

**Commercial Space Transportation Advisory Committee**  
**May 31, 2000**  
**MEETING MINUTES**

COMSTAC Chair, Steve Flajser, convened the meeting at 8:30 a.m., and welcomed COMSTAC members and guests. He began the meeting by introducing 8 new members: Mark E. Bitterman, Senior Vice President for Government Relations, Orbital Sciences Corporation, Alfred A. Boyd, Senior Vice President, Science Applications International Corporation; Frank A. DiBello, Vice Chairman, Managing Director, SpaceVest; Jeffrey O. Foote, Vice President & General Manager, Propulsion Aerospace Group, Alliant Techsystems; John S. Perkins, Director, Launch Services Acquisition, Hughes Space and Communications Company; Billie M. Reed, Executive Director, Virginia Commercial Space Flight Authority; Noah A. Samara, Chairman, Chief Executive Officer, WorldSpace Management Corporation; and John W. Vinter, President/Chief Executive Officer, International Space Brokers, Inc.

Chairman Flajser acknowledged Mrs. Elizabeth Fuller, wife of long time COMSTAC member, Paul Fuller, who passed away in January, and noted Paul Fuller's outstanding contribution to the work of the Committee. He also recognized the work of Henry Minami, (The Boeing Company), who has served as the secretary for the Technology and Innovation Working Group for several years and who has made a significant contribution to the annual Commercial Spacecraft Mission Model. Mr. Flajser also acknowledged the work and cooperation of COMSTAC member, Bob Cowls who would be taking over as chair of the Technology and Innovation Working Group, and stepping down as Chair of the Risk Management Working Group (RMWG). He announced that new member, John Vinter, would be the new chair of the RMWG. Mr. Flajser commended Mike Kelly, chair of the RLV Working Group and Russ Turner, chair of the Launch Operations and Support Working Group on their work over the last 6 months. He noted the report from Launch Operations and Support that would be released later on at the meeting and commended the work of Jack Boyland, (United Space Alliance) who was instrumental in the development of the report. Mr. Flajser then acknowledged the outstanding work of Livingston Holder, Deputy Chair of the Committee, noting that he was stepping down as Chair and that Mr. Holder had been recently appointed as the new COMSTAC Chair.

**Special Presentations**

Patricia G. Smith, Associate Administrator for Commercial Space Transportation presented a plaque to Mrs. Elizabeth Fuller, in memory and honor of past COMSTAC member, Paul Fuller. Ms. Smith also presented a plaque to Steve Flajser, for his work and contributions as COMSTAC Chair over the last 2 years.

**Report on AST Activities**

Ms. Smith provided a comprehensive update of activities in the Associate Administrator for Commercial Space Transportation (AST), reporting that AST has begun cooperative efforts to develop common range safety standards and a Memorandum of Agreement with the Air Force, formalizing responsibilities for launch operations safety. She explained that both of these activities are part of the implementation of the

recommendations made in the report on The Future Management and Use of the U.S. Space Launch Bases and Ranges, lead by the White House Office of Science and Technology Policy and the National Security Council.

Ms. Smith reported that there were 17 licensed launches in 1999, including 14 launches for commercial clients worth \$864 million dollars, two launches for the United States government worth \$94 million, and one demonstration launch by Sea Launch, which did not generate any revenue. She noted that annual commercial launch revenues grew by two-thirds over the period from 1995 to 1999 and 1999 revenues were about \$1.3 billion dollars in U.S. dollars, compared to \$2.2 billion U.S. dollars in 1998. In addition to 2 previous failures (Delta III and Athena II), she noted the recent failure of the third Sea Launch mission.

Ms. Smith reported on several milestones for AST regulatory activities including:

- the Internet-based virtual meeting on exemptive class launch vehicles, which generated more than 300 comments from the public including hobbyist and recreational rocketeers scattered throughout the U.S. She noted that this format was in lieu of an advanced notice of proposed rulemaking;
- the publication of final rules on licensing reentry operations, licensing of commercial and state-owned launch sites, and financial requirements for reentry operations by the end of the fiscal year;
- the publication of a Notice of Proposed Rulemaking (NPRM) on licensing operations at non-federal launch sites by the end of the fiscal year; and
- the publication of a notice seeking comments on a Programmatic Environmental Impact Statement, identifying environmental impacts relating to commercial launch vehicles.

