation to enable the state to vigorously pursue its long-term interest of leveraging advanced data transmittal technology (telecommunications, remote sensing, satellite navigation, and data management), and to recommend any actions or legislation which the Committee deems necessary or appropriate. Additionally, the Commission recognizes the positive trend in commercial space launch operations and corresponding infrastructure (spaceports), and believes these areas have the potential to contribute to the economic interest of Georgia. This report describes the Committee's work and makes recommendations for consideration by the General Assembly.

The Senate Study Commission on Promoting Aerospace Development, Commercial Space Activities, and Telecommunications Technology consisted of four members of the Senate. Senator Donzella J. James was appointed and served as chairman of the Committee. The other three committee members were Senator Floyd L. Griffin Jr., Senator Rene' D. Kemp, and Senator Vincent D. Fort. The legislative staff members assigned to aid the committee in its study include: Karen Thompson, secretary to Senator Donzella J. James; Patsy Turner, Legislative Counsel; Yetta Gibson, Senate Information Office; and Eden Fesshazion, Senate Research Office. Ruben Van Mitchell served as a special aide to Senator James and the Commission.

The Commission held five meetings, four in Atlanta, and one in Columbus. The meetings were open to the public, and were designed to let committee members hear from those involved with the aerospace industry.

II. **BACKGROUND INFORMATION**

The Senate Study Commission on Promoting Aerospace Development, Commercial Space Activities, and Telecommunications Technology was introduced in order to carry on the work of the Governor's Science and Technology Advisory Council (GSTAC) 1994 study regarding the aerospace/aviation industry in Georgia, and to examine how Georgia can benefit economically from the aerospace industry. The focus areas captured in the policy statements in the Governor's 1994 report entitled "*Georgia: Champion for Aerospace and Aviation*," served as a foundation for study of the issues for the Commission. Furthermore, the Commission's work maintains consistency with GSTAC's vision that science and technology are critical in building a prosperous Georgia.

On the national level, according to a report entitled "*1998 Year-end Review and 1999 Forecast*" by Mr. David H. Napier, director of Aerospace Research Center,

the U.S. aerospace industry posted a record \$7.4 billion in profits on \$140 billion in sales during 1998. While profit margins have been decreasing, this is the third year in a row the aerospace industry has earned profits in excess of five cents on every dollar of sales. Aerospace industry revenues grew 5.1 percent, or \$6.8 billion more than 1997 sales. The report also indicated that in 1997, the latest year of comparative data, the U.S. aerospace industry posted the highest trade balance of all industry categories.

According to the Aerospace Industries Association (AIA), which is a trade association with 54 member companies representing the nation's leading manufacturers of commercial, military, and business aircraft and related components, aerospace industry employment has leveled off at around 890,000 in 1998. A 1999 forecast predicts that U.S. aerospace industry sales are forecast to grow another \$4.5 billion in 1999 to \$145 billion. According

to the present AIA President and Chief Executive Officer John W. Douglass, nearly 900,000 American workers are taking home paychecks from the aerospace industry this year. Despite recent employment reduction announcements, this is 100,000 more than 1995.

By the turn of the century, the commercial aerospace industry will have reached a major milestone in its evolution as a robust and viable service provider. Significant technological advances such as remote sensing and global positioning systems have resulted in the establishment of space services that have gone beyond most people's expectations in recent years. Studying space has allowed a greater understanding of the environment, medical services, pharmaceuticals, communication, and transportation.

Since the 1950s, the United States government has built, operated, and maintained a space launch infrastructure for launching satellites into space. Most notably, Cape Canaveral Air Station (Eastern Range) and Vandenberg Air Force Base (Western Range) have been the backbone of the U.S. orbital launch infrastructure. Much of the demand for and use of these launch sites has traditionally come from U.S. military and civil government agencies. Following the Challenger accident, however, a White House decision in August 1986 ruled that launch customers could solicit bids directly from the launch vehicle builders who would, in turn lease launch facilities from NASA or the U.S. Air Force. This decision, coupled with the 1984 U.S. Commercial Space Launch Act and its 1988 amendments, did much to foster a true commercial launch business.

Most dramatic is the rate of growth in the commercial space sector. During the last five years, the commercial space sector increased a stunning 170 percent. It is by far our fastest growing sector with an increase in sales from \$3 billion in 1991 to \$8.6 billion in 1998. Civil space is the place where huge investments in the American economy are being made, and in addition, it is where NASA continues its exploration and development programs. According to a new report by the AIA

Research Center, *"The Race for Space: A General Survey of the Commercial Space Market,"* billions of dollars are being invested in this new business area by private industry, resulting in new technologies, partnerships, and business ventures that are having a profound impact on the aerospace industry.

