Europe Plans Its Own Mini Space Station

A proposal to build a small orbiting laboratory as part of Europe's contribution to the U.S. space station could make for some hard bargaining with NASA

Paris

EUROPEAN nations are contemplating building a small orbiting laboratory in the 1990's, which would be launched by an expanded version of Europe's Ariane rocket and serviced by the proposed European mini-shuttle Hermès. These plans could be the focus of some hard bargaining between the European Space Agency (ESA) and the U.S. National Aeronautics and Space Administration.

The orbiting laboratory, which would conduct microgravity experiments, is being proposed by ESA as part of the European agency's contribution to NASA's planned space station. Responding to an invitation to participate from President Ronald Reagan, ESA's 11 member states agreed at a meeting in Rome last year that this contribution would take the form of a package of hardware elements known jointly as Columbus.

NASA has already expressed enthusiasm for several of these elements, including a permanently attached laboratory module and a polar orbiting platform, both of which would form part of the space station's initial configuration. It is less enthusiastic about the free-flying laboratory, which Europe wants to be included as an early "add-on" at the end of the 1990's.

However, ESA officials say that, if NASA rejects the offer to include the free-flier in its space station contribution, then Europe will press ahead independently to create the core of what would eventually become a fully manned, orbiting research laboratory. "If they say no, we are still going to do it, and we are going to do it in the same time scale," says ESA's director of administration, George van Reeth.

ESA's decision to begin design work on a man-tended free-flier was taken at a meeting of the Columbus Program Board in Paris on 17 April. It follows NASA's rejection of an earlier proposal that the European agency's contribution to the U.S. space station should take the form of a laboratory module which would initially be attached to the station but could subsequently be removed and maneuvered independently.

This earlier proposal reflected ESA's concern that the European effort be explicitly designed as a step toward its "autonomous capability" in space. But NASA opposed the idea on the grounds that it would add both cost and complexity to the initial configuration of the space station.

"Having detachable elements is an expensive and dangerous way of doing things," says Robert Freitag, director of space station policy and plans at NASA. "We want to bolt [the European module] in there so that it is firm. We have designed a space station that has certain capabilities which are divided among its component parts; if you take one away, you take away part of the capability that you want to use."

"If [NASA] says no, we are still going to do it, and we are going to do it in the same time scale," says a top ESA official.

NASA's rejection of ESA's proposals for a removable module has led to a stalemate in negotiations between the two agencies that has threatened to exclude the Europeans from the detailed design studies for the space station that are due to begin soon. ESA is hoping to break the deadlock by agreeing to build both a fixed module and a free-flying laboratory.

The new proposals approved by the Columbus Program Board have five separate hardware elements:

- A pressurized laboratory module which, ESA has agreed, will be a "permanent attachment" to what it describes as the International Space Station;
- An unmanned polar platform, designed primarily for earth observation applications;
- A man-tended free-flier, currently planned as a smaller version of the laboratory attached to the space station;
- A "resource module" which would, in slightly different versions, be able to support the operations of both the polar platform and the free-flier; and
- A small, co-orbiting platform, based on an enhanced version of the Eureka platform currently under development.

The complexity of this package reflects the variety of political and commercial pressures under which Europe's space planners are being required to operate, in addition to pressures from NASA.

An important element leading to the decision to include the separate free-flier in addition to the permanently attached laboratory module was a desire by German companies (backed by their government) to attract more contracts in return for the 37% of the $2.4-billion cost of Columbus that West Germany has promised to pay. The resource module required by the free-flier is expected to be built by the German company Dornier.

The inclusion of the polar platform is aimed at ensuring Britain's political support for the whole project. This is partly because the development contract is expected to be awarded to British Aerospace, and partly because Britain's politicians and industrialists remain skeptical about the potential utility of the microgravity research that will be the main justification for the two orbiting laboratories.

Italy is happy, since its main aerospace company, Aeritalia, is scheduled to receive the contracts for the overall design and engineering work of both laboratories.

ESA officials also claim that the Columbus package in its current form should be sufficient to satisfy both the demands for autonomy—they have, for example, specified that the British-produced polar platform will be launched by an Ariane rocket, not the space shuttle—and U.S. concerns about what these demands could mean in practice.

"Cooperative programs are now of a different nature from those in the past," ESA director Reimar Lüst told participants at a conference on the space station organized by EUROSPACE in Venice last month. "It is important that Europe should accept that the United States is autonomous, and that it can accomplish all tasks in space on its own; but it is of equal importance that the U.S. accept the fact that Europe, too, will eventually be autonomous," Lüst said.

Many problems need to be resolved before the full terms of Europe's cooperation on the space station are agreed. One, inevitably, is the effect that the Challenger disaster will have both on the overall program and on Europe's potential contribution. Already, for example, it has added support to

those pushing for the rapid development of the new, heavy-lift version of Ariane, Ariane V, currently scheduled to be ready in 1995. This launcher's potential role in the construction and servicing of the space station is already being discussed as one way that Europe might contribute to its operating costs.