Ms. Smith reported on several international issues, including her participation in the International Space University Symposium in Strasbourg, France from May 22-26 and on-going discussions with the Australians over Kistler Aerospace, a U.S. company, planning to launch from Australia's Woomera launch range.

She concluded her remarks by reporting that the 4<sup>th</sup> Annual Commercial Space Transportation Forecast Conference would take place on February 6<sup>th</sup> and 7<sup>th</sup> at the Sheraton National Hotel in Arlington, Virginia, and welcoming Livingston Holder as the new Chair of COMSTAC.

Brenda Parker, COMSTAC Executive Director and AST Customer Service project leader, reported on the Customer Service activities currently taking place in AST. She reported that AST actually began a structured program of customer service activities in 1993, as a result of the Administration's National Performance Review Initiative, now called the National Partnership for Reinventing Government. She noted that AST has conducted three surveys since 1997; however, the response rate has been low.

Ms. Parker listed the programs and activities which AST has targeted for customer service purposes, including such activities as the Space and Air Traffic Management Initiative, the

AST Forecast Conference, and the development of a series of briefings to AST licensees on licensee responsibility under current FAA regulations and launch license provisions. She pointed out that AST was currently examining various means of obtaining feedback from AST customers.

### **The NASA Space Transportation Initiative**

Daniel Dumbacher, Manager, 2<sup>nd</sup> Generation RLV Program at NASA's Marshall Space Flight Center, provided an overview of the NASA Space Transportation Initiative and what is included in the President's budget to implement the Initiative. He explained that the Initiative grew out of efforts to determine what was needed beyond the current stable of X-vehicles to attain the goals of a reusable launch vehicle with a 1 in 10,000 loss of crew limit and a \$1000 per pound to orbit cost. He discussed 5 points of the NASA Integrated Space Transportation Plan, including:

- NASA's efforts to ensure continued safe access to space through Space Shuttle safety upgrades until a replacement alternative has been demonstrated, the leading safety goal for NASA;
- investment in technical and programmatic risk reduction activities, driven by industry needs to enable full-scale development of commercially-competitive, privately-owned and operated, Earth-to-Orbit (ETO) reusable launch vehicles (RLVs) by 2005;
- development of an integrated architecture with systems that build on commercial ETO launch vehicles to meet NASA-unique requirements that cannot be economically served by commercial vehicles alone;
- enabling procurements of near-term, pathfinding launch services for select International Space Station needs on existing and emergent commercial launch vehicles; and
- securing safe, reliable and cost-effective access to space in the far-term through investments in 3<sup>rd</sup> Generation RLV technologies for ETO and in-space applications.

Mr. Dumbacher emphasized that the NASA initiative: is **requirement-based** with safety (1 in 10,000 crew loss) and reduced cost (\$1000 per pound to orbit) as specific design requirements, as well as planned and anticipated NASA missions; **maximizes the commercial convergence** by minimizing technical and business risk for full-scale development; and **creates competition** which enables at least 2 viable commercial competitors and ensures adequate systems flexibility and standardization, meeting near-term requirements affordably while providing growth paths to meet future requirements. He briefly discussed the need for assured methods of getting cargo to the Space Station. He closed by emphasizing that safety is NASA's number one value, followed closely by the need to have safe and affordable access to space.

COMSTAC member, Lou Gomez asked how the X-33 flight demonstrator fit into the 2<sup>nd</sup> Generation program. Mr. Dumbacher replied that the demonstrator helps NASA identify 2<sup>nd</sup> Generation RLV needs. Mr. Gomez also asked if the VentureStar was one of the 2<sup>nd</sup> Generation launch vehicles and Mr. Dumbacher advised him that it was a possibility. COMSTAC member John Logsdon commented that the House Appropriations Subcommittee has zeroed out all money for the Initiative except for the alternative access to Space Station.

