Case study on Space shuttle Challenger Disaster

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The Case….

On January 28, 1986, seven astronauts were killed when the space shuttle they were piloting, the Challenger, exploded just after 73 seconds into the flight.

The case… contd

The spacecraft disintegrated 46,000 feet (14 km) above the Atlantic Ocean, off the coast of Cape Canaveral, Florida, at 11:39 a.m. EST (16:39 UTC).

It was the first fatal accident involving an American spacecraft while in flight.


SHUTTLE TRAGEDY

Dallas Times Herald

U.S. mourns crew of shuttle

Probe launched into cause; sea scoured for debris

Pilot gets close look at disaster

Shuttle missions suspended

Area pupils take loss personally

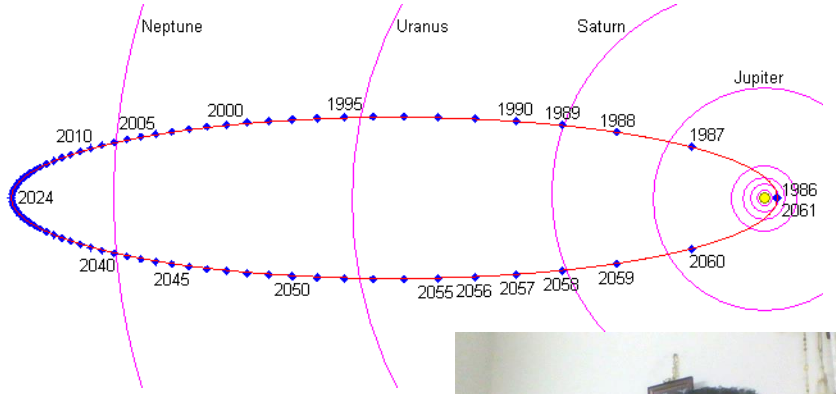
Shaken complacency

Objective

To observe Halley's Comet, making its return to the inner solar system in its 76-year orbit around the Sun

Spartan-Halley astronomy satellite, developed by NASA's Goddard Space Flight Center in Greenbelt, Maryland.

Spartan-Halley's observations were to contribute to integrated studies conducted by several international spacecraft.



Crew of the Challenger

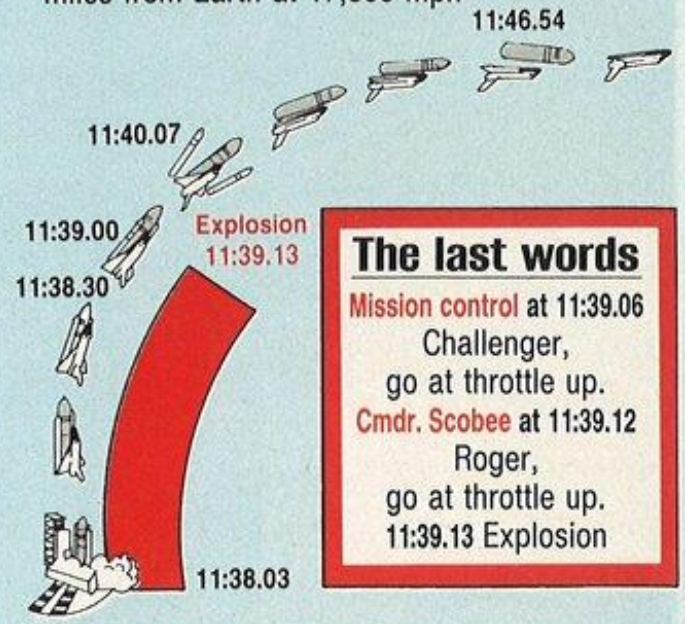
1. Ellison S. Onizuka
2. S. Christa McAuliffe,
3. Gregory B. Jarvis
4. Judith A. Resnik,
5. Michael J. Smith
6. Francis R. “D
7. Ronald E. M

Challenger's final seconds

11:38.03 a.m. EST Shuttle lifts off
11:38.07 Clears launch pad
11:38.30 Rolls to its back
11:38.44 Engines throttle down to 65% thrust
11:39.06 Engines throttle up to 104% thrust
11:39.13 Shuttle explodes

