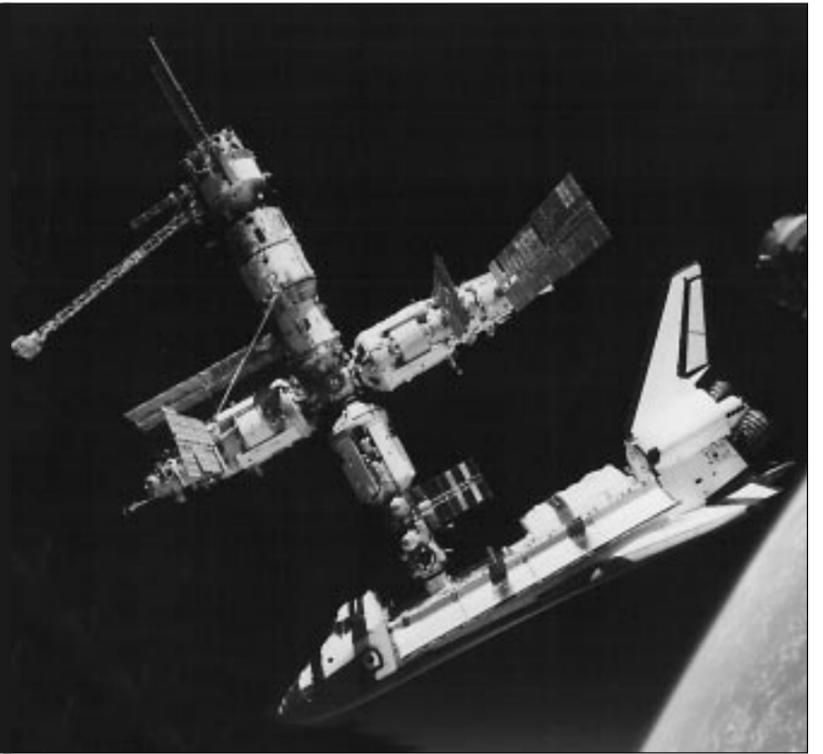


Mission: Possible

Culmination of shuttle-Mir docking program provides measure of confidence for International Space Station



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By John Ira Petty

The shuttle-Mir Phase 1 of the International Space Station program has been a time of learning—a time of sometimes unexpected challenges and a time of developing ways to operate in a new environment.

It has been a time of huge accomplishment, of reaping rewards associated with overcoming some of those challenges not known when Phase 1 began.

Challenges met and mastered go far beyond the strictly operational, said Frank Culbertson, director of the shuttle-Mir Phase 1 Program. They also involved learning to overcome cultural and management differences and to mold the ways NASA and its Russian partners did things into a more optimal whole taking the best from both sides.

"When we began the program... we all had very high expectations of what we would learn and what we would experience in Phase 1, particularly of how that would relate to what we would do in future cooperative ventures," Culbertson said. "I believe that we far exceeded those expectations. We had no idea of how much we would learn."

That, he noted, has been true not only in the space program, but in human exploration in general.

Expectations Exceeded

Phase 1, he believes, met and exceeded those expectations in the quantity and quality of lessons learned by perhaps 10 times.

Randy Brinkley, International Space Station program manager, said he believes remaining ISS challenges will be no more difficult than those that have been overcome during Phase 1. "We have made tremendous progress in terms of understanding one another and being able to work through the various challenges... to building the ISS."

Probably as much has been learned from the

problems on Mir as from the successes, Brinkley said, from working together with Russian partners to understanding and resolving those difficulties safely.

The benefits accrue not only to Phase 1 itself but to design and procedures development for the station. Brinkley said an intangible factor—the development of confidence in one another that grew as we worked together—was at least as important.

"We have learned a great, great deal from Phase 1 and we continue to learn from Phase 1," he said.

Phase 1 manager Culbertson said: "We've been through challenges; we've experienced things we didn't anticipate experiencing; we've learned lessons we didn't know we could learn."

What's Out There?

That's what Phase 1 was about —"going out and finding out what is out there; going out and finding out how we're going to operate in a new environment on a new station, and then how to do it better and safer."

And that, Culbertson said, is what the International Space Station is about, because it won't be the final answer either. "We're going to be always learning, always looking for new ways of doing business."

Phase 1 has contributed not only to improving the way the partners do things in space, but to the way they relate to one another on Earth, Culbertson said.

