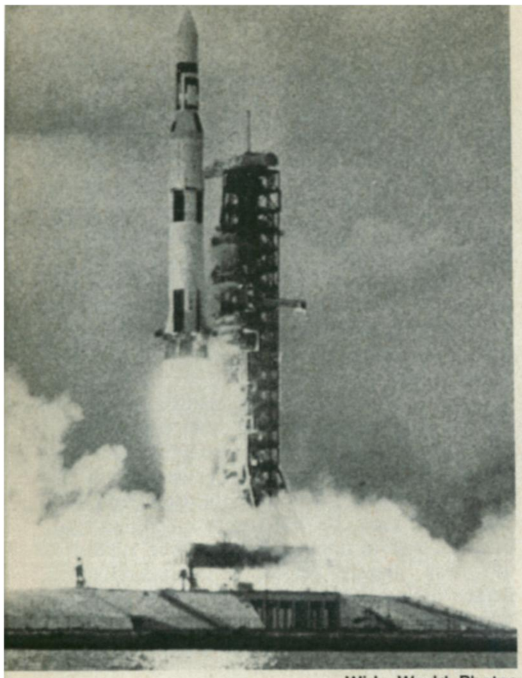
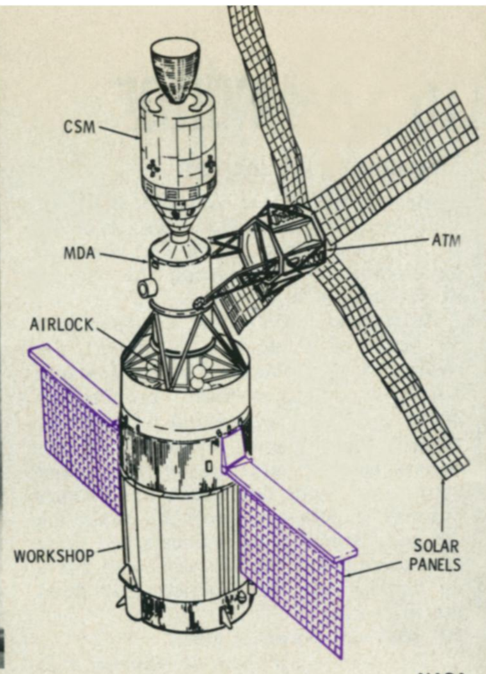
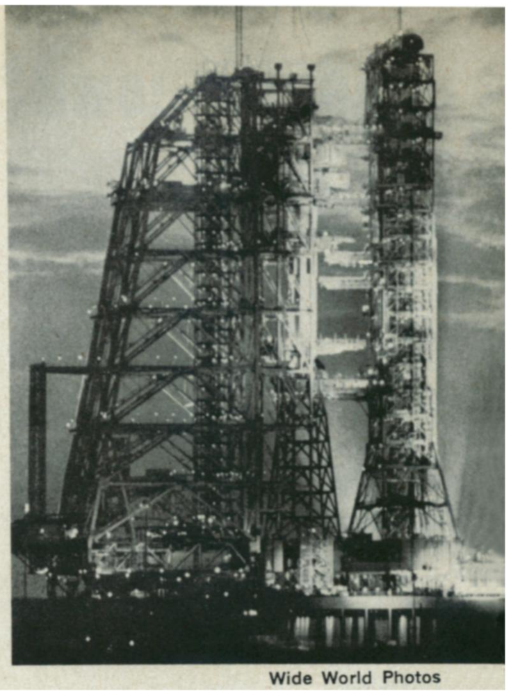


Wide World Photos



NASA



Wide World Photos

Skylab's launch went well, but the solar panels (purple) did not deploy properly; Saturn 1B waits to launch the men.

science news OF THE WEEK

Troubled Skylab: A mission in jeopardy

The space agency's decade-old hopes of establishing an experimental space station in earth orbit were severely dimmed this week. The failure of the solar panels to open up (the major source of electrical power for the laboratory) and the subsequent overheating of the space station posed difficulties that jeopardized the entire Skylab mission.

