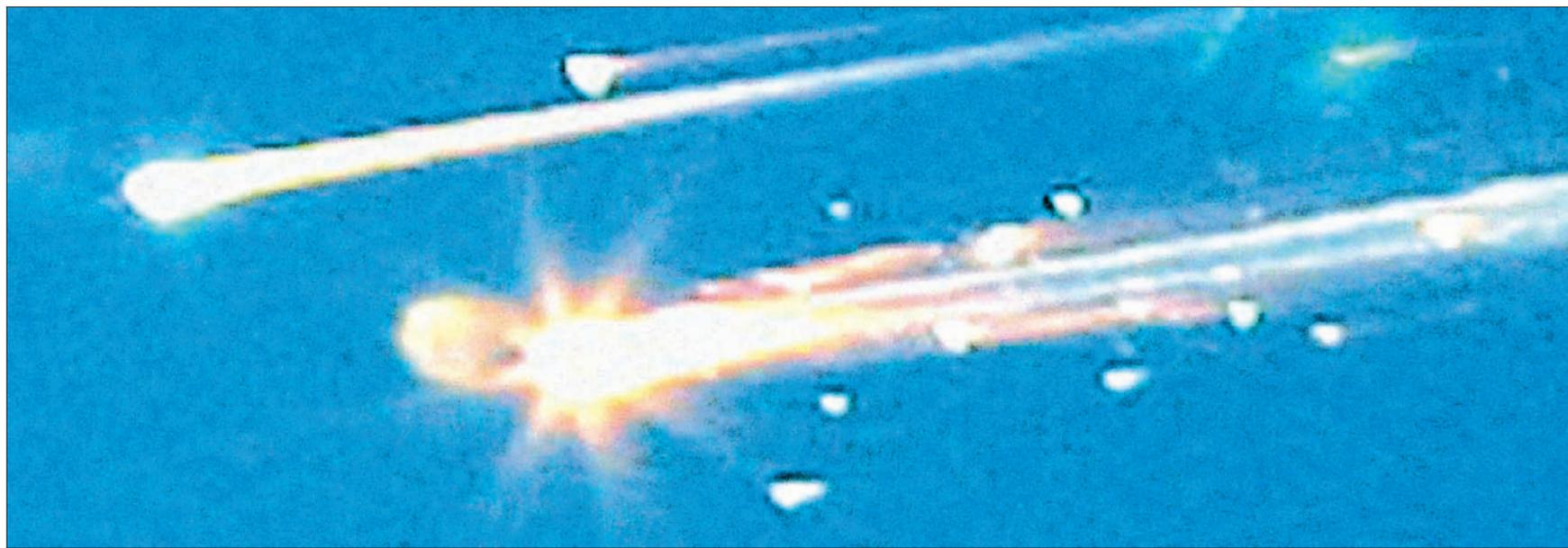




'The Columbia is lost'

Shuttle disintegrates, killing all 7 aboard



Tyler Morning Telegraph photo by Scott Lieberman

Debris from the space shuttle Columbia streaks across the sky Saturday over Tyler, Texas, just minutes before the craft was due to land in Florida. Wreckage was found in Texas and Louisiana.

Officials consider failure of ship's skin

By **Jeremy Manier**
Tribune staff reporter

NASA officials will be investigating whether loose foam that struck Columbia during takeoff 16 days before it exploded Saturday contributed to its disintegration under the extreme physical stress of re-entering the Earth's atmosphere—one of the most dangerous parts of any shuttle mission.

Cameras detected the foam insulation breaking free from an external fuel tank and striking Columbia's left wing, prompting days of review while the shuttle was in space over whether the orbiter's safety had been compromised, officials said Saturday.

The sparse information NASA had Saturday seemed to point to failures on the craft's left side. Sensors on the shuttle's left wing and in the left wheel gear detected a temperature increase or stopped working minutes before the vehicle exploded 207,000 feet over Texas as it flew at 12,500 m.p.h.