States such as Florida, California, Alaska, New Mexico, and Virginia have shown immense interest in the space industry and are trying to benefit from the niche that has been created in the market. For example, Texas is looking into creating a spaceport. In the spaceport sweepstakes, Florida and California have the ability to launch rockets now that their respective legislatures have created the Spaceport Florida Authority, and the California Spaceport Authority. Earlier this year, the first launch from a U.S. commercial launch industry site took place at Spaceport Florida.

It is interesting to note that since September 1996, three organizations have been awarded a commercial Launch Site Operator License by the Federal Aviation Administration. These licenses support three sites - Spaceport Florida, California Spaceport, and the Virginia Commercial Space Flight Center which are co-located with federal launch facilities but are run by non-federal organizations at these sites.

DynCorp, a major company which provides information technology and services to both the public and the private sectors, entered into a major venture with the state to develop and operate the Virginia Commercial Space Flight Center at Wallops Island, Virginia. DynCorp generates more than \$1 billion in annual revenue and employs 16,000 people worldwide. According to Defense Daily, this agreement between the state of Virginia and DynCorp creates a facility, and the business development resources needed, to attract launch customers to the Virginia center.

III. KEY FOCUS AREAS

Although the testimonies given before the Commission covered a broad range of issues relating to the aerospace industry, the Commission decided to focus on three major areas which were designed to address the critical issues that have the potential to impact Georgia's economy. The three focus areas identified were:

- **Economic Development:** To use space technology to support and improve Georgia's economy, especially agribusiness, forestry, job development, and job creation, by providing incentives to attract companies involved in aerospace technology.
- **Private-to-Public Technology Transfer:** To utilize private-to-public technology transfer to educate and attract young people into science and technology which will create a highly technologically oriented future workforce.

- **Launch Infrastructure:** To create a launch infrastructure by initially studying the feasibility of a spaceport located in Georgia.

1) **ECONOMIC DEVELOPMENT**

The first focus area identified by the Commission was the application of the latest innovations in space technology to improve the state's economic base. The Commission heard from Mr. Charlie Gatlin of Georgia's Department of Industry, Trade and Tourism, who informed the Commission that industry in Georgia is made of companies which are producers of products, i.e., companies which produce aerospace raw materials. Georgia's aerospace industry focuses mainly on manufacturing, but many are also engaged in research and development, design, engineering, and software development for the aerospace and defense industries.

Over the years, there has been a consolidation of military aircraft manufacturers. According to Mr. Brian Johnson with Lockheed Martin Aeronautical Systems' Public Affairs Office, in 1994 there were 19 prime contractors in the U.S. In 1997, that figure dwindled to four: Lockheed Martin, Northrop Grumman, Boeing, Raytheon. It is interesting to note that Georgia gets only 2 percent of the aerospace industry business mainly through major manufacturing companies such as Lockheed Martin whose annual payroll and tax revenue per year is \$600 million and \$150 million respectively. According to the Georgia Space Grant Consortium, Georgia has aerospace giants such as Lockheed, Delta Airlines, Rockwell, and Westinghouse, and more than 185 aerospace companies. Annually, these companies add more than \$900 million to the state and employ a workforce in excess of 31,000.

According to 1996 figures from the Georgia Department of Industry Trade and Tourism, Georgia acquires \$4.1 billion annually in prime defense contracts and has 13 military bases with nearly 152,000 total personnel. Georgia capitalizes on much of the aerospace industry because of its military installations, business climate, and excellent universities. Over 15,000 Georgians are employed in aerospace related manufacturing jobs with the following companies:

- Lockheed Martin in Marietta 9000
- Boeing (McDonnell Douglas) in Macon 600
- Lucas Aerospace in Macon 700
- Gulfstream in Savannah 3700
- Northrop Grumman in Perry 900
- Northrop Grumman in Milledgeville 700

Other significant aerospace firms are:

- Delta Air Lines 24,000
- Robins Air Force Base 17,000

Mr. Ruben Mitchell, advisor to the Commission, gave the following assessment of the impact of space technology on Georgia's economy. According to Mr. Mitchell, the emerging space applications promise to improve the nation and Georgia's standard of living not only by creating jobs, but also by providing information and products that make life more productive and convenient. For example, commercial remote sensing will revolutionize agriculture, mineral exploration, urban planning, map-making, and distribution of educational programs by providing high-resolution imagery services from space.

