On the Space Station Freedom Program

On March 30, 1992, Space Studies Board Chair Louis J. Lanzerotti sent the following letter to Mr. Arnold D. Aldrich, Associate Administrator for Space Systems Development.

At its February 26-28, 1991, meeting at the Jet Propulsion Laboratory, the Space Studies Board was briefed by officials of the Space Station Freedom program on the results of the congressionally mandated restructuring activity. The restructured plan and design described at that briefing presented several areas of significant concern for research utilization of the space station. The Board articulated these concerns in a letter and attached statement addressed to Administrator Richard Truly on March 14, 1991. A copy of this letter and enclosure are appended for your convenient reference.

A year later, at its meeting on February 27, 1992, in Washington, D.C., the Board was given an update briefing by Mr. Richard Kohrs and other members of the Freedom program management team. The Board compared progress in the program to its previous advice and has summarized its assessment in the enclosed statement. The life sciences research program envisioned for Space Station Freedom is essential to achieving an understanding of the performance of humans in long-duration spaceflight. The enclosed statement notes that the inclusion of provisions for the centrifuge and related life sciences equipment in the baseline plan is a welcome development. The statement goes on, however, to elucidate several areas of continuing concern.

This past year has been marked by clear improvement in communications between the Space Station Freedom program and the Board; we look forward to continuing and expanding this dialogue in the coming year.

Assessment

On the Space Station Freedom Program

**Space Studies Board Assessment
of the Space Station Freedom Program**

The Space Studies Board was briefed by representatives of the Space Station Freedom program on February 27, 1992. This briefing and subsequent discussion focused on space station planning and design for science utilization.

In March 1991, the Board issued a statement[1] questioning the cost-effectiveness of the reconfigured Space Station Freedom for microgravity research and its adequacy for life sciences research. The statement recognized that there are national considerations other than scientific research for building a space station. It also noted, however, that a properly equipped and configured space station is pivotal to the conduct of the life sciences research needed in advance of long-duration human spaceflight. The Board is gratified that resources and planning for a 2.5-meter centrifuge and supporting equipment are now included in the Freedom baseline. According to this baseline, the centrifuge will be launched in an integrated node in late 1999. The Board was also pleased to learn that a life scientist, Dr. Robert Phillips, has been appointed as the next chief scientist of the Freedom program.

Both the Space Science Board[2] and the Advisory Committee on the Future of the U.S. Space Program[3] have recommended that life sciences research should be the primary scientific use for an Earth-orbiting space station. In this regard, the Board notes several areas of continuing concern. These include the following:

- As articulated in the Board's March 1991 statement: the small crew size at Permanently Manned Capability (four members, of which only two will be available to conduct research); uncertain adequacy of power, supporting equipment, and space; and the delay until the early 2000s in accomplishing life sciences research that is essential prior to long-duration human spaceflight;

- The vulnerability of the schedule for installation of the centrifuge and for the life sciences research enabled by it. Freedom system design and assembly planning should give higher priority to making the most direct and rapid progress possible toward establishing capability for life sciences research—essential to human space exploration goals—including installation of the 2.5-meter centrifuge, rather than to maintaining the schedule for station first element launch and subsequent Man-Tended Capability; and

- The tenuous programmatic linkage between Freedom program planning and human space exploration requirements, particularly in the area of life sciences research. NASA should establish a clear, long-term plan for Freedom's utilization for life sciences research. This planning should address the impact of microgravity and of psychosocial factors on humans in transit between Earth and Mars; the design, test, and critical evaluation of applicable mitigation measures; and the consequences of fractional gravity as a working environment both in transit and on the surfaces of the Moon and Mars.

[1]"Space Studies Board Position on Proposed Redesign of Space Station Freedom," Space Studies Board, Washington, D.C., March 14, 1991.

[2]"Space Science Board Assessment of the Scientific Value of a Space Station" and letter to NASA Administrator James Beggs, Space Science Board, Washington, D.C., September 9, 1983. *See also:* Space Studies Board, testimony to U.S. Senate Subcommittee on Science, Technology and Space, May 10, 1990; and *Toward a New Era in Space—Realigning Policies to New Realities—Recommendations for President-Elect George Bush*, Committee on Space Policy of the National Academy of Sciences and the National Academy of Engineering, National Academy Press, Washington, D.C., 1988.

[3]*Report of the Advisory Committee on the Future of the U.S. Space Program*, Superintendent of Documents, Government Printing Office, Washington, D.C., December 1990.

Letter