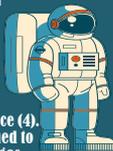


THE CHALLENGER DISASTER

On January 28, 1986, the Challenger exploded 73 seconds after liftoff, following several technical malfunctions that pushed the launch back (Challenger 3). This breakup led to the death of seven astronauts, including Christa McAuliffe, the first civilian/teacher to go to space (4). The official cause of this accident was determined to be the destruction of the seals that prevent hot gas leakage through the joint during the propellant burn (US 4).



Dick Covey directly experienced this disaster while working on Shuttle Mission 51-L, the last final flight of the Challenger. He was a Mission Control spacecraft communicator (CAPCOM), at Houston's Mission Control, and spoke the infamous words "Challenger, go at throttle up" just minutes before the disaster (Hamburg 3).

CHALLENGER'S LEGACY

The crews' families founded the Challenger Center for Space Science Education Program that focuses on space-themed STEM experiences including fully immersive Space Station and Mission Control simulations (What 1). Debris from the incident can be seen in an exhibit at the Kennedy Space Center called Forever Remembered. This incident occurred on live television with thousands of citizens and school children watching, and this was the first time NASA had ever lost a crew in space (Challenger's Legacy 19). The public response was widespread and continues to live on in the memory of everyone affected, directly or indirectly.

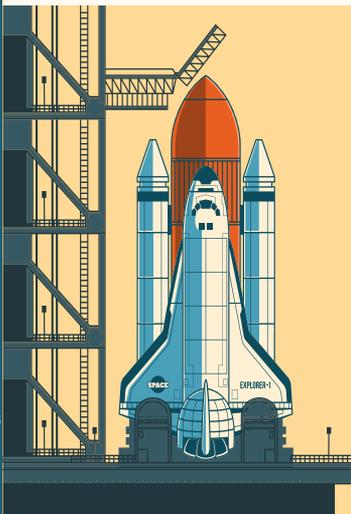


SPACE INDUSTRY RESPONSE

The Challenger Disaster, the first major accident of its kind, led to massive reform within the culture or work and technical protocols at NASA (What 7). The failed O-ring would not have been a problem if the launch had not occurred on such a cold day, colder conditions than any practice had accounted for (Hamburg 5). Civilians could not fly in space for the next 22 years until 2007, and satellite launches were shifted to reusable rockets (8). Astronauts were also pulled off of projects like repairing satellites to preserve safety (8). Internal failure of safety protocols and workforce culture left engineers that suspected danger due to the weather ignored by upper management and NASA (5). The Shuttle Program resumed in 1988 after extensive work on technical and safety protocol revision as well as increased enforced accountability and communication among NASA's workforce (Challenger's Legacy 24).



SPACE SHUTTLE DISASTERS



THE COLUMBIA DISASTER



Columbia, the first space shuttle to fly in space, made its 28th and last flight on February 1, 2003 (Howell 2019). The Columbia Disaster had an orbiter that had suffered critical damage during launch when the fuel tank's insulation foam fell off and hit its wing (Tate 2013). The damage went undetected until re-entry, where atmospheric gas entered the wing, leading to its disaster, and the temperature and tire pressure readings had vanished right before landing at the Kennedy Space Center (1). This tragedy led to the death of the seven astronauts on board (1). The Space Shuttle Program at the time was focused on building the International Space Station, but this particular mission was purely research-focused (2).

COLUMBIA'S LEGACY

The Kennedy Space Center Visitor's Center now exhibits window frames from the Columbia Space Shuttle and also includes personal items from each of the seven astronauts (10). The name of the rover Spirit's landing site was affectionately named Columbia Memorial Station, and there are several asteroids that bear the crew's name (10). Columbia's loss of life is remembered by public tribute every year at NASA's Day of Remembrance, joined by the Apollo 1 and the Challenger crews (7). The Columbia Preservation Office is responsible for sending discovered artifacts to research institutions, classrooms, and academia to educate the public and youth (Hoffpaul 2).



SPACE INDUSTRY RESPONSE

In the following weeks, the Columbia Accident Investigation Board, CAIB, published a report that detailed the incident, as well as criticized the NASA culture that allowed for the faulty foam to remain unfixed (Tate 8). The CAIB recommended that NASA reevaluate the culture of their program, and the Columbia disaster increased the awareness of the fixture of past safety problems as well as an emphasis on predictable government funding and consistent political support (8). This incident ultimately led to President George W. Bush ruling to retire NASA's Space Shuttle fleet after the International Space Station was completed, with NASA launching their final mission on July 8, 2011 (Mansfield 3).



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