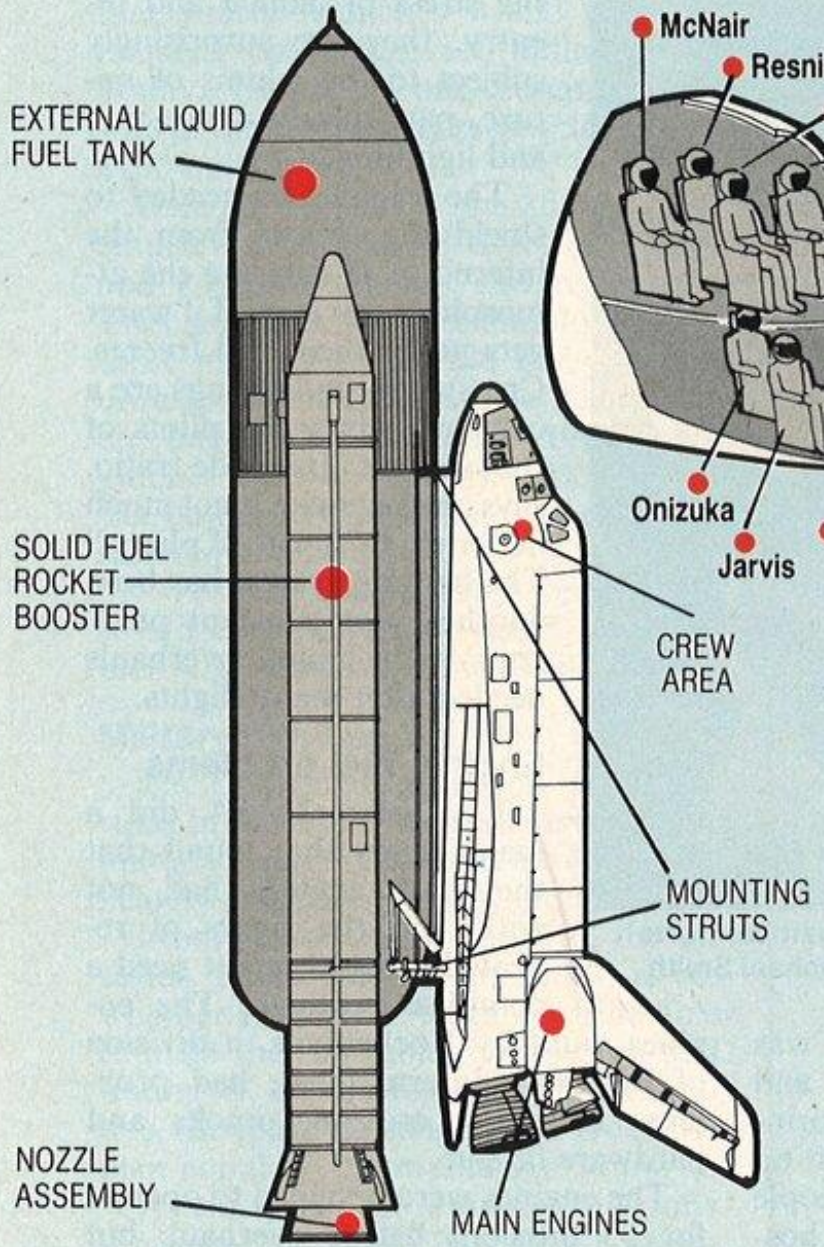
What would have followed—

11:40.07 Solid–fuel rocket boosters break away over Atlantic
11:46.54 External tank detaches over Indian Ocean
11:48.39 Shuttle enters low elliptical orbit
12:23.58 p.m. Reaches maximum altitude—177 miles from Earth at 17,500 mph



The last words

Mission control at 11:39.06
Challenger,
go at throttle up.
Cmdr. Scobee at 11:39.12
Roger,
go at throttle up.
11:39.13 Explosion



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Cause of the disaster

The failure of the primary and secondary redundant O-ring seals in a joint in the shuttle's right solid rocket booster (SRB).

The record-low temperatures on the morning of the launch had stiffened the rubber O-rings, reducing their ability to seal the joints.

