

Polyus/Skif, part 2

Source: <http://sci.tech-archive.net/Archive/sci.space.history/2007-06/msg00257.html>

- *From:* henry@xxxxxxxxxxxxxx (Henry Spencer)
 - *Date:* Thu, 21 Jun 2007 04:50:19 GMT
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A few months ago, in a discussion of the somewhat-mysterious Polyus/Skif payload of the first Energia launch, I posted a brief summary of the paper on it in the then-latest issue of Quest (vol. 14 no. 1). The next issue has appeared, and with it part 2 of the paper, so here's a summary of the rest of it...

(Brief recap of part 1: Concepts for orbital laser ABM systems produced an interim goal of an orbital laser antisatellite system, Skif. The prototype, Skif-D, would use a CO2 laser already designed for an aircraft testbed, and various other systems including a variant of the TKS service module for attitude control and general support services. Skif-DM was an attempt to assemble as much of a test article as could be built quickly — in particular, no laser — as a payload for the first Energia. The top third of it, under a big launch fairing, was the TKS service module. Much of the rest was an empty shell, although there were a few real subsystems, like the nonpropulsive-vent system for the laser — with provisions to expel gas through it for testing — and the target dispensers at the tail. It was painted black to help with thermal control, its internal heat output being far less than an operational version.)

Skif-DM was put together in great haste, with much of the assembly and testing done at Baikonur. Even final testing was somewhat compressed. In the end, Skif-DM, Energia, and the launch pad (modified from the static-test stand, because the definitive Energia launch complex was running very late) were all behind schedule and none were ready for the original Sept 1986 launch date.

Skif-DM was originally labeled "Polyus". While waiting at Baikonur, it acquired another label: "Mir-2". The latter appears to have been partly KB Salyut politicking for their Mir-2 concept (based somewhat on Skif, and in competition with NPO Energiya's concept), and partly an attempt to give Skif-DM a cover story as a prototype space-station module.

Around this time, politics started scaling back the Skif-DM test plans. Gorbachev was highly critical of SDI, and there was some sentiment that this was not a good time for a Soviet space-weapon prototype to be tested, with or without plausible deniability. Target deployment and testing of the vent system were both canceled. And when Gorbachev visited Baikonur, partly to see Energia/Skif-DM, he was quite firm: "We are categorically

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against the shift of the arms race into space." Launch was approved, for 15 May 1987, but the program had no future after that.

On the 15th, after some hours of delays due to Energia problems, launch occurred in late evening. Energia did its job, the service-module fairing was jettisoned properly during ascent, and Skif-DM separated cleanly, in a barely-suborbital trajectory. The TKS service module having been launched on top (to match its launch environment to that of Proton, for which it had been built, as closely as possible), Skif-DM would have to turn 180deg before the first of the two orbit-insertion burns.

Attitude control and the RCS system were activated, and the turn started. Several equipment covers were jettisoned... and when the RCS system should have fired to stop the turn at 180deg, nothing happened and the rotation continued. Various other cover jettisons and deployments happened as programmed, and the OMS engines were started for the first burn, but the rotation continued unchecked, and the OMS burn (lasting roughly two full turns) accomplished nothing. Skif-DM reentered and fell into the same area where the Energia core fell.

The problem was identified quickly: the RCS engines had been disabled because a command had shut down their "power amplifiers" [drive circuits for their valves, I would guess] just before the cover jettison. The cover jettison used a timing signal which, on the original TKS, deployed the service module's solar arrays... and RCS operation was inhibited during solar-array deployment.

This would have been caught if normal development testing had been done at the factory, but the test setup at Baikonur didn't permit the full range of tests. Even so, the RCS shutoff command did show up in the recorded test results, but there had been no time for a full data analysis and nobody had noticed.

Work continued for a little while on Skif-D1, a more complete Skif prototype (although without the laser), but resources started to dwindle since the government was no longer very interested, delays multiplied, and technical problems did not get solved. Skif prototype work was stopped in late 1987, and the combination of the weakening Cold War and growing Soviet economic problems ended all military "heavy orbital station" funding in 1989.

One minor surviving element is the big carbon-composite launch fairing that covered the TKS service module. The Mir add-on modules and the Zarya ISS module were all variants of the same service-module design, and all were launched under the fairing developed by the Skif program.

(Oh yes, credits: the two-part article is "The 'Star Wars' That Never Happened", original by Konstantin Lantratov, translation by Asif Siddiqi.)

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spsystems.net is temporarily off the air; | Henry Spencer
mail to henry at zoo.utoronto.ca instead. | henry@xxxxxxxxxxxxxx