The loss of half the space station's electrical-producing capacity—as damaging as it was to the science program of Skylab—was something NASA could live with. But the thermal problem was not. Both problems derived from the premature deployment and loss of the laboratory's meteoroid shield—a shield which no one had bothered to mention was also necessary to protect against solar heat.

The lift-off of Skylab 1 astronauts Charles Conrad, Joseph P. Kerwin and Paul Weitz that was to follow the launch of the space station by 24 hours was delayed at least five days until May 20 to allow NASA officials time to assess the full impact of the loss. A decision whether to postpone the crew launch even further was being awaited late this week.

The crippling mishap occurred during the time of maximum aerodynamic pressure on the spacecraft only 63 seconds into the launch of the complex laboratory. But the exact sequence of events leading to the failure of the solar panels was not determined until almost 8 hours later after detailed analysis of telemetry from the spacecraft during launch. This telemetry showed that at 63 seconds after lift-off the space station's meteoroid shield deployed prematurely, was ripped off the spacecraft and most likely, in the process, damaged the solar array structure.

During launch the huge solar panels were flush against the outer wall of the workshop in accordion folds protected inside a beam and fairing assembly mounted lengthwise on the workshop wall. After the station reached orbit the solar panels were to have opened automatically into two nearly square wings on both sides of the workshop. Only then was the meteoroid shield to have deployed. The early activation of the shield probably damaged the solar panels.

Why the shield deployed early and exactly what mechanical damage was done to the solar panels is not yet known although plans were already being made for the astronauts to inspect the outside of the workshop from the command and service modules before their docking with the station. The solar panels were not gone. "We are getting some electrical power from them," William Schneider, director of the Skylab program at NASA headquarters said the night of the accident. The question arose when ground tracking showed some debris in orbit with the giant space station. Orbital debris was one of the first indications last month that something was amiss with the Soviet space station, Salyut.

NASA was hoping there would be no further eerie similarities between the fate of Salyut and Skylab. The space station has another group of solar panels on the telescope mount that did deploy normally into the shape of four giant windmill blades. They were functioning normally, but they supply less than half of the electrical power for the station. This is enough power to maintain what NASA calls the housekeeping functions of the station but it is not sufficient for operating all the scientific experiments on board.

At mid-week NASA was looking tentatively at a substantially reduced Skylab 1 mission from the planned 28 days to 16 or 21 days and curtailed operation of all scientific instruments on board.

The working plan was to augment the power from the successfully deployed telescope solar panels with power channeled in from the Apollo command and service modules which would carry the astronauts into orbit to dock with the station.

Then the thermal problem occurred. When the meteoroid shield ripped off, it also took with it the thermal protection for the workshop—a heat-reflecting paint. The temperature increased significantly on the sun side of the workshop within 12 hours after the launch, and ground controllers had to make the decision to stop pressurizing the space station because of another worry. The specific type of aluminum of which the workshop's outer skin is made loses a great deal of strength, according to Schneider, when the temperatures rise. This damage to the structural strength of the space station was a major concern. As temperatures inside the station rose to 100 degrees F. there was also concern about damage to film, equipment and food.

The major difficulty about the electrical and thermal problems, said Schneider, was that they imposed conflicting requirements. To maximize the electrical power it is desirable to point the solar telescope arrays at the sun constantly. But this orientation of the space station causes the skin of the unprotected workshop to heat up excessively. "This thermal question . . . has given us more concern [than the electrical power], because if we can't solve the thermal problem, then we have a very hot space station."

As the week progressed, engineers were shifting their major attention from the electrical to the thermal problem. Consideration was being given to all kinds of schemes—some more bizarre than others—to have the astronauts carry something into space to shield the sun side of the space station. Engineers at the Marshall Space Flight Center in Huntsville, Ala., were examining the possibility of emplacing the same kind of aluminum Mylar reflective material used in the Apollo spacesuits. In Houston the Skylab 1 astronauts began walking through procedures to spread the material out over the sun side of the station like a curtain. This would require a spacewalk after the crew docked with the space station.