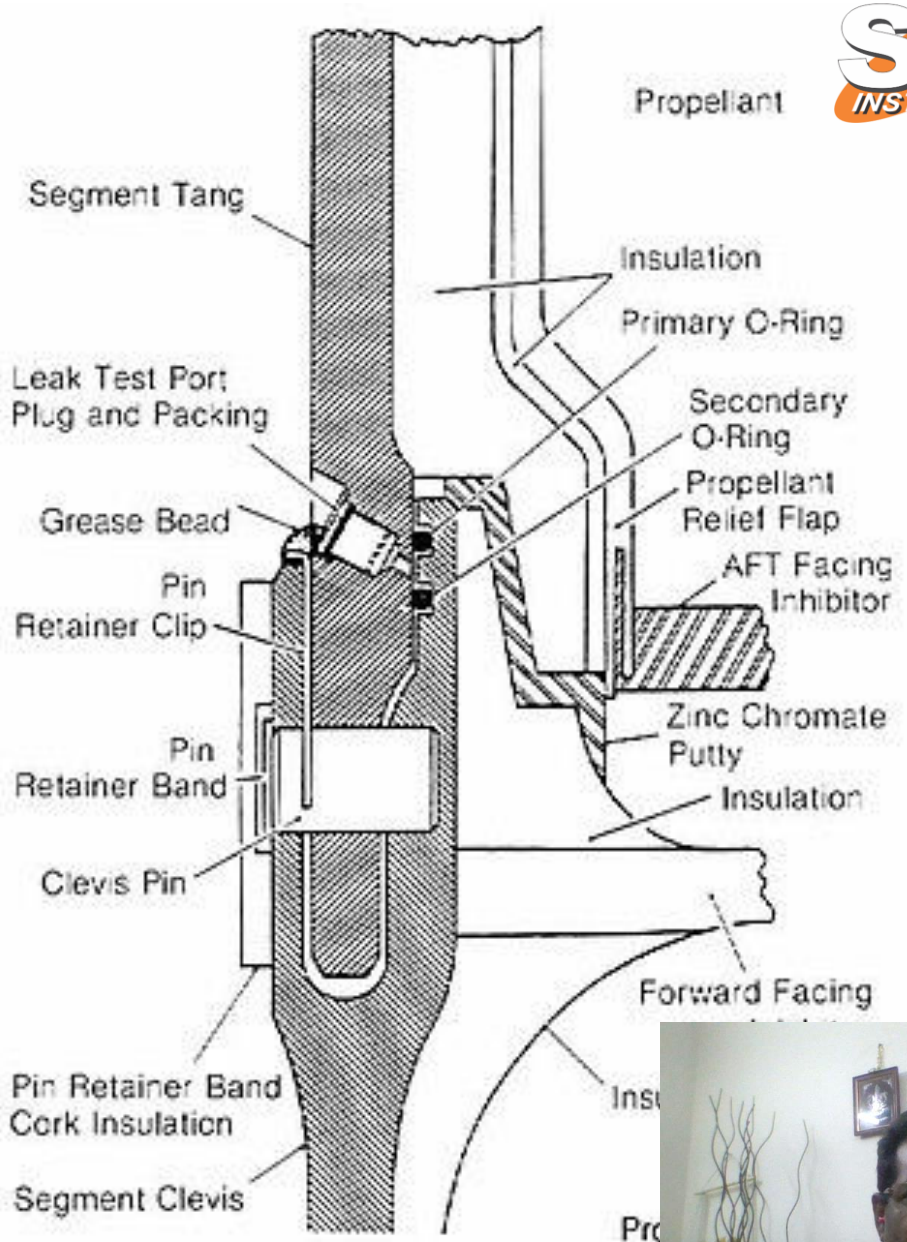
Shortly after liftoff, the seals were breached, and hot pressurized gas from within the SRB leaked through the joint and burned through the aft attachment strut connecting it to the external propellant tank (ET), then into the tank itself.

The collapse of the ET's internal structures and the rotation of the SRB that followed threw the shuttle stack, traveling at a speed of Mach 1.92, into a direction which allowed aerodynamic forces to tear the orbiter apart.

Both SRBs detached from the now-destroyed ET and continued to fly uncontr
the range safety officer destroyed them.

O-ring concerns

1. External temperature of the day of launch
2. High tolerances
3. Oversight of the suggestions by engineers



Final word of Conclusion

The cause of death of the *Challenger* astronauts cannot be positively determined;

- the forces to which the crew were exposed during Orbiter breakup were probably not sufficient to cause death or serious injury
- the crew possibly, but not certainly, lost consciousness in the seconds following Orbiter breakup due to in-flight loss of crew module pressure.