### **Commercial Launch Legislative Updates**

Floyd Deschamps, Professional Staff Member, Senate Committee on Commerce, Science, and Transportation reported that Committee Chairman, Senator McCain, decided not to proceed with the Indemnification Bill until the NASA Authorization Bill is resolved. He stated that the Committee is currently working to resolve all differences and get a member's meeting set up. Mr. Deschamps also reported that a bill was in progress that will require more systems engineering in NASA programs and that Senator Graham has introduced a bill that deals with the leasing of government facilities for launch companies.

Eric Sterner, Staff Director for the Subcommittee on Space and Aeronautics, Committee on Science, discussed the changing philosophy in the way launch is viewed and the NASA Space Launch Initiative. He noted that the general opinion is that NASA has done a good job of addressing some of the failures and limitations of the RLV program over the last 5 years, shifting the focus to technology and defining the government requirements. He expressed concern, however, that government/industry partnerships for research and development can sometimes tie up federal money, and keep research from benefiting the entire industry. He noted that if a company pulls out, the government can end up with nothing to show for its funding. He also expressed concern that the focus to replace the Shuttle by 2005 may be too narrow.

Mr. Sterner stated that progress has been made in bringing about a stable business environment for space launch, largely due to the regulatory work of the AST. He also noted that the government is making progress in not competing with the private sector in space launch business.

COMSTAC member Gomez inquired about the status of the Breaux Bill and asked why the Graham Bill was being held up. Mr. Deschamps replied that the Breaux Bill was currently at a standstill and that the Graham Bill has not yet come up for discussion.

### **Defense Science Board Task Force Study**

Edward "Pete" Aldridge, President and Chief Executive Officer of The Aerospace Corporation, reported on the status of the Defense Science Board Task Force Study, noting that it was directed by the FY 2000 Defense Authorization Bill and was established in January 2000. He noted that the study, scheduled to be completed and delivered to Congress by June, seeks to assess the future military, civil, and commercial space launch requirements, to examine technical shortcomings at the ranges in support of these requirements, to evaluate future and current oversight, as well as range safety requirements, and to estimate funding requirements or any funding shortfalls that are projected for range operations. He also noted that the scope of the study is limited to the Air Force ranges at Cape Canaveral and Vandenberg.

Mr. Aldridge identified several issues facing the U. S. launch ranges, including a lack of vision for the ranges especially in the area of utilization; lack of user-friendly environment for commercial customers; inconsistent government policy; and lack of flexibility for range utilization. He also noted that when EELVs become operational,

there will be a change in launch operations and discussed the issue of the impact of new technology, including the use of the GPS metric tracking system instead of radar at the ranges. He concluded by reporting that recommendations are scheduled to be released by June and would include recommendations on a vision, on the precise role of the Secretary of the Air Force, and on the role and responsibilities of the Air Force Space Command.

### **Historical Overview of Commercial Space Transportation**

Tom Rogers, Chief Scientist for the Space Transportation Association, began his historical overview of commercial space transportation activities with the former Soviet Union's launch of Sputnik in 1957, the first satellite business revenue received by COMSAT in 1964, and the world's first global communications system in 1966. Next, using a 39-year span, he compared the progress made in human space flight with that of aviation, noting that there is only 1 space transport system for human space flight, carrying only a small number of people (usually government employees), maintained and operated at government expense, and not contributing to personal and business travel needs. Mr. Rogers pointed out the lack of progress in the human space flight area, stating that space remains closed to the American public.

