Orbital assembly: Memories of Skylab

High above the earth, astronauts in orbit linked a series of slim tubes, end to end, forming a much longer structure that they hoped would be able to fill an essential role for a U.S. space station. The year: 1973.

The space station was Skylab, already aloft, but during whose ascent a vital protective sunshade had accidentally been stripped away. In addition, one of the craft's power-producing solar panels had only partially deployed. The two mishaps together had left NASA uncertain about whether the costly facility would ever live up to the promise of its complex scientific mission, planned to occupy three successive three-astronaut crews for months.

The first crew arrived on Skylab's 11th day in orbit, carrying, among other equipment, two new sunshades, the larger of which would be deployed on a huge A-frame that the astronauts would build in space by screwing together 23 five-foot tubular sections. First, however, it was necessary to free the stuck solar panel, which turned out to be jammed by a metal strap that could only be reached by somehow clambering across the outside of the station where there were neither handholds nor footrests. The solution was to join five of the tubes into a single railing, along which one of the astronauts moved hand over hand and cut the strap. Several weeks later, astronauts from the second crew recombined all the tubes into their intended A-frame (55 feet on a side) and erected the sunshade, finally reducing temperatures that had gotten as high within Skylab as 135°F.

More than 12 years would pass before astronauts would try similar assembly methods again in orbit. When the space shuttle Atlantis took off Nov. 26 (on the 23rd shuttle mission), its payload included two projects to test construction techniques for what the administration hopes will be the next U.S. space station, envisioned for the early 1990s.

Most reminiscent of the Skylab experience, though far more sophisticated, was ACCESS (Assembly Concept for Construction of Erectable Space Structures), a collection of 93 tubular aluminum struts and 33 connecting joints that would lock them together into a single, 45-foot-long, triangular girder. Similar components have been envisioned as major structural members in NASA's planned space station, which would be largely assembled in orbit. The other experiment was EASE (Experimental Assembly of Structures in Extravehicular Activity), consisting of six 12-foot aluminum beams, together forming a spidery pyramid.

Handling the construction were rookie astronauts Jerry L. Ross and Sherwood C. Spring, who had practiced the tasks for months underwater to simulate the effects of working in near-weightlessness. The practice paid off, as did the fact that the whole task was designed to be as quick and easy as possible. Spacewalking in the shuttle's payload bay, Ross and Spring unstowed the sections of the tower from their mounting fixture, and used the quick-connect fittings to build and dismantle the entire tower in barely 40 minutes.

The EASE pyramid was designed to let the astronauts assemble and disassemble it repeatedly, while cameras monitored their activities to document their efficiency and whether they were learning from experience. Indeed, by the time they had finished their first day's spacewalking, they were putting up the pyramid in nine minutes and taking it down in six – three minutes less than their total time when they began. So readily did they take to the task that they completed it eight times in a shorter period than had been allotted for the six times on their planned schedule. "Need any space stations you want built?" Spring asked Mission Control in Houston. "Condos?"

Two days later, the construction crew was out again, this time helped from inside the shuttlecraft by rookie astronaut Mary L. Cleave, who used the vehicle's remote-control arm to transport the spacewalkers from one work station to another. This time, most of the activity centered on the tower, with the astronauts' tasks representing what might someday be repair operations on a real space station.

The astronauts described the tasks as simple though tiring, and reported considerable perspiration in their spacesuit gloves, possibly suggesting suit design changes for tomorrow's workers-in-orbit.

Also part of the mission were a number of other activities, including the deployment of three communications satellites: Mexico's Morelos 2 (Mexican payload specialist Rudolfo Neri Vela was also aboard, though not to help with the satellite), Aussat 2 for Australia, and RCA's Satcom K-2. The Satcom was described as the first commercial satellite to be sent into space without insurance, a decision that RCA decided to gamble on because of sharply rising insurance premiums.

Meanwhile, the Syncom 3 communications satellite, deployed in April but which reached its final orbit only after being repaired from the shuttle in August (SN: 9/7/85, p. 150), was declared operational last week. – *J. Eberhart*

Keyworth resigns White House post

Last week, Presidential Science Adviser George A. Keyworth II unexpectedly announced he will be leaving his White House post to consult on corporate intelligence gathering. The resignation, effective Dec. 31, comes at what both he and outside observers acknowledge is the pinnacle of his public career. Reticent about the decision, he has said only that he leaves the position on good terms and is anxious to focus his energies on teaching the intelligence-gathering skills he believes U.S. firms will find essential if they are to thrive in the face of growing foreign competition.

George A. Keyworth II

Keyworth feels especially comfortable about the timing of his departure because "the things that he has been working on most – the things that are really important – are at a kind of plateau," according one of his aides, Bruce Abell. For example, Abell says, "as a result of Geneva [the Strategic Defense Initiative, or SDI] is much more stable." Similarly, the administration's renewed emphasis on basic research "is well established," Abell says. And Keyworth is especially proud of the improved working relationship between industry and universities that has taken hold under the Reagan administration – due in part to a number of his initiatives, like the engineering research centers that he helped develop.

Keyworth "is going to be a hard act to follow," says William Carey, executive director of the American Association for the Advancement of Science, based in Washington, D.C. In particular, Carey terms Keyworth's ability to garner 14 percent and 18 percent increases in federal support for basic research funding as "astounding." Noting that Keyworth's undaunting support of SDI has hurt his credibility with some scientists, Carey says, "On the whole he gets very high marks."

Carey and others suggest that Keyworth's decision to leave may in fact signal his recognition that growing congressional concern over the budget deficit would have prevented his being able to shelter science from the budget ax much longer. – *J. Raloff*