supply of attitude-control gas, but since that time it has behaved perfectly, using no gas at all in the intervening 12 weeks. One deliberate maneuver is planned for Nov. 4 — "and maneuvers," says a NASA official, "are when things sometimes go wrong" — when the space station will be turned nose-for-tail to take a rather friction-prone bearing out of shadow so that its lubricants can warm up. About six months later, it will be turned back again, again a simple maneuver except perhaps for a five-year-old, long-dormant facility not planned for such tricks in its twilight years.

In trying to predict when Skylab will reenter the atmosphere (if unreached by the space shuttle), NASA now estimates that the chance will reach 50-50 by April 1980, with the "point of natural decay" beginning two months later. All such calculations, of course, are subject to many of the same uncertainties that necessitated the stakeout in the first place. □

Seasat-A: Concern and questions

The Seasat-A experimental ocean-monitoring satellite was sent into orbit on June 26, carrying an array of sensors on a diverse mission (SN: 7/1/78, p. 4) that was to have lasted at least a year, with planned extensions if everything went well. Instead, just 15 weeks after the launching, the probe apparently suffered what officials say was a malfunction that stopped its transmissions and may also have ended its ability to receive ground commands. That would leave it effectively "dead" in space.

Signs of the incident were detected late on Oct. 9, beginning when several onboard irregularities, including a high current drain from the spacecraft's batteries, showed up in data from a tracking station in Santiago, Chile. Later, while Seasat-A was being tracked from Orroral, Australia, its S-band receiver, used for picking up commands from earth, abruptly shut off, followed a few seconds later by the transmitter. (Since then, project officials have found additional data, now being evaluated, from a Seasat tracking station in England, whose coverage spanned the period between the Santiago and Orroral passes. Ironically, it was only two days earlier that the directors of NASA and the European Space Agency had signed a memorandum of understanding providing for the acquisition of the probe's data for a special European Seasat Users Research Group.)

Flight controllers at Jet Propulsion Laboratory in Pasadena continued to send commands to the spacecraft in hopes that it could be reactivated, but no success had been reported as of Oct. 17. Meanwhile, occasional transmissions at frequencies close to Seasat's were being recorded, but indications were that they were from Landsat 3 and other satellites broadcasting on similar bands.

From launching to the report of the malfunction, Seasat-A had had its sensors in operation for a total of 99 days (an initial period was devoted to checking out the spacecraft and fine-tuning and measuring its orbit). All but one of the sensors were microwave instruments assigned primarily to such tasks as monitoring wave heights and directions, tides, currents, ice fields, and temperatures and winds at the sea surface. (The one nonmicrowave instrument, a visual-and-infrared imaging radiometer for day-and-night photography, failed earlier in the mission.) The project, although apparently cut short, went a long way, officials say, toward its goal of demonstrating the concept of the microwave approach to ocean studies.

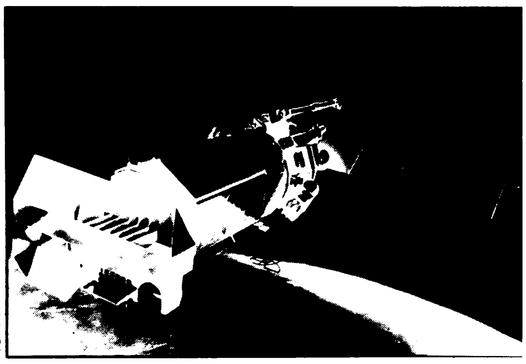
There, except for the months of data analysis that remain, the story would end — and perhaps it does. But there are signs that there has been more to the Seasat saga than has met the public eye. A principal factor in such suppositions is one of the satellite's sensors known as a synthetic-aperture radar, or SAR. On Seasat-A, the SAR has been used primarily for its microwave "images" of the ocean surface, revealing wave patterns and other disturbances as small as a few meters across (SN: 8/5/78, p. 89). Experience with the device as a satellite-borne oceanographic sensor is limited, and researchers are still in the process of learning what the images are really showing. They are investigating the possibilities of seeing currents, shear zones, weather correlations and even perhaps subsurface thermal upwellings, all from a sensor that is recording radar reflections from presumably the uppermost millimeter or less of the ocean.

There has, however, been some military SAR experience, and reports of military interest in the civilian Seasat program (beyond the meteorological concerns of the U.S. Navy's Fleet Numerical Weather Central) seem to hover around it like ghost stories or UFO sightings — difficult to substantiate, but repeatedly popping up. One source close to the program has told SCIENCE NEWS, for example, that the Defense Department once sought to have the data from the SAR and a companion sensor (a microwave radar altimeter) classified, but that the National Security Council determined that Seasat would operate as a "totally open civilian satellite." Failing that, says the source, an option for a different sort of military constraint was achieved by persuading NASA to submit each proposed operation of the SAR for Defense Department "clearance," or, by implication, veto. This assertion is unconfirmed, but not greatly at odds with the tenor of the Seasat "rumor mill."

Why might there be such interest? What could the SAR reveal that other "sky-spy" satellites might not, or that would suffer from appearing in publicly available data? One possibility, labeled "unlikely" or "far-fetched" by some sources but stated — though again unconfirmed — by three others, is this: The assertion has been made that, perhaps by specialized analysis of the data, it has been possible (one source says "may have been") to detect signs of submarines (apparently nuclear) operating at depths as great as 1,500 meters. Some researchers conversant with synthetic-aperture radar reject the idea, since it would almost certainly depend on surface manifestations of the submarine's passage. Others, however, acknowledge at least the possibility of such exotic effects as a change in the surface's dielectric constant due to temperature variations caused by the heat of a nuclear sub's reactor coolant.

Even assuming that such assertions are so, Seasat-A would not be a unique case of military/civilian conflict in space programs, and the interagency committee on space policy recently created by President Carter (SN: 10/7/78, p. 244) has been designed in part to deal with such issues. Meanwhile, the "backup" unit to the Seasat SAR is being readied for a civilian mission on an early space shuttle flight. Who will be looking through its radar eye? □

TIROS-N launched


NOAA

On Oct. 13, after a month-long series of delays, the TIROS-N "environmental" satellite was launched for the National Oceanic and Atmospheric Administration, destined for a major role in the upcoming worldwide weather study of the Global Atmospheric Research Program (GARP). Besides scanning and photographing the land and seas, the 723-kilogram probe will provide vertical "soundings" of the atmosphere, measure particle fluxes related to the sun's output, and serve as a centralized relay system for information from a variety of other data-gathering devices, such as balloons, buoys and ground-based sensors.

To an extent, TIROS-N is a multi-national satellite. It is equipped with a stratospheric sounding device from Great Britain, while the collection system for the remote data sources comes from France. The satellite's photographs can be "read out" by relatively low-cost receiving stations now in use in more than 100 countries, and the GARP project involves at least 140 nations. □