World space programs ready to take off

by Marsha Freeman

At the March 28-29 Goddard Memorial Symposium sponsored by the American Astronautical Society, ambitious plans for future space programs by the European Space Agency, Canada, and Japan were put foward. The plans for international cooperation in the upcoming U.S. Space Station will bring U.S. allies into joint operation and responsibility for a space program for the first time. The only potential problem is whether the United States will hold up its side of the commitment, as budget deficit hysteria now threatens to cut NASA spending.

Western Europe will build on its Spacelab experience with the Space Shuttle, and come into full partnership with the United States in manned space systems. In previous joint ventures, the Europeans have generally contributed a piece of equipment or instrument to a U.S. program. In the Space Station, they will not only build a section, but will be responsible for scheduling experiments, and paying for repair and maintenance.

For the Japanese, it will be their first experience in building manned-rated systems. The Canadians plan to play a major role in the Space Station as well.

At the symposium, Karl Doetsch of the National Research Council (NRC) of Canada announced that his government had recently decided to proceed with its participation in the Phase-B space-station studies. All participants are now starting these engineering-design studies which will lead to the building and launching of actual hardware by the early 1990s.

The Canadians plan to build on their experience in designing and fabricating the Remote Manipulator System arm that has become integral to the functioning of the Space Shuttle. Doetsch reported that in this Phase-B study, the NRC will examine the possibility of developing more sophisticated robot capabilities; perhaps one integrated facility for servicing and repairing satellites, the assembly of large space structures, and construction of new infrastructure from the Space Station.

Remote arms similar to that of the Shuttle will be integral to this kind of facility. Astronaut extravehicular activity is quite taxing and expensive, making remote robotic systems, controlled from inside the station, very attractive.

In addition to a facility attached to the station, the Canadians are very interested in developing unmanned platforms for remote sensing. Landsat-type systems are crucial for Canada for agriculture, resource identification, and water management in its vast, remote land areas. They will also be looking at auxiliary power systems for the station.

On April 16, a formal Memorandum of Understanding was signed by NASA Administrator James Beggs and Canadian Minister for Science and Technology Tom Sidden, under which Canada will conduct Phase-B definition and design studies in parallel with studies NASA is conducting.

Mr. T. Mori from the Science and Technology Agency in Tokyo presented an exciting picture of what Japan is considering as its contribution to the international station. Japanese scientists and engineers have determined that their nation could develop a science or manufacturing laboratory for the station, orbital maneuvering or orbital transfer vehicles for in-space transportation, a logistics supply module, or free-flying unmanned platforms that would fly near the station.

Japan could not afford to do all of these, Mori explained. It has decided to proceed with engineering studies of a JEM—Japanese Experiment Module. This module, which would be pressurized and outfitted for manned operation, could be used for life-science studies or materials processing. It is also possible that the Japanese will decide to build more than one laboratory.

The Japanese are also preparing for the trip of their first astronaut in the Space Shuttle in 1988.

European space plans

The 11 nations of the European Space Agency (ESA) have started a series of important initiatives. At the symposium, ESA representative Jack Collet reported that Phase-B studies by ESA, which have been projected to cost 80 million European Currency Units, have been oversubscribed—the member nations have offered to spend 110% of that for the design work!

ESA's major contribution to the Space Shuttle, the Spacelab science laboratory, has put Europe in the position to apply that technology to a laboratory module for the Space Station. Collet reported that in addition, ESA is anxious to develop free-flying or man-tended space systems.

Dr. Wilfried Ley of the German Aerospace Research Establishment, DFVLR, reported on their recent study on potential European missions aboard a Space Station. According to Dr. Ley, European scientists are interested in doing experiments in the materials and life sciences, space science and astronomy, Earth observation, communications and navigation, and robotic and other new technologies.

Seventeen specific mission experiments have been decided upon, touching on all of these fields. These 17 missions

are just for the first three or four years of the initial operation of the station, and the list will likely be greatly expanded as the time gets closer for operation.

ESA has not yet decided what equipment would be included in any specific module. As an example, Dr. Ley stated that a materials-processing lab might have facilities for crystal growth experiments, metals processing, fluid science experiments, storage racks, and other equipment. The module might be a "quiet" lab, where there is a minimum of human movement, noise, etc. or a "busy" lab. This will all be determined in the Phase-B studies.