Although it's possible the foam knocked off heat-resistant tiles the shuttle needs for re-entry, officials said, it's too soon to draw conclusions.

"Is that the smoking gun? We do not know," shuttle program manager Ron Dittmore said during a news conference Saturday. "There are a lot of things in this business that look like a smoking gun but turn out to be not even close."

Experts said many other malfunctions could have destroyed the shuttle during re-entry, when a cocoon of hot plasma envelops the spacecraft.

Columbia's underside and the leading edges of its wings would have been subjected to some of the highest temperatures during re-entry—up to 3,000 degrees Fahrenheit—as friction from air rushing by heated its surface, experts say.

During this critical period, computers control the shuttle's angle of descent as it flies with its nose pointed about 40 degrees upward; the slightest deviation from the ideal orientation can expose underprotected parts, causing it to burn up.

The shuttle's chief defenses against an inferno are some 28,000 tiles made of heat-resistant silica and carbon composites attached to the vessel's vulnerable aluminum exterior. Although those tiles have never failed to protect the shuttle, ex-

Columbia's final minutes

Columbia lost contact with Mission Control in Houston at the most critical moment of its descent. A shuttle reaches its hottest point about 20 minutes before it lands on the runway, about the same time Columbia's problems began.

SEQUENCE OF EVENTS

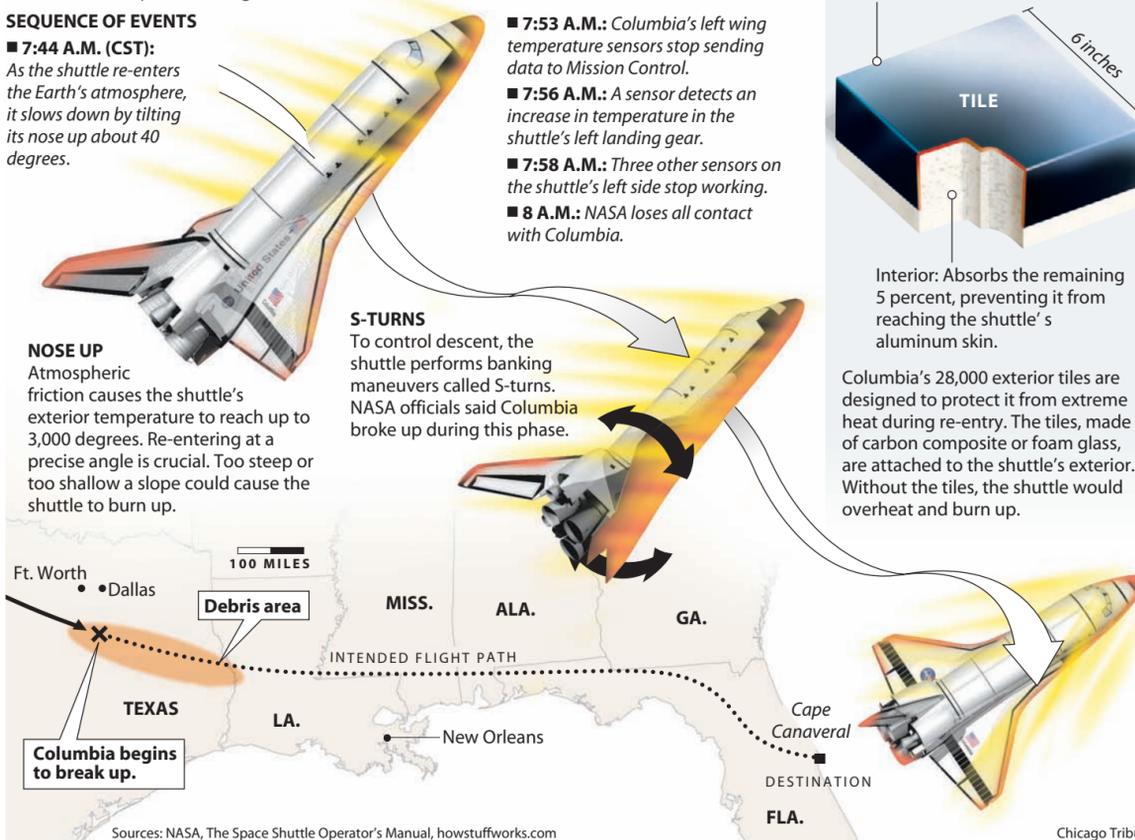
■ **7:44 A.M. (CST):** As the shuttle re-enters the Earth's atmosphere, it slows down by tilting its nose up about 40 degrees.