Along with commercial remote sensing, the addition of exact location information provided by commercial global positioning system (GPS) data receivers will greatly increase the ease and accuracy of surveying, natural disaster relief, fleet tracking and monitoring, vehicle navigation and utility service. Mr. Mitchell further explained that these advances in space-based telecommunications, remote sensing, global positioning and space-based manufacturing coupled with low cost and reliable access to space has the potential to result in economic growth and job creation.

2) PRIVATE-TO-PUBLIC TECHNOLOGY TRANSFER

The second focus area of the Commission was private-to-public technology transfer. Looking at the current work force, industry in Georgia will need more highly skilled workers to meet the demands of the state in the future. According to the National Science Foundation, America will experience a shortage of nearly 500,000 scientists, engineers, and related technical professionals by the year 2000. Since the jobs of the future demand a highly technologically oriented work force, Georgia must build the skills of the existing and future work force for the next millennium by educating its citizens today. Efforts must go to strengthen the flow of technology from universities and the private sector into the marketplace. One way is to strengthen research efforts at the universities with an existing space related science curriculum, and to promote improvements of secondary education (i.e., math and science) through space science. One of the main concerns of educators was students' loss of interest in science, math, and technology by the time they reach high school.

The Commission heard from representatives of SciTrek, Coca Cola Space Science Center (Columbus Challenger Space Learning Center), Georgia Youth Science and Technology Center (GYSTC), Thirteen Scribes Inc., and the Georgia Institute of Technology who gave the Commission the following overview of their programs along with their recommendations and needs. SciTrek, along with the Columbus Challenger Space Learning Center and GYSTC provide school aged

children with hands-on experience in science and technology. The Commission also visited the Lockheed Martin plant in Marietta.

SciTrek

The Commission first heard from Angela Cooper assistant director at SciTrek. Since it opened in 1988, SciTrek has served two million visitors, 90 percent of which are students. A statewide resource with outreach programs, SciTrek offers hands-on learning opportunities to 100,000 school children per year, mainly those from metro Atlanta. SciTrek partners with schools, parents, and corporations, some of which include Lockheed Martin, Georgia Institute of Technology, and Georgia Youth Science and Technology Center in Atlanta.

Some of the educational programs offered by SciTrek include technology of robots, principles of aviation, environmental science, flight camp programs, career workshops , and national programs such as Science Odyssey . SciTrek is ADA equipped so children with disabilities can enjoy all the different programs at SciTrek. Along with science and technology, children have the opportunity to learn critical life skills such as problem solving, decision making, and communication skills.

Mrs. Gwendolyn Crider, president and executive director of SciTrek's Science and Technology Center , explained to the Commission that SciTrek needs to increase its investment in order to meet the demands of schools and students and be competitive with other states. SciTrek needs to invest a total of \$7 million in program expansion. The priority being to build a statewide outreach program and to build a Challenger Learning Center.

Along with the Columbus Challenger Center, SciTrek is requesting \$1.5 million from the state, \$250,000 for Columbus Challenger Space Center and \$750,000 for SciTrek to invest in their center to construct a Challenger Space Center. After the initial construction, the Challenger Learning Center at SciTrek will need \$120,000-\$150,000 per year for operational expenses. Mrs. Crider further explained that SciTrek already has the space to house a Challenger Learning Center, and they are hoping to bring a Challenger Learning Center to Atlanta. A learning center would increase the number of students they serve.

Coca Cola Space Science Center

The Commission held one of its meetings at the Coca Cola Space Science Center in Columbus. The Center was founded in 1986 as a living memorial to the space shuttle Challenger 51-L Crew. The Dr. Ronald E. McNair Foundation, is a non-profit organization located in Atlanta founded as a tribute to one of the astronauts aboard the space shuttle Challenger. The foundation is committed to making science, mathematics, and technology more interesting, motivating, and challenging for young people.

According to Mrs. Sherry Brock, eastern regional director for the Challenger Center for Space Science Education, there are 31 Challenger Learning Centers in the U.S. and Canada. The Center, which is part of the University of Columbus system, opened two and a half years ago, and has eleven full time employees, two part-time employees, and three teachers on loan from public and private schools.

The Center is affiliated with a number of companies, NASA, and the community. The Center conducts corporate tours for business or community groups, and has remote missions with Fernbank Science Center. The Challenger Space Learning Center with its motto, "Hands on leads to Minds on," is a full day experience geared toward 6th grade and above. The Center accommodates 20 to 32 students and gives them the opportunity to "fly simulated missions." The Center conducts workshops to train teachers. It is designed to act as a bridge between a classroom and real life experience, and focuses on teaching students team work, decision making, communication and problem solving skills.