Mr. Rogers also gave his view of NASA's Space Transportation Initiative and reiterated the statement by the Secretary of Transportation regarding space tourism: "We are rapidly moving into an era in which people other than astronauts and cosmonauts will routinely fly into space for recreational or leisure time activities. There are numerous programs underway by both government and the private sector to develop usable launch vehicles that will fly over populated areas carrying commercial passengers as well as crew. As evidence to their commitment to commercial space, the President and Vice President are proposing to more than double, for commercial space -- all of commercial space transportation office." The statement was made by Rodney E. Slater in Colorado Springs on April the 4th, the year 2000. The office referred to is the FAA's Commercial Space Transportation office.

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### **WORKING GROUP REPORTS**

#### **Technology and Innovation Working Group (TIWG)**

Bob Cows, newly appointed Chairman of the TIWG, reported on activities since the October 1999 COMSTAC meeting. He reported that the TIWG would be meeting with the Air Force EELV Special Projects Office on June 30, in El Segundo. Next he introduced Mike Izzo, Launch Services Program Manager for Lockheed Martin Commercial Space Systems, who provided a summary of the *Annual GSO Commercial Geostationary Launch Demand Model for 2000*.

#### **2000 Update: Commercial Geostationary Launch Demand Model**

Mr. Izzo, who served as Team Leader, reported on the development, the methodology, and the results of the 2000 GSO Launch Demand Model. He noted that the goal for the development of the Launch Demand Model was to reach an industry agreement on the worldwide demand for addressable commercial GSO spacecraft and define what the demand was. He noted that demand is the number of identified or projected programs that

can be launched for a given year. He added that the report is not a prediction of actual launches, but of a peak load which sizes the market and that the addressable market is the satellites that are open for internationally competitive launch service procurement. He reported that the survey for the study was sent to 55 industry organizations, and from that, 20 spacecraft manufacturers, operators and launch service providers responded. He described the methodology as twofold using a near-term forecast, which included industry consensus forecasts, published manifests, and satellite readiness dates; and a long-term forecast, which is an average of different forecasts including planned programs, unidentified future satellite procurements, replenishment satellites, and attrition based on failure.

He reported that the results of the survey showed the near term demand for the next three years to be 30, 31, and 35 satellites for 2000, 2001, and 2002 respectively; and the average annual satellite demand for launches to be 30.6 per year, which translates into a demand of 23.5 per year until 2010. He pointed out that these results show the difference between the demand and the actual number of launches and that the year 2000 average of 30.6 is approximately 10% lower than 1998 and 1999. He stated that the lower rate is probably caused by the consolidation in the industry (manufacturers and service providers), longer satellite life and a trend toward larger satellites; and a growing conservatism in the space industry due to some recent bankruptcies. The forecast was adopted by the full Committee.

2000 Commercial Space Transportation Projections for Non-Geosynchronous Orbits (NGSO)

Herb Bachner, Manager, Space Systems Development Division, FAA/AST, reported on the 2000 NGSO Projections (formerly LEO Commercial Market Projections). He pointed out that the forecast period for the study is 2000 through 2010 and that the study is an assessment of commercial launch demand for all non-geosynchronous orbits (NGSO) including LEO, medium earth orbit (MEO), and elliptical orbits (ELI), and all commercial space systems including communications (approximately 90%), remote sensing, foreign scientific payloads (launched commercially), and CD radio. He noted that the market segments included in the study are: Little LEOs (narrowband data communications, e.g., e-mail, 2-way paging below 1 GHz); Big LEOs (and other mobile satellite services providing voice and data, operating in the 1-2 GHz frequency range); Broadband LEOs (high-bandwidth data links using Ku-band (12/17 GHz), Ka-band (17/30 GHz), V-band (36/45 GHz), and Q-band (46/56 GHz); commercial remote sensing satellites (for earth observation data and imagery); and foreign scientific and technical payloads (for providing data on microgravity, life sciences, and communications experiments).

Mr. Bachner described the study methodology, compared the current study with the 1999 LEO projections, and summarized the results of the report.

**Payload projections:**

Baseline Scenario: 552 payloads over 11 years (38.5% lower than the 898 projected last year for an 11-year period).

Robust Scenario: 685 payloads over 12 years (38.6% lower than the 1,117 payloads projected last year for an 11-year period).

