



The seven members of the space shuttle Columbia were killed yesterday after the spacecraft broke apart 200,000 feet above Texas.

NASA photo

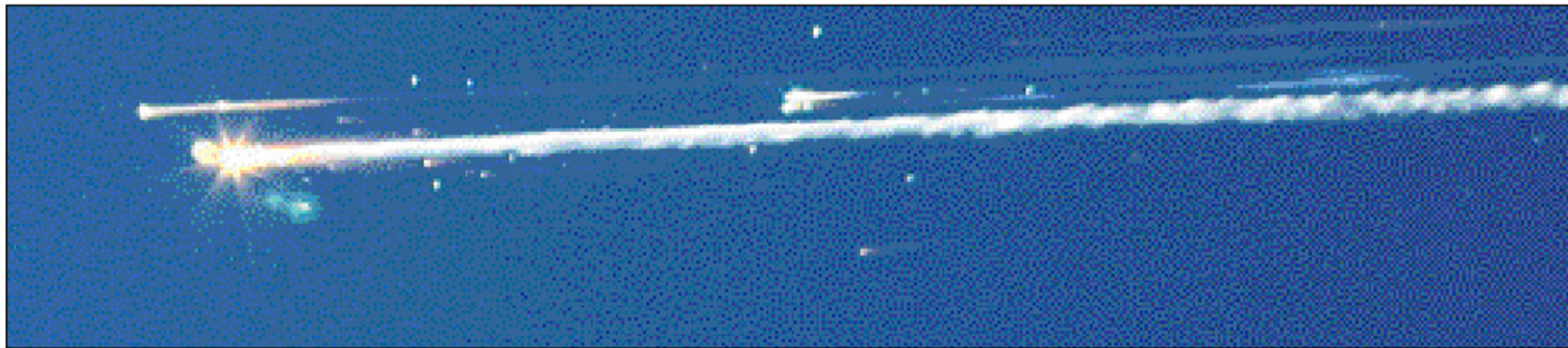


"The crew of the shuttle Columbia did not return safely to Earth — yet we can pray that all are safely home."

— PRESIDENT BUSH

U.S. mourns loss of Columbia crew

Liftoff wing damage among possible causes of breakup



Dr. Scott Liberman photo via AP

Vapor trails from debris of the space shuttle Columbia were seen over Tyler, Texas, yesterday. The shuttle was returning to Florida after a 16-day mission when it exploded 200,000 feet above the Lone Star state.

▲▲▲ Sensors cut out on left side of craft on re-entry

ADVERTISER NEWS SERVICES

Temperature sensors on Columbia's left wing stopped transmitting data. Then the readings on the shuttle's retracted left main landing gear went flat, and the structure of the 116-ton craft overheated.

The chain of escalating emergencies that ended with multiple fire trails in the sky has quickly focused attention on the left underside of the shuttle, which was hit by a chunk of foam insulation that peeled off a fuel tank during the Jan. 16 liftoff.

The wing tiles, and possible damage from the falling insulation, emerged as suspects because Columbia broke up at 200,000 feet, during one of the hottest phases of its flight.

But experts, including NASA engineer E. Vincent Zoby, cautioned yesterday that no one should jump to conclusions about what caused the failure of what is an extremely complex machine.

"I remember when they asked astronaut John Young what were some of the dangers of space flight, and he said, 'Anything from lift-off to landing,'" said Zoby, a researcher at the National Aeronautics and Space Administration's Langley Research Center in Hampton, Va. "These things are still research. Anything

Disaster in space: What happened, and clues to the cause

Damaged wing?