NASA has in the past recouped remarkably from major mission failures such as Apollo 13. The same expertise was being mobilized this week to work through the Skylab failure, and there was every indication NASA would salvage something out of the laboratory. But the laboratory failure has much broader implications than any one single mishap in the past. The most obvious are the direct effects on the three manned missions which would have taken astronauts up to live and work in the laboratory for a total of five months between now and January 1974. While the focus this week was on the feasibility of the first shortened Skylab mission, no one was predicting what would happen to the two following missions originally planned for 56 days each. Nor was anyone holding out any hope for securing the $200 million necessary to put together another space laboratory from duplicate hardware at various NASA centers and contractors' plants. □

Solar flares and the length of day

Solar flare storms generate an influence that spreads through the circumsolar space and extends far out into the planetary system. One of the effects of that influence, it now appears, is a sudden increase in the length of the day, a slowing of the earth's spin.

In the May 4 NATURE John Gribbin of NATURE and Stephen Plagemann of the NASA Institute for Space Studies in New York call the occurrence a glitch, borrowing the terminology from pulsar astrophysics, where sudden changes in spin rate are also of interest. The terrestrial glitch comes as a superimposition on the increase in the length of the day that is always taking place as the earth gradually spins down.

The occurrence of such glitches as a result of solar storms had been predicted by a French scientist, A. Danjon, who was, however, unable to derive unequivocal evidence of one. Gribbin and Plagemann have found such evidence: a glitch that happened shortly after the great solar storm of August 1972. Because of the prediction they believe that "after" may well equal "because of:"

"[The glitch and attendant changes in the rate of the spin down] are not so dramatic that one would necessarily attribute them to an outside cause on the basis of these data alone, but they take on a greater significance in the light of our prediction, following Danjon, that just such a change should occur soon after a great solar flare. We are confident that the effect is real, and that the glitch was indeed caused by events associated with the solar activity of early August 1972."

The mechanism that links solar flare with earth glitch is not entirely clear yet. The effect of solar storms is to produce an increase in the flux of solar cosmic rays and changes in the interplanetary magnetic field. This has well-known effects on the earth's magnetosphere and outer atmosphere, as auroral displays and disturbances in radio transmissions following solar storms indicate.

Down near the surface of the earth, wind and weather can cause changes in the spin rate. If the wind blows steadily in the direction of the earth's spin, it can increase the spin slightly; if it blows against the spin, it can slow the spin. The problem is to make a connection between the magnetosphere, where the solar particles have a known effect, and the troposphere, where the weather takes place. "How the solar particles disturb the weather is unclear," says Plagemann, and he is now analyzing meteorological data for the period to look for a connection.

There is also a possible connection between earth glitches and earthquakes. The glitches cause "tremendous accelerations," Plagemann says, and these lead to irregular earth tides. The tides could trigger quakes along the margins of tectonic plates. He is checking earthquake data for six months before and after great flares to see if there is any increase. □

Anthropology, films and the changing world

"If picture taking is an anthropological activity, it would seem quite reasonable to expect to find a body of literature which demonstrates that anthropological picture taking is scientifically justifiable. . . . Obviously, this is not the case," says Jay Ruby of Temple University. Ruby was talking about still photography but his concern includes motion picture taking.

Several moves have been taken, however, to establish such a body of literature. Ruby and a group of interested anthropologists and film makers have been presenting papers and participating in seminars on film making at meetings of the American Anthropological Association and at Temple University's conferences on visual anthropology. They are also attempting, with the Smithsonian Institution, to establish a national anthropological film archive. And last week in Washington more than 350 anthropologists and film makers attended the Smithsonian's first anthropological film conference.

William W. Warner of the Smithsonian explained the purpose of the proposed archive and the goals of the conference. Large and valuable quantities of film—especially out-take footage—are often lost because of improper storage or inadequate notation. At a national archive such film would be preserved as a scientific record and made available for research and training. Opening the three-day conference, Warner said, "There is the need to accelerate the filming of rapidly disappearing cultures, before the research value that these cultures have for all mankind is irreversibly lost." There is also, he said, the need to develop the full educational potential of ethnographic film.

Neither of these goals can be achieved properly unless the anthropologists and film makers communicate with each other and learn from each other. This is just what participants in the conference attempted to do. Discussions centered around such things as requirements for research use, extraction of data from large bodies of film, the differences between observational and in-