Doing these things with international partners focuses people outward, on gathering knowledge and on looking at ways to improve life on Earth as well as on looking at ways to expand human life beyond Earth. Doing that cooperatively rather than in competition "sets an extremely good example for the rest of the world," he said.

Not only information from Phase 1, but also some of its people will provide a foundation for Phase 2, assembly of the International Space Station.

Station Foundation

People "who can carry their experience, their knowledge, their own lessons learned into the future operations are being transferred into Phase 2," Culbertson said. "We think that's a very important part of what we're doing."

"It's very difficult to imagine beginning Phase 2 without doing what we've done during the shuttle-Mir program," he said. "Getting to know how to operate in space, getting to know how to work with an international partner, getting to understand the Russian way of doing business and the Russians learning the way we do business, has been critical to beginning the (station) operations in space. You're not going to be able to afford the luxury of too many mistakes up there."

It hasn't always been easy. "Sometimes you've got to keep going in the most difficult of circumstances."

Culbertson said he believes a lot of cultural and communications barriers have been overcome. As a result, as Phase 2 begins both partners will have a good operational base and a good understanding of each other. "We'll know how to solve the problems, even if we don't know all the solutions up front. That's one of the main things that Phase 1 has given us, the ability to work on problems together."

Unprecedented Science

John Uri, shuttle-Mir mission scientist, said Phase 1 has been "a very exciting, very challenging program." On the science side too, a lot of the challenges came at the beginning, as the partners learned to work with one another.

Uri said the scope of Phase 1 "is almost unprecedented in the history of NASA, for conducting a science program of this magnitude over such a short period of time."

Four major science objectives established at the beginning of the program. They were:

- To get engineering and operational experience on a research program on a long-duration space platform. The most recent U.S. experi-

ence had been aboard Skylab in the 1970s. A lot was learned on Mir, and many of the lessons are applicable to the ISS program. "I think that objective has been more than met," Uri said.

- To learn more about Mir and the microgravity environment in general for conducting research programs in various disciplines. "We have certainly done that," Uri said. "It is very feasible to do research on such a platform, which bodes well for the ISS."

- To use Mir as a test bed for space station technologies. "We had a whole program on risk-mitigation experiments, and in some of the science activities we're testing hardware that has been planned or proposed for the ISS," Uri said. Certainly this objective has been met and probably exceeded in a lot of cases."

- To learn how to do space walks with Russian counterparts and systems. One Phase 1 EVA was planned initially. Three were performed. "I believe that objective has been exceeded," Uri said.

During the seven long-duration flights "we've conducted over 100 unique investigations in seven major disciplines, ranging from space science to biomedical to risk mitigation, materials processing," Uri said. They involved 150 principal investigators and many co-investigators from government, universities and the private sector.

Most investigators came from the U.S. and Russia. Others came from Canada, the United Kingdom, Japan, Germany, France and Hungary.

Eye on the Future

Culbertson said that with international partners, "We have to keep our eye on the future. We have to realize that the Earth is not going to be our only home forever. We need to go beyond it."

"Mir was a really good first step. ISS is a tremendous next step. We'll go far beyond that in generations to come. We can't let those generations down by slacking off or slowing down now." □



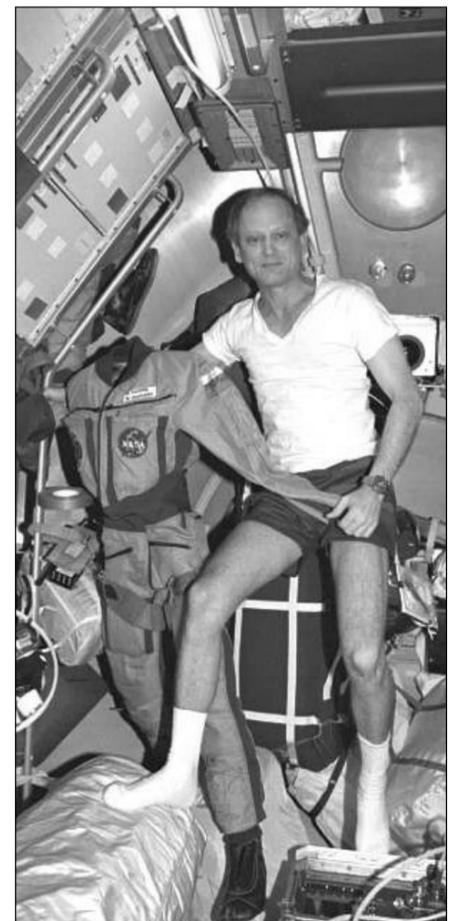
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