**Launch demand:** (Assessed for two launch vehicle sizes: small (<5000 lb, nm, 28.5°) and medium-to-heavy (>5,000 lb, 100 nm, 28.5°).

Baseline scenario: 196 launches over 11 years; 7.5 medium-to-heavy launches and 10.4 small launches. (32% lower than last year's projection).

Robust scenario: 272 launches over 11 years; 11.6 medium-to-heavy launches and 13.1 small launches.

Mr. Bachner concluded that the number of NGSO commercial launches has increased rapidly over the past several years, with projections showing that the rate of increase has slowed; that last year included significant setbacks including business failures and lowered expectations for satellite services which, combined with the buildout of wireless technologies and last-mile access poses a significant challenge to satellite based systems, and that in both the Big LEO and Broadband LEO market segments the projection of fewer systems has reduced the projected demand for NGSO launches.

#### **Reusable Launch Vehicle Working Group (RLVWG)**

Michael Kelly, Chairman of the RLVWG, reported that in the category of current actions, the group was currently reviewing AST's RLV Operation and Maintenance White Paper and that a RLVWG electronic interactive bulletin board had been established on the AST web site. He also reported that the February 10 working group meeting covered several issues, including an ITAR compliance overview prepared by Kelly Space & Technology; the use of TDRSS for control of unmanned RLVs and the status of the TDRSS Demonstration Program; a report on financial responsibility requirements for licensed reentry activities, and a briefing on technician training requirements for RLV, vision for the RLVWG.

Mr. Kelly also reported on the issues discussed in the May 30<sup>th</sup> working group meeting. He noted that one of the most important issues for RLV development will be passenger indemnification and the group identified possible mechanisms for dealing with liability including a liability cap for RLV operators similar to the Warsaw Convention model for aircraft. He also reported on other issues discussed at that meeting, including the use of TDRSS as a "range surrogate," and the import/export issues affecting the commercial launch industry (ITAR, technology transfer, national security, etc.). Because of the extensive impact that the export control issues are having, Mr. Kelly recommended that a separate COMSTAC working group be established to examine that issue. Mr. Kelly also reported that the RLVWG would be reviewing the FAA's RLV Safety Process Program Plan by July 14<sup>th</sup>.

#### **Risk Management Working Group (RMWG)**

Bob Cows, outgoing chair for the RMWG, presented the report, noting that after this meeting, new member, John Vinter, would be taking over as Chair. Mr. Cows reported that the RMWG met on January 5 to work on comments for FAA's NPRM for Financial Responsibility for Reentry Vehicles, and that on May 24, a teleconference was conducted

in lieu of a meeting on May 30<sup>th</sup>. He stated that during the May 24<sup>th</sup> teleconference, the working group discussed the status of risk management issues and decided to take a closer look at the threats to procuring off-shore insurance, whether it be property or liability insurance, because of the restrictions imposed by the current export controls process.

#### **Launch Operations and Support Working Group (LOSWG)**

Russell Turner, Chair of the LOSWG, highlighted the work of the LOSWG over the last 6 months, and noted that it has resulted in a report, which he introduced to the full Committee. He stated that the LOSWG charter outlines the working groups mission to develop a vision of commercial spaceports, both coastal and inland, included existing launch vehicles and proposed RLVs, finally determining what would affect the long-range competitiveness of the industry. He noted that the work of the LOSWG was divided into 3 major categories: spaceports and related policy and regulations; operations including launch processing and landing; and cost and financing.

