NASA HEADACHE–I

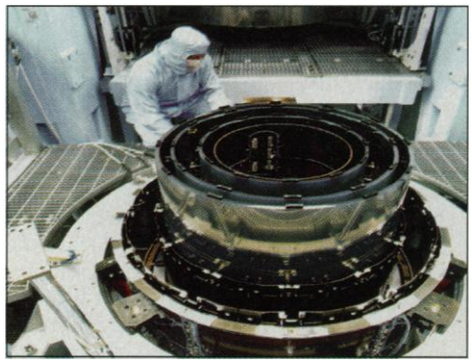
AXAF Delay Threatens Station, Hubble

What began last summer as a series of minor delays in the development of a giant $2 billion x-ray observatory now threatens to turn into a crisis that could affect this year's launch of the first components of the international space station and a planned 1999 Hubble Space Telescope service mission. NASA officials say that difficulties in completing the Advanced X-ray Astrophysics Facility (AXAF) will postpone its slated 27 August launch aboard the space shuttle Columbia by more than 2 months—and perhaps as long as half a year—sending a ripple effect through the shuttle schedule.

Twenty years in the making, AXAF is designed to capture high-energy x-rays streaming from some of the universe's most violent locales. Four sets of powerful mirrors promise to provide astronomers with high-resolution images of the Milky Way's center, other galaxies, and distant quasars. That flow of data—which could last from 5 to 10 years—was scheduled to begin in November, but now will not start until sometime in 1999.

AXAF's technical troubles came to light last summer, when prime contractor TRW Inc. of Redondo Beach, California, and its subcontractors took longer than expected to complete work on the spacecraft's components, says Fred Wojtalik, manager of observatory projects at NASA's Marshall Space Flight Center in Huntsville, Alabama, which oversees the effort. For example, Ball Aerospace of Boulder, Colorado, was nearly 2 months late in delivering the module containing science equipment. Now, TRW is encountering software problems in AXAF's electrical systems. "There were more bugs to be solved than expected," says TRW spokesperson Brooks McKinney.

Senior NASA managers say they were caught off guard when they learned last month that these difficulties could force a two-and-a-half-month launch delay and add about $50 million to the mission's total cost. NASA space science chief Wes Huntress told Marshall officials that the delays and cost increases are unacceptable, and ordered Marshall and TRW to produce a better plan by 26 January. Wojtalik told *Science* last week that the team has yet to come up with "dramatic results," but added that the schedule has not slipped further. Other agency officials, however, warn that the delay could stretch to 5 to 6 months, if further difficulties arise as TRW checks out the spacecraft.



NASA

Last-minute snags. Technician prepares key AXAF component for launch.

A delay longer than about 2 months would pose a serious threat to other missions. The massive observatory must be launched aboard Columbia, because the other three shuttles are outfitted with bulky docking modules that will be used in space station assembly. Delaying AXAF's launch until November or December would pose problems for shuttle managers, who will be juggling those space station assembly flights and can only prepare for so many missions at a time, says Robert Elsbernd, a NASA space shuttle official. A longer delay would be even more problematic. Once it has launched AXAF, Columbia is slated for a 15-month overhaul for a December 1999 mission to check out the Hubble telescope and boost it into a higher orbit. "If AXAF slips 5 or 6 months, then there is a big worry about Hubble," because its orbit will be slowly decaying, says Elsbernd.

TRW officials say they are trying to ensure that the delay does not go beyond 10 weeks. The company has replaced its AXAF program manager, added 50 testing and integration personnel, and has shifts working around the clock to complete integration of the spacecraft, says McKinney. And Wojtalik adds that there may be innovative ways to speed up the effort. But TRW and Marshall officials—no doubt with Hubble's initial astigmatism in mind—warn that there are limits to how far they can go to make up for lost time. Says Wojtalik: "The one thing we don't want to do is to get this thing into orbit and find it doesn't work."

–Andrew Lawler

NASA HEADACHE–II

Goldin May Cancel NASA Earth Probe

The Clark satellite was to be a model of NASA Administrator Dan Goldin's faster, cheaper, better approach to space missions: a small craft laden with instruments for observing Earth's surface and the sun, all for just $54 million. But Clark may instead turn into a test of Goldin's fiscal toughness. He is considering a recommendation to cancel the mission due to poor management, a host of technical troubles, and spiraling costs. Sources say the ax could fall as early as this week, although program supporters are lobbying hard to keep Clark alive.

Clark was originally scheduled to make it into orbit in the summer of 1996, where it was to join a sister spacecraft called Lewis. But a variety of problems delayed both satellites, and Lewis failed shortly after launch last August. A new contractor pledged to put Clark back on track last year. As recently as November, NASA officials were confident the spacecraft could be orbited by May, at no more than 13% over the projected cost (*Science*, 14 November, p. 1216). Now, an internal NASA team has found a host of new problems—including cost overruns that would increase the pricetag by at least 20%—and recommended that the administrator cancel the effort, according to agency sources.

The NASA team, led by Al Diaz—who was named director of the agency's Goddard Space Flight Center in Greenbelt, Maryland, on 8 January—warned in a 19 December meeting with other agency officials that difficulties with the Lockheed Martin launch vehicle would postpone the mission until August. Diaz's team also argued that the new contractor—Orbital Sciences Corp. (OSC) of Fairfax, Virginia—hadn't committed enough staff to complete the project, say NASA officials. Software problems, a leaky battery, and the possibility of $4.8 million in added testing costs also worried the NASA group. Sources say OSC disputed that negative assessment in a 37-page letter to agency officials delivered on 9 January.

Goldin has long warned that he would cancel any mission that overran its projected pricetag by 15%. The Diaz team's new estimate would put Clark well over the threshold. As a result, NASA managers say it is likely Goldin will cancel the effort. OSC spokesperson Barry Beneski declined comment.

Researchers are low key about Clark's impending death, largely because the project was not peer reviewed and never gained strong scientific support, one NASA scientist says. And those involved in the project wouldn't be left entirely out in the cold. A copy of the primary instrument aboard the satellite—a camera designed to provide high-resolution remote-sensing data for use by a wide variety of researchers—already is flying on a private satellite, although it went on the blink last week. And an advanced x-ray spectrometer slated to fly on Clark to observe solar flares might be flown on the space shuttle or as part of a U.S.–Argentinian mission to be launched after 2000, say project scientists.

–Andrew Lawler