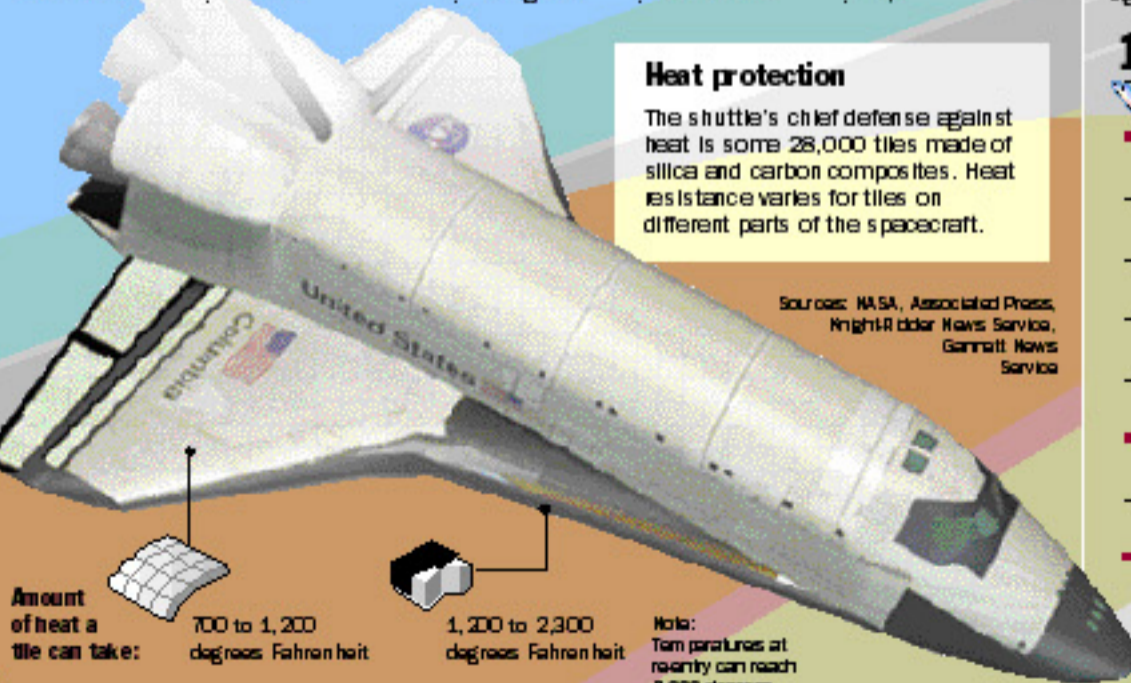
On takeoff Jan. 16, the left wing was struck by a chunk of insulating foam from the external fuel tank, possibly damaging the insulating tiles that protect the shuttle on re-entry. What happened yesterday (All times HST):

- 353 a.m.** — Several left wing temperature sensors fail.
- 356 a.m.** — Temperature rises in left tires and brakes.
- 358 a.m.** — More sensors in left wing fail.
- 359 a.m.** — Last transmission from Columbia.
- 4:00 a.m.** — Shuttle breaks up.

Heat protection

The shuttle's chief defense against heat is some 28,000 tiles made of silica and carbon composites. Heat resistance varies for tiles on different parts of the spacecraft.

Sources: NASA, Associated Press, Knight-Ridder News Service, Garrett News Service



Amount of heat a tile can take: 700 to 1,200 degrees Fahrenheit, 1,200 to 2,300 degrees Fahrenheit

Note: Tem. pressures at re-entry can reach 2,000 degrees Fahrenheit.

MARTHA P. HERNADEZ and STEPHEN J. DOWNES • The Honolulu Advertiser

High speed, high heat

Coming in at an angle too steep or too shallow might have destroyed the shuttle. Columbia re-entered the earth's atmosphere in a series of maneuvers designed to slow its descent.

- 1 The shuttle turns backward and fires engines.
- 2 then turns forward as it enters atmosphere.
- 3 Points nose up at 40 degree angle.
- 4 Breaks up, possibly from heat stress.

Shuttle disaster provokes soul searching about program

By Michael Gunwald
WASHINGTON POST

The shuttle Columbia, returning to Earth after a 16-day scientific journey through space, disintegrated yesterday high above the central Texas plains, killing seven astronauts who had dedicated their lives to exploring the heavens.

"The Columbia is lost," President Bush told the nation. "There are no survivors."

The Columbia, the oldest shuttle in the U.S. fleet, was streaking through the sky at 12,500 mph when it burst into flames about 4 a.m. Hawai'i time, shortly after re-entering Earth's atmosphere. The crew of six Americans and the first Israeli astronaut was scheduled to land in Florida about 15 minutes later.

It was not clear last night what caused the Columbia's demise so close to home, but with the world bracing for war in Iraq U.S. officials said they saw nothing to suggest foul play.

There were a few possible indications of mechanical trouble from shuttle sensors in the minutes before the disaster, but the mission director said the Columbia was still "flying with no problems at that time."

DEBRIS: Parts fall across two states. **A2** | **THE CREW:** Seven profiles. **A3** | **RE-ENTRY:** Perilous time for flight. **A4** | **FUTURE:** Program in doubt. **A5** | **INVESTIGATION:** NASA's priorities questioned. **A8**

See **DAMAGE**, **A4**

ON THE WEB: For up dates, links to comprehensive shuttle coverage, see honoluluadvertiser.com

See **SHUTTLE**, **A2**

IN OTHER NEWS

CRUISE SHIP ARRIVES WITH NORWALK VIRUS:

Nearly 250 passengers and crew aboard the Sun Princess become ill en route to Hawai'i from Los Angeles, but the CDC says the outbreak is under control. **HAWAII, PAGE A29.**

ECONOMISTS SHARE MIXED VIEWS ON WAR:

Two of the state's leading economists lay out scenarios on the impact of war in Iraq as the House Select Committee on War Preparedness meets. **HAWAII, PAGE A29.**



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