According to Mrs. Brock, in order to evaluate the Center's impact on children and families, individual Challenger Learning Centers conduct evaluative studies. The most recent and notable is a study entitled the Career Challenge Project conducted under the auspices of Dr. Carolyn Summers at the Houston Museum of Natural Science, which tracked 2,000 students from two districts comprised mainly of predominantly at-risk youth. The outcome showed an expressed interest in significantly more science topics, courses and careers. Students also showed significant gains in knowledge of science concepts related to the programs' experiences.

According to Dr. Carol Rutland, executive director of the Coca Cola Space Science Center, at the present moment the Center is able to serve only 8,000 students per year because of inadequate space. The Center is requesting \$250,000 from the state to expand their program so as to accommodate more students.

Thirteen Scribes Inc.

The Commission also heard from Mr. Gregory Bisi Coker, marketing director of Thirteen Scribes Inc., an Atlanta-based software engineering company. Statistics show a technological gap between the "haves and the have-nots." According to a U.S. Commerce Department report, 19 percent of African Americans own a personal computer, compared to 41 percent of white families. Mr. Coker further explained that the jobs of the future are going to demand a highly technologically oriented and computer literate work force, and African Americans who make up a good percentage of the work force in the service industry will be displaced in the future by GPA systems, robots, and satellite technology. According to Mr. Coker, this growing concern prompted his company to bridge the gap that exists between the African American communities and other communities as far as computer access and financial issues are concerned, by targeting urban and rural communities.

To address this issue, Thirteen Scribes Inc. decided to initiate a program called "Computers in the Hood." The program is especially designed to reach out to African Americans in disadvantaged communities, by providing low-cost financing for families to buy low-cost computers with installation and training included. They also offer computer courses and train people to help build computers which they then turn around and are able to sell at relatively low prices. The program started in May 1997, and has been featured on CNN and in many national newspapers. His company needs help in getting the word out about their program and computer education in general, and urges the state to look into programs such as his as one of the ways of reaching out for example to those on welfare.

Georgia Youth Science and Technology Center

The Commission also heard from Mr. Ed Anderson, regional coordinator for the Metro Atlanta Georgia Youth Science and Technology Center (GYSTC), which is one of the 15 networks of science and technology support centers throughout the state of Georgia. The center is supported by state funds which are administered by the Department of Education. The GYSTC is also partners with companies such as The Southern Company, Georgia Power, Bell South, Scientific Atlanta, and GE Capital. According to Mr. Anderson, the Georgia Youth Science and Technology Center offers programs designed for families, educators, and students which include professional development programs and student programs. Some of the programs they offer or help develop for school systems include staff development courses, training workshops, science clubs, and after-school and summer programs.

Mr. Anderson informed the Commission that he would like to see the state reach out to students in school systems who do not have opportunities to get involved in science and technology. For example, for every one scientist there is a need for three or four technicians, which means there is a greater need for people with two or three years of college education or some form of training. Mr. Anderson mentioned that we need to encourage our students into science and technology so as to meet the demand in the future for a highly technologically skilled work force.

Georgia Institute of Technology

Georgia Institute of Technology (Georgia Tech) School of Engineering professors and researchers gave members of the Commission an overview of the School of Aerospace Engineering and the research activities conducted at Georgia Tech. According to US News and World Report, Georgia Tech ranks in the top three schools in the nation. Georgia Tech has, in the past, produced seven astronauts. Georgia Tech, renowned for its outstanding faculty, staff and students, is one of the leaders in aerospace education in the country and in the world, and has one of the top advanced space vehicle design programs (graduate level) in the U.S. It also has close ties with advanced design groups at NASA, the U.S. Air Force, and the aerospace industry.

Georgia Institute of Technology is the only institution in Georgia that offers an aerospace engineering degree. Georgia Tech is funded by private and public partnerships, NASA, and the state. Along with Georgia Tech, a number of technical schools and institutions such as Southern Polytechnic State University, Fort Valley State University, and Middle Georgia Technical Institute offer programs in aerospace technology, aeronautics, or aerospace related fields.

Professor Erian Armanios briefed the Commission on the Georgia Space Grant Consortium, which he described as "the NASA in our state". The Georgia Space Grant Consortium was created by Congress when it passed the National Space Grant College and Fellowship Act of 1989. The Georgia Space Consortium is made up of 10 member universities, with Georgia Tech as the leading institution, including historically black colleges, research universities, and rural universities.