Europe has also started to examine future commercial requirements for space manufacturing. The German aerospace company MBB has performed studies over the past two years concerning future In-Orbit Infrastructure (IOI) with a focus on establishing an automated, independent European infrastructure in low-Earth orbit for commercial applications.

Peter Sharp from the MBB/ERNO Space Division in Bremen reported at the symposium that their study found that materials-processing missions were identified as having the highest interest among technologists, and also placed a high demand on infrastructure, involving frequent visits for servicing and exchanging materials at the facility.

In the MBB study, many options for commercial materials processing were examined. For example, it is possible to outfit the factory with re-entry vehicles which would come back to Earth without relying on the Space Shuttle. Three different re-entry vehicle configurations are being investigated, modeled on the U.S. Mercury, Gemini, and Apollo programs.

The Europeans will also design the facility to be compatible with both an Ariane and Shuttle launch. Because the major reason to do materials processing in space is the microgravity available, automated systems rather than man will be used. This will push foward the development of robotic systems in space.

L. Breton from the French space agency, CNES, described a possible joint ocean remote sensing program, and a presentation by Prof. Ernest Vallerani from Aeritalia explored the great potential of tethered satellite system experiments, under development in Italy, from the Shuttle and Space Station.

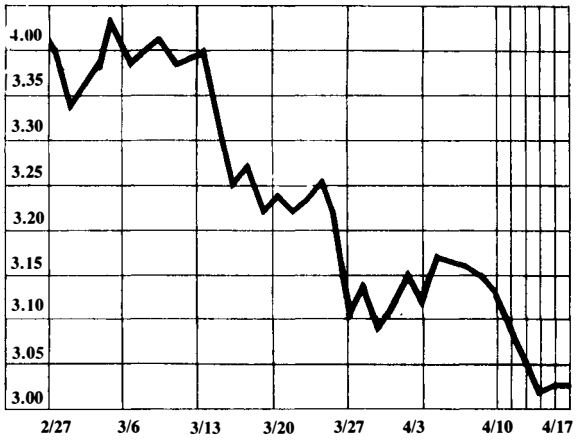
The formal agreements between NASA and Japan, Canada, and ESA are in the process of being signed. The nagging question, however, is: Will the United States keep its side of the bargain, in building the basic structure of the station, upon which everything else depends?

Before the fiscal year 1986 NASA budget left the White House six months ago, the Office of Management and Budget had reduced the Space Station funding by $50 million. Recently, the House Budget Committee voted to freeze the budget at this year's level. That would mean a nearly $400 million reduction in the budget NASA expected to have available in FY86.

Currency Rates

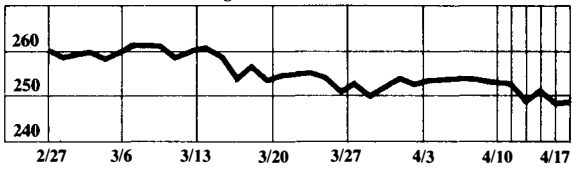
The dollar in deutschemarks

New York late afternoon fixing



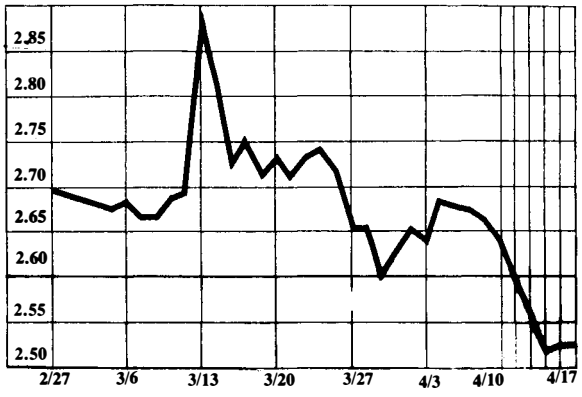
The dollar in yen

New York late afternoon fixing



The dollar in Swiss francs

New York late afternoon fixing



The British pound in dollars

New York late afternoon fixing