

Ariane 5 failure investigation focuses on upper stage

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SPACEFLIGHT NOW

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The upper stage of the Ariane 5 failed to deliver its full thrust and shut down early during Thursday's botched launch that left two satellite payloads in the wrong orbit, Arianespace officials said Friday.



The upper stage for the Ariane 510 rocket is hoisted for attachment to the vehicle's cryogenic main stage in Kourou during pre-launch processing. Photo: [Arianespace](#)

The Storable Propellant Stage (EPS) was deployed from the Ariane 5's spent main stage about 10 minutes after liftoff from Kourou, French Guiana.

Telemetry measurements from the Astrium-built EPS stage indicate there was a "disturbance" in the first three seconds after ignition of the single Aestus engine, said Edouard Perez, Arianespace's senior vice president for engineering.

The stage was supposed to fire for 16 minutes and 20 seconds, propelling the European Space Agency's Artemis communications technology satellite and Japanese BSAT-2b direct-to-home TV spacecraft into an egg-shaped geosynchronous transfer orbit with a high point of 35,853 km, low point of 858 km and inclination of 2.0 degrees to the equator.

But the stage only generated 80 percent of its intended thrust, and then suffered an engine shutdown 80 seconds prematurely. The stage actually should have fired longer than planned to compensate for the low thrust.

Arianespace says the engine cut off on its own, suggesting the stage may have run out of fuel for some yet-known reason. Early speculation has centered on the idea the stage had a propellant leak.

Flight data file

Vehicle: Ariane 510

Payload: Artemis & BSAT-2b

Launch date: July 12, 2001

Launch window: 2158-2331

GMT (1758-1931 EDT)

Launch site: ELA-3, Kourou,
French Guiana

Broadcast coordinates: Telstar
6, Trans. 12, C-band

The trouble meant the satellites were released into an extremely lower-than-planned orbit of 17,528 km at apogee, 592 km at perigee and inclined 2.9 degrees.

The upper stage uses monomethyl hydrazine fuel and nitrogen tetroxide oxidizer, which are fed from pressurized tanks to the Aestus engine.

An independent inquiry board is being established to investigate the failure and propose any corrective measures. The panel's members will be announced Monday, with their preliminary report expected on August 1.

"In keeping with Arianespace's policy of openness, we will communicate regularly on the progress of the board's work, coordinating closely with our customers," said Jean-Marie Luton, Arianespace's chairman and chief executive officer.

Officials say the Ariane 5's cryogenic first stage and twin solid rocket boosters performed normally. Additionally, the upper stage did orient itself correctly and deploy Artemis and BSAT-2b despite the propulsion shortfall.

While Arianespace spent the hours after the mishap reviewing data from the rocket, the spacecraft teams were working to devise plans to salvage the satellites. Both satellites carry engines that might be able to boost the craft into their proper geostationary orbits 36,000 km above the equator.



Ariane 510 rocket blasts off at sunset from the ELA-3 pad in Kourou on Thursday. Photo: [Arianespace](#)

"Our ground controllers were ready for such an eventuality," said Gotthard Oppenhaeuser, ESA's Artemis project manager. "Thanks to the availability of the ion propulsion system for position-keeping maneuvers, most of the chemical fuel on board the satellite can be used to raise its orbit to the right altitude. Experts are working out a strategy to make the best use of the available fuel."

Artemis is supposed to test next-generation telecommunications technologies in satellite navigation,

mobile communication services and inter-satellite data relay.

The prospects for the Orbital Sciences-built BSAT-2b aren't as rosy, however. The satellite's main kick motor is solid-propellant and its small thrusters are liquid-fueled. Although it might reach geostationary orbit with the combined efforts of both systems, the satellite likely wouldn't have much fuel left for its planned 10-year lifetime.

"It is too early to judge, we are looking at the strategy, but it will be difficult to get to a GEO orbit and still have a useful life for the satellite," J.R. Thompson, Orbital's president and chief operating officer.

BSAT-2b is supposed to become an orbiting insurance policy for operator Japanese Broadcasting Satellite System. The spacecraft was designed to serve as an in-orbit spare for BSAT-2a, which was launched on the last Ariane 5 in March and has begun relaying digital TV programming across Japan.

Three more Ariane 5 rockets were slated for launch through the end of the year. However, with the vehicle effectively grounded, Luton wouldn't speculate on how the manifest might change.

Luton did say Arianespace would press ahead with the next Ariane 4 launch, which scheduled for the evening of August 23 carrying the Intelsat 902 communications satellite.

There are 12 Ariane 4 rockets left to fly before the workhorse launcher is retired in favor of the more powerful Ariane 5.

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