The Consortium is a program that targets pre-college, undergraduate, graduate, post graduate, and professional populations, and has a blend of educational, technical, research, and social elements. The Consortium works with NASA, local schools and government to provide help to students in math, science, and technology using "space" as the attraction. It also provides funding for aerospace related research, and develops aerospace related courses and curriculum to name a few. Additionally, through its fellowship program, it strengthens the state's aerospace capabilities, by creating a workforce with advanced degrees in fields such as math, engineering, education, and environmental science.

Another research center at Georgia Tech is the Space Technology Advanced Research Center (STAR). Georgia Tech's STAR focuses on technology development on space needs and applications, and is helping create the future of space technology by stimulating innovation in the space technology community. The Center nurtures the growth of space technology professionals by teaming with government, industry, and other universities.

3) LAUNCH INFRASTRUCTURE

The third focus area identified by the Commission was to investigate the feasibility of the emerging aerospace and telecommunication market niches supporting major economic sectors of Georgia. According to Dr. Steven Rufflin, aerodynamics specialist at Georgia Tech, a feasibility study needs to be done to assess if a spaceport can be brought to Georgia . The goal of the study is to provide the foundation to enable the state to pursue its long term goal involving commercial space launch operation and the corresponding infrastructure, i.e., the spaceport.

The launch infrastructure would query industry on the merits of a launch site in Georgia and determine the costs and benefits of such a venture. The feasibility

study will identify potential barriers, environmental, political and/or cultural, to site development. Dr. John R. Olds, director of the Space Systems Design Lab at Georgia Tech, testified that a Georgia Spaceport could help attract new businesses and employment opportunities to Georgia. Even though Georgia has competitors including Alaska, Arizona, California, Florida, and Virginia, Georgia's low latitude and east coast location make it a good geographic location for a new spaceport .

Another advantage is the fact that many companies are currently developing new reusable launch vehicles (RLV's), and Dr. Olds estimates that there will be from 25 to 100 new launches per year after 2005, from which Georgia can benefit. According to Mr. Mitchell, if Georgia is conducive for a spaceport, state agencies can provide investment and operational infrastructure for a spaceport, as they have done in the past for airports, seaports, and commercial road transportation.

IV. RECOMMENDATIONS

1. The Commission believes that in order to attract students into science and technology, and meet the demands of schools and students, existing programs at SciTrek and at the Coca Cola Space Science Center need to be expanded. The expansion will increase the ability of these programs to accommodate more students which will in turn help them achieve their goals and fulfill their missions of giving hands-on experience to students. **The Commission recommends state funding for SciTrek and Columbus's Coca Cola Challenger Space Science Center to help expand programs and to promote education in science and technology, especially in aerospace.**
2. Georgia needs to compete with other states in developing its aerospace industry. Emphasis must be put on recruiting high-tech companies, supporting the needs of space technology-based companies, and developing leadership for the state's technology initiatives. **The Commission recommends that the state provide tax incentives for companies involved in the aerospace industry so as to attract high-tech companies to invest in Georgia.**
3. A Georgia Spaceport will bring investment and operational infrastructure to the state. Researchers at Georgia Institute of Technology, have indicated that an environmental study is required to assess the impact of a spaceport on the land, air, and soil, which will determine whether Georgia is conducive for a spaceport. **The Commission recommends a resolution be introduced which would allow the Senate Study Commission on Promoting Aerospace Development, Commercial Space Activities, and Telecommunications Technology to continue studying the feasibility of a Georgia Spaceport.**

4. Georgia will need to increase its technologically skilled work force to meet the demands of the state in the future. To strengthen the flow of technology from universities and the private sector into the marketplace, Georgia needs to stimulate and attract its youth's interest in pursuing careers in science, mathematics, and technology by providing scholarships. For example, Georgia's Promise Teacher Scholarship provides cancelable loans to high achieving undergraduate students who seek a career in teaching. **The Commission recommends additional grants or HOPE scholarship money be awarded to students who enroll in aerospace, or aerospace related fields, similar to those awards given to students who enroll in traditional educational courses.**

V. CONCLUSION

The Commission believes that opportunities exist for growth in commercial space launch, communication satellite transmissions, and satellite-based imaging, in Georgia. Favorable policies need to be implemented to enhance Georgia's competitiveness in commercial space. According to different sources, within five years satellite networks are expected to transform forever the way people conduct their daily lives. The effect of commercial space on the wider public will be significant. Society will continue to reap the benefit of improvements resulting from aerospace technology . The commercial space industry has witnessed unparalleled growth, particularly in the space transportation market segment, over the past few years. This growth trend is likely to continue establishing a bridge to the 21st Century for all Americans and Georgians in particular.