Mr. Turner discussed some of the major issues outlined in the LOSWG report, including the role of the Air Force and the evolving role of the FAA for safety responsibility, and how spaceports are evolving. He discussed some of the recommendations, indicating that the first set of recommendations covers both the spaceport and the operations issues, ranging from the definition of what a spaceport is, how it is licensed, how it would be operated, and all other issues related to those items; noting that these recommendations end up with a vision of a joint-use spaceport that would look like an airport. He pointed out that the second set of recommendations relate to the cost issues, such as how the Air Force does its cost collection method, how cost might be shared by industry today, issues related to whether industry would share in the cost and the decision making processes that impact cost in operations

Mr. Turner noted that the report included a definition of a spaceport, comprehensive enough to cover both the current systems, as well as future systems. He explained that a spaceport, depending on the kind of vehicle it has, may have no requirement for a government range to provide safety services, since those safety services could be provided by the spaceport or could be inherited in the launch vehicle itself. He stated that the report included a recommendation for a spaceport safety system, which would encompass all the issues related to spaceport safety, both for people on the spaceport, as well as for the results of the launch, using a model that gives the responsibility to the FAA, similar to what it has already for airports. He added that the Department of Defense would maintain its test ranges and do its own launches, using its own range safety services.

Mr. Turner discussed other recommendations in the report including a recommendation for the government to recategorize their costs into three areas; the spaceport, the launch services, and the range communications; and recommendations on ways to prevent the government from competing with commercial spaceports. Mr. Turner asked that the Committee review the report and provide comments in 2 weeks.

COMSTAC member, Alex Liang, asked whether military needs and the government's need for access to space especially during war, were considered in the report. Mr. Turner responded that the report did cover some of those issues, including the government's national security needs and the most efficient and cost effective ways to meet their needs.

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Wrap Up

Since there was no new business, the meeting was adjourned at 12:30 p.m., subject to the call of the Chair.

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Steven Flajser, Chairman, COMSTAC

**ATTENDEES****COMSTAC Members**

Steven Flajser, COMSTAC Chairman, Loral Space and Communications, Ltd.  
Livingston Holder, COMSTAC Deputy Chairman, The Boeing Company  
Eleanor Aldrich, AIAA  
Mark Bitterman, Orbital Sciences Corporation  
Robert Cows, The Boeing Company  
Frank DiBello, SpaceVest  
Jeffrey Foote, AlliantTechsystems  
Louis Gomez, New Mexico Office of Space Commercialization  
Michael Kelly, Kelly Space & Technology, Inc.  
Alex Liang, The Aerospace Corporation  
John Logsdon, George Washington University  
John Perkins, Hughes Space and Communications  
Robert Ragan, Bechtel, Inc.  
Billie Reed, Virginia Commercial Space Flight Authority  
Noah Samara, WorldSpace Corporation  
Russell Turner, United Space Alliance  
John Vinter, International Space Brokers

**FAA/Associate Administrator for Commercial Space Transportation**

Patricia G. Smith, Associate Administrator for Commercial Space Transportation  
Joseph Hawkins, Deputy Associate Administrator for Commercial Space Transportation  
Brenda Parker, COMSTAC Executive Director  
Herb Bachner  
Kelvin Coleman  
Michael Etchart  
Carole Flores  
Ronald Gress  
Nikos Himaras  
Stewart Jackson  
Chuck Kline  
Chuck Larsen  
Randy Maday  
Carl Rappaport  
Ken Wong