Furthermore, French officials are already describing Hermès, which they hope to have adopted by ESA next year, as a possible backup to the shuttle. "Access to the space station by two different launch systems is necessary to bring safety to an acceptable level, in case problems are encountered with one and it is necessary to use the other," says one top French space official.

Then there is the question of budget. Many European officials feel that NASA is being excessively optimistic in claiming that, under current financial pressures, it can still meet the first launch deadline of 1994 which was set by President Reagan 2 years ago.

Europe, however, also has its budgetary problems. The five-element Columbus package is already expected to cost 10% more than the budget agreed to in principle by the European ministers last year. And the acceptance of Hermès (and possibly the British project HOTOL) as additional projects will increase financial pressures still further (*Science*, 17 January, p. 209).

On the legal side, detailed consideration is currently being given to the conditions that would allow Europe the full use of any technology it contributes to the space station. There are still bitter memories of Spacelab, which European countries built but now must hire from NASA at commercial rates whenever they want to use it.

For the moment, however, the key question is whether NASA will accept the Columbus package in its revised form. The U.S. agency is currently reluctant to make any commitment to provide support services for the free-flier, which a recent NASA task force described as being "of little value."

European officials hope that their determination to proceed with the free-flier regardless of NASA's decision will convince NASA to support it, just as—in reverse—the United States' unilateral commitment to the space station was a major factor in convincing the European space community to sign up for it.

Whether the two space agencies can reach agreement that will allow Europe to participate as a full partner in the next stage of the space station design will depend on the outcome of a round of negotiations that are just getting started. But, as one Italian delegate to the EUROSPACE conference said, "at least we have all now agreed on what we are discussing." ■ DAVID DICKSON

Microgravity Seeks Lift-Off

Venice

"Microgravity is a virgin field," says Frederick Engström, director of space station and platforms for the European Space Agency in Paris. "It may turn out to be the promised land; at least you can sell it as the promised land." That statement, delivered to a meeting of space officials and industrialists from both sides of the Atlantic, suggests the dilemma currently faced in Europe by those eager for more space-based facilities aimed at exploiting the behavior of physical processes in low gravitational fields.

On the one hand, European industry so far has shown relatively little interest in the potential use of space for producing materials ranging from superconductors to protein crystals. Indeed, space production was hardly mentioned in a recent report on "The Space Industry" produced by the Paris-based Organisation for Economic Cooperation and Development. However, enthusiasm for the potential rewards of microgravity research plays a significant role in the case that European space agencies must put to their respective governments to justify increased expenditure on future space projects. These range from further flights of the German/Italian-built Spacelab through participation in the U.S. space station to plans for a totally European, man-tended free-flying laboratory (see accompanying story).

The main push for microgravity research is coming from the aerospace companies that have a direct interest in producing the space-based laboratory systems with which the research would be carried out. These include MBB/Erno and Dornier in West Germany, Aeritalia in Italy, and Matra and Aerospatiale in France, each of which is scheduled to receive major contracts for Columbus, Europe's proposed contribution to the U.S. space station.

Later this month the first general meeting of a new organization called INTOSPACE will be held. With some 60 members, the group hopes to coordinate and stimulate interest in microgravity research among Europe's industrial and commercial communities, and lobby for it in political circles.

"We want to provide concrete inputs into future programs from the users' side, for example, by finding out from different disciplines their particular research requirements," says INTOSPACE general manager Hans Hoffman, previously with the German aerospace company MBB/Erno.

Hoffman argues that the major problem facing microgravity research is the lack of facilities, and suggests that industrial enthusiasm will only grow once a substantial number of experiments have been carried out and the costs of research have been brought down. "Launch costs are still too high, and flight opportunities are still too few."

At least two-thirds of INTOSPACE's members are potential users of microgravity research facilities. These range from the French pharmaceutical company Roussel-Uclaf—which has expressed particular interest in the potential applications to biotechnology—to Italy's Olivetti, keen to study the possibilities for semiconductor production.

The advantages of microgravity research are one of the main technical claims being made for a free-flying laboratory that would operate in conjunction with—but physically independent from—the main U.S. space station. "In the space station, you have man walking around all the time; with a free-flier you have a quiet laboratory without such disturbances, but with experiments better shielded than they would be on an open platform," says one German space official.

There are a growing number of enthusiasts within Europe's scientific community. "We are creating a new science which no one even spoke about 5 years ago," says Italian physicist Luigi Napolitano, chairman of the European Low Gravity Research Association. "We need both scientific and engineering data, as well as the facilities that will enable us to make measurements at a number of different levels of gravity."

However, British Aerospace, which expects to be given the contract under Columbus for Europe's polar platform, shares the skepticism of the British government. "We have been interested in the platform because it seems to be one of the routes to early commercialization," BA executive John Holt told the Eurospace meeting. "We have not yet had the same insights into microgravity." ■

DAVID DICKSON