■ **7:53 A.M.:** Columbia's left wing temperature sensors stop sending data to Mission Control.

■ **7:56 A.M.:** A sensor detects an increase in temperature in the shuttle's left landing gear.

■ **7:58 A.M.:** Three other sensors on the shuttle's left side stop working.

■ **8 A.M.:** NASA loses all contact with Columbia.



Debris scatters across 2 states

By **Tim Jones**
Tribune national correspondent

The homeward-bound space shuttle Columbia broke up in orange flames and contrails of smoke Saturday over Texas, killing all seven astronauts aboard and leaving investigators baffled over what went wrong on a mission that was only 16 minutes away from a successful completion.

Echoing the tragedy of the space shuttle Challenger that stunned the nation almost exactly 17 years ago, Columbia exploded at an altitude of about 39 miles as it was traveling 18 times the speed of sound en route to Cape Canaveral, Fla. The force of the explosion scattered debris across hundreds of square miles in Texas and Louisiana and, according to witnesses, shook houses in the area around Nacogdoches, Texas.

The catastrophe evoked an outpouring of sympathy from a nation grappling with the memories of terrorist attacks and the prospect of war. Flags were lowered to half-staff. Americans interrupted their normal weekend routines to monitor developments on television and, in Texas and Florida, to create memorials to the fallen astronauts.

"The Columbia is lost," an emotional President Bush said in a televised address to the nation. He paid homage to the astronauts, saying, "The crew of the shuttle Columbia did not return safely to Earth, but we can pray that they are safely home."

NASA and an independent review panel said they will investigate the disaster. While officials said it was too early to speculate about the cause of the disaster, early indicators pointed to debris that damaged the left wing during Columbia's launch. That could have been responsible for the loss of signals from temperature sensors in the wing's hydraulic system during re-entry.

Investigators have all but ruled out terrorism as a cause because the shuttle's high altitude and extreme speed put it



Reuters photo by Joe Skipper

Space shuttle Columbia crew members (from left) Rick Husband, William McCool, Ilan Ramon, David Brown, Michael Anderson, Laurel Clark and Kalpana Chawla speak at a preflight news conference. All were killed Saturday as the orbiter broke up during re-entry.

Passion for science, adventure bound crew

By **Amy E. Nevala and Vincent J. Schodolski**
Tribune staff reporters

The astronauts of Columbia were astounding achievers, brimming with master's degrees and military commendations. But beneath the gold-plated resumes, they also were old-fashioned adventurers who ignored huge obstacles and leapt at the chance to fly into space.

They came from around the globe and wide-ranging backgrounds, bound together by a passion for science and an appetite for the rigors of astronaut training. Among them: a female engineer from India, an elite air force pilot from Israel, a female doctor from Wisconsin, an African-American Air Force colonel from Washington state.

Together, they stood as testimony to NASA's power to mine

talent from around the world and to the enduring lure of space travel.

Mission specialist Kalpana Chawla, 41, was a 10th grader in India when she set her sights on a career in aerospace engineering, even though her nation had no space program. A teacher once scolded her that such a career choice was not "ladylike."

In 1988, David M. Brown, also a mission specialist, became the

first Navy physician in a decade to win a spot in a special flight-training program. Brown, 46, graduated first in his class.

Ilan Ramon, 48, the son of a Holocaust survivor, joined the Israeli air force and flew in the 1973 Yom Kippur War and other conflicts, including the controversial 1981 attack on an Iraqi nuclear reactor. In 1997, he was

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