<b>NAME</b>	<b>COMPANY/ORGANIZATION</b>
1. Bates, Jason	Space News
2. Birkeland, Paul W.	Kistler Aerospace
3. Bocek, Robert R.	The Boeing Company
4. Boyland, Jack	United Space Alliance
5. Branch, B.	Satellite Week, Communication Daily
6. Brandt, David	Lockheed Martin Venture Star
7. Brauer, Doug	Department of Commerce /NOAA, Silver Spring, MD
8. Carey, Bill	New Technology Week
9. Carriger, Doug	Wah Wah ICE, Cedar City, UT
10. Chase, Charles	Pratt & Whitney
11. Chefer, Barry	45 <sup>th</sup> Space Wing, Patrick AFB, FL
12. Coleman, Mark	JHU/CPIA
13. Curo, Federico	Inside FAA
14. David, Elaine	Lockheed Martin Corporation
15. Davis, Bob	R V Davis & Associates
16. Divis, Dee Ann	Aviation Week Online
17. Engel, Max	Futron Corporation
18. English, Bill	COMSAT Corporation
19. Falato, Betty K.	FAA (ASD-110)
20. Finch, Jay	ANSER (SAF/SXP
21. Findiesen, Bill	The Boeing Company, Seal Beach, CA
22. Finley, Greg	Department of Commerce
23. Fleming, Sean	Law Offices of Pamela Meredith
24. Fortuna, Donna	NASA/AIA
25. Foster, Bill	R V Davis & Associates, Washington, DC
26. Froiseth, Dave	MAMCO, Melbourne, FL
27. Gagnon, Gary	HQ AFSPC/DOS
28. Ganesan, Kannan	The Boeing Company
29. Greason, Jeff	XCOR Aerospace, Tehachapi, CA
30. Haase, Ethan	International Launch Services
31. Hawes, Tim	SAF/SX, AF Pentagon, Washington, DC
32. Hawkins, Bernard P.	Aerospace Corporation
33. Heatil, Web	The Boeing Company
34. Heydon, Douglas	Arianespace, Inc.
35. Howe, Douglas	The Boeing Company
36. Hudiburg, John	NASA Kennedy Space Center
37. Izzo, Michael	Lockheed Martin Corporation
38. Kaisler, Kenneth L.	Research Triangle Institute, NC
39. Keltner, Bob	Kelly Space & Technology, Inc.
40. Kennedy-Reid, Sherry	Astrium, Inc.
41. Kerr, Michael	Praxair, Inc.
42. King, Bill	Office of Trade & Economic Development, Seattle
43. Klasinski, Ken	Free Flight Phase II, FAA

44. Kopecky, John	Pratt & Whitney
45. Kronmiller, Ted	Arianespace
46. Kuick, Victoria	APSC, San Diego, CA
47. Lane, Carol	Lockheed Martin
48. Lauer, Chuck	Pioneer Rocketplane
49. Macaw, H. G.	Booz, Allen & Hamilton
50. Mace, Casey	Futron
51. MacKenzie, Don	Hughes Space and Communication
52. Magnuson, Stew	Space News
53. Manning, Frank	GMV-CCP, Fairfax, VA
54. Mellors, Jane	European Space Agency, Washington, DC
55. Mitsis, Nick	Phillips Business Information
56. Mueller, Gary	The Aerospace Corporation
57. Muncy, Jim	PoliSpace
58. Murphy, Ed	U.S. Department of the Treasury
59. Pao, Cary	Orbital Sciences Corporation
60. Parker, Bob	DynSpace
61. Peah, Cindy	ATCA, Arlington, VA
62. Piantes, Tony	Aerojet, Washington, DC
63. Pinkowski, Stan	Boeing, RocketDyne
64. Rey, Rene	The Boeing Company, Huntington Beach, CA
65. Rosepink, Ronald K.	Space Access, LLC
66. Schena, Ron	ASTi
67. Scredon, Rich	Futron Corporation
68. Schroeder, Franceska	Milbank, Tweed, Hadley & McCloy
69. Sheahan, John P.	George Mason University, Herndon, VA
70. Simons, Pete	Command and Control Technologies Corporation
71. Smith, Phil	Futron Corporation
72. Snowdon, Jack	OSD CSI Space Systems, Washington, DC
73. Solitario, Thomas J.	Space Systems/Loral
74. Spendlove, Gregg	Thiokol Propulsion, Utah
75. Stadd, Courtney	CapSou, Bethesda, MD
76. Stephenson, Stepheni	United Space Alliance
77. Sumpter, Lonnie	NMOSC
78. Thomas, Albert	Spaceport Florida Authority
79. Van Horn, Jerry	NASA
80. Van Scoy, Mike	The Boeing Company, Huntington Beach, CA
81. VanSuetendael, Rich	FAA, KSC
82. Verna, Joe	ATK Alliant Techsystems
83. Wiser, Tommy	AIAA
84. Yahner, Jack	The Aerospace Corporation

