

Significant Incidents and Close Calls in Human Spaceflight

A Product of the JSC S&MA Flight Safety Office

Legend

Loss of Crew	Crew Injury/Illness and/or Loss of Vehicle or Mission	Related or Recurring event
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STS-110 4/8/2002
STS-109 3/1/2002
STS-108 12/5/2001
 Incorrect adjustments to the controller software resulted in SSME underperformance.
 Crew: 7

STS-91 6/2/1998
 Main engine pressure chamber sensor failed. If it occurred later, logic error may have triggered at RLTS.
 Crew: 6

Soyuz TM-9 2/11/1990
 DM insulation torn loose on ascent; contingency EVA repair.
 Crew: 2

SRB Seal Events (1981-1996)
STS-51L (Challenger) 1/28/1986
 SRB seal failure.
 Crew: 7
 Loss of Crew

Other SRB gas sealing anomalies: STS-2, 6, 41B, 41C, 41D, 51C, 51D, 51B, 51C, 51F, 51I, 51J, 61A, 61B, 61C, 42, 71, 70, 78

STS-61F 7/29/1985
 Temperature sensor problems resulted in SSME1 shutdown at T+5:45.
 Crew: 7
 Abort To Orbit

Soyuz 18-1 (18a) 4/5/1975
 Electrical fault caused premature firing of half of the 2nd stage separation bolts, resulting in the inability to fire the remaining ones. Staging failure resulted in abort sequence being used at T+29:5 seconds.
 Crew: 2
 Loss of Vehicle/Mission

Apollo 13 4/11/1970
 2nd stage center engine shutdown due to pogo oscillations.
 Crew: 3

Apollo 12 11/14/1969
 Lightning strike on ascent.
 Crew: 3

Gemini 10 7/18/1966
 1st stage oxidizer tank exploded at staging. No discernable effects. Nominal ascent.
 Crew: 2

STS-112 10/7/2002
 T-0 umbilical issues resulted in none of the system A pyrotechnic charges firing.
 Crew: 6

STS-61C 1/6/1986
 System configuration errors resulted in inadvertent drain back of 14,000 lbs of LOX prelaunch, which would have resulted in a Trans-Atlantic Abort Landing.
 Crew: 7

On-pad Abort Events (1984-1993)
STS-41D 6/26/1984
 Following a pad abort, LH₂ leaked from SSME3, resulting in a fire at the base of the orbiter.
 Crew: 6

Soyuz T-10-1 (T-10a) 9/24/1983
 Pad booster fire/explosion. Capsule Escape System used.
 Crew: 2
 Loss of Vehicle/Mission

Other On-pad Abort Events:
 STS-51F, STS-55, STS-51, STS-68.

STS-1 4/12/1981
 SRB ignition pressure wave caused TPS and structural damage.
 Crew: 2

Apollo 1 (AS-204) 1/27/1967
 Crew cabin fire (electrical short + high pressure O₂ atmosphere).
 Crew: 3
 Loss of Crew

Gemini 6 12/12/1965
 Main engine shutdown. Booster left unsecured on pad. Crew ejected not to eject. Launched 3 days later.
 Crew: 2

Progress M-12M (44P) 8/24/2011
 Anomaly in fuel pressurization system led to shutdown of 3rd stage engine. Vehicle failed to reach orbit.
 Crew: 0
 Loss of Vehicle/Mission

STS-117 6/8/2007
 Thermal blanket damage. EVA performed to repair damage.
 Crew: 7

STS-114 5/26/2005
 Bird strike on External Tank.
 • Loss of foam from External Tank PAL ramp.
 • TPS gap filers protruding. Removed during third mission EVA.
 • Missing Q-ring resulted in ejection of one of two NISs, compromising the ET forward separation bolt function and damaging secondary structure and a thermal blanket.
 Crew: 7

STS-93 7/23/1999
 • AT T+5 a short on AC1 Phase A resulted in loss of SSME1 Controller A and SSME3 Controller B.
 • SSME3 H₂ leak: early LOX depletion and shutdown.
 Crew: 5

Ascent Debris
STS-124 5/31/2008
 Pad 39-A flame trench suffered significant damage causing about 3,500 refractory bricks to be blown away from the flame trench wall.
 Crew: 7

STS-95 10/29/1998
 Drag chute door separated during launch and impacted main engine bell.
 Crew: 7

Other significant ascent debris events have occurred on:
 STS-116 and STS-125

Late Release Orbiter Tyvek Covers
 STS-114, 115, 118, 119, 124, 126

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SpaceShipOne, 16P 9/29/2004
 Uncommanded vehicle roll. Control regained prior to apogee.
 Crew: 1

SpaceShipOne, 14P 5/13/2004
 Flight computer unresponsive. Recovered by rebooting.
 Crew: 1

Altitude Chamber O₂ Fire - Soviet 3/23/1961
 Alcohol wipe hit hot plate and started fire in oxygen-rich test chamber.
 Crew: 1
 Loss of Crew

Navy Chamber 11/17/1962
 Fire started in a 100% oxygen environment at 5 psi. Four officers injured.
 Crew: 4
 Crew Injury (4)

EVA Incidents Summary (1965-2014)
 13 EVAs resulted in crew injury:
 Gemini 10, Apollo 17, Salyut 7 PE-1, Salyut 7 VE-3, STS-61-B EVAs 1&2, STS-37, Mir PE-9, STS-63, STS-97/4A, STS-100/6A EVAs 1&2, STS-134/ULF6
 Crew: 7

Apollo 14 1/31/1971
 Multiple failed docking attempts. Contingency procedures developed to mