

Life in Space

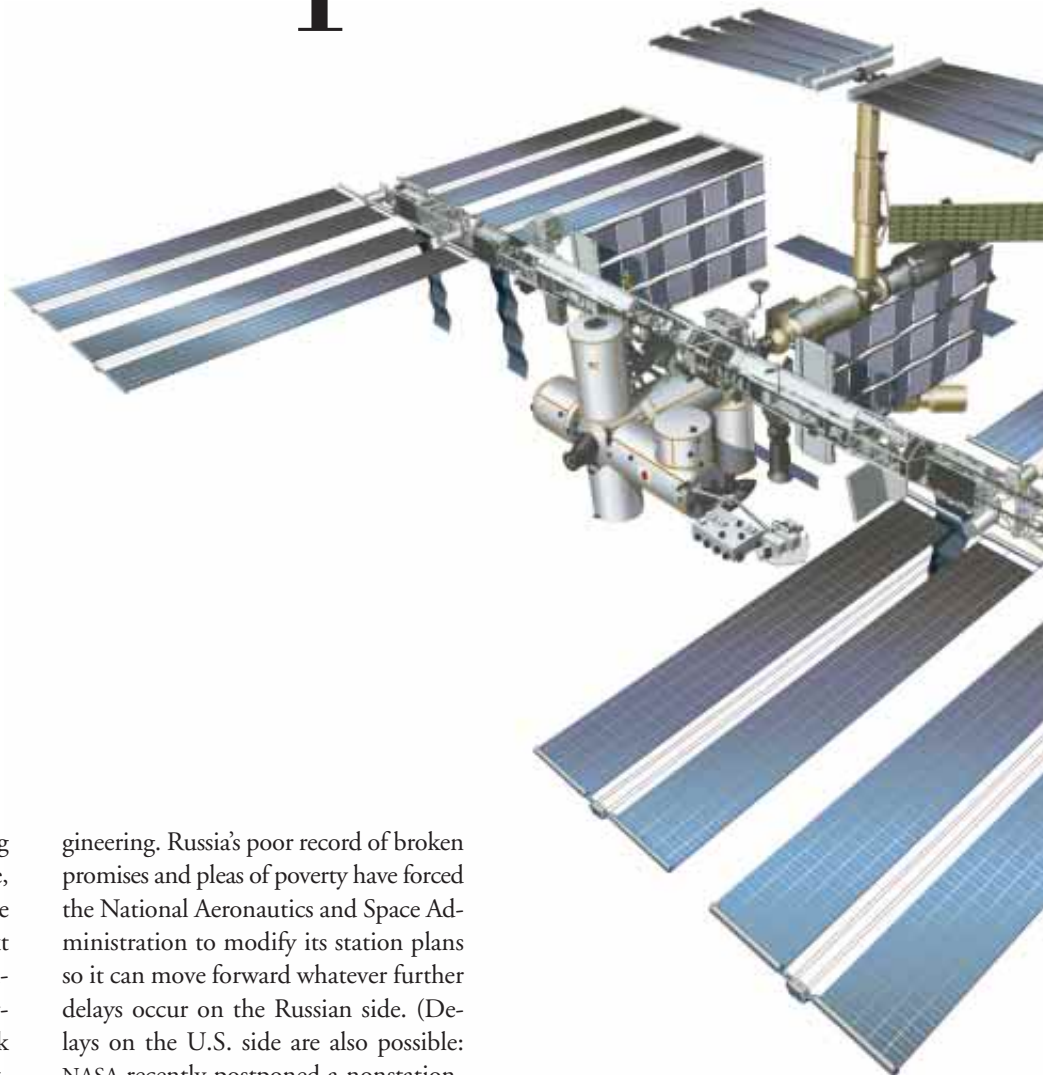
by Tim Beardsley

As long as no last-minute problems intervene, the International Space Station will come to life in earnest sometime in the next few months. In December 1999 or January 2000 the long-delayed Russian Service Module, *Zvezda* (“Star”), will dock with the station components already flying—the U.S. Unity node and the Russian-built *Zarya* (“Sunrise”). Because it will provide power and living quarters during the station’s early years, *Zvezda* is the most vital component of the whole huge program. Its successful docking will clear the way for the first station crew, a U.S. astronaut and two Russian cosmonauts, who are scheduled to arrive in March 2000. By the time this pioneering party returns to Earth five months later, the station should have its initial complement of solar panels and other essentials for long-duration spaceflight, delivered by three U.S. shuttle missions.

A successful launch of *Zvezda* will be a triumph not only of technical engineering but also of political and financial en-

gineering. Russia’s poor record of broken promises and pleas of poverty have forced the National Aeronautics and Space Administration to modify its station plans so it can move forward whatever further delays occur on the Russian side. (Delays on the U.S. side are also possible: NASA recently postponed a nonstation-related September flight of the shuttle *Endeavour* because of an electrical problem.) Should any obstacle prevent *Zvezda* from docking with the embryonic orbital outpost, a backup U.S. Interim Control Module—designed when it was unclear whether Russia would ever complete *Zvezda*—could be ready to fly just nine months later, according to station senior engineer W. Michael Hawes, Sr. And NASA will most likely launch the Interim Control Module at some point even if *Zvezda* does join the station, because the U.S. module will help preserve the project schedule in the event of future launch or technical problems.

After *Zvezda*, NASA is banking on rather little by way of space station help



The International Space Station, the only extraterrestrial construction project, will be ready for inhabitants by March 2000



ILLUSTRATION BY GEORGE RETSECK; PHOTOGRAPHS COURTESY OF NASA

IT'S NO HOLODECK: Life on board the International Space Station is not all work. A mock-up of the station here on Earth offers a glimpse of the facilities that astronauts can expect (*from left, on opposite page*): the movie “theater,” the hand-washer, the kitchen and dining area.

from Russia. Under the terms of the original agreement with Russia, that country was to build, in addition to Zvezda and Zarya, two research laboratories, a life-support module and a solar-panel tower. There are no signs that Russia is putting any significant effort into the research laboratories. The same is true, Hawes reports, of the supposed life-support module; consequently, Boeing is now building a component known prosaically as Node 3 that will provide room for life-support equipment that originally would have been housed in the Russian module. NASA is also proceeding with plans to construct a propulsion module not foreseen in the initial plan. It will ensure

that the station stays in orbit even if, as now seems likely, Russia cannot deliver on its commitment to provide seven refueling flights each year.

Despite Russia's weak performance, Hawes sees grounds for optimism that it will yet play a constructive role. The Russian Space Agency has recently restarted design work on its solar-panel tower, and although the Russian space program is still underfunded, it has at least been receiving regular disbursements for the past year, Hawes notes—a definite improvement. “Things are getting better from a financial standpoint,” he says.

Moreover, the Russian and U.S. teams tracking and monitoring Zarya and Uni-

ty from their respective countries have started to work well together, according to Hawes. Other components are also taking shape: Italy recently delivered a storage module, and Japan is making progress on its lab module. The space station—arguably one of the most complicated engineering tasks ever attempted—could be ready to support its full crew of seven as early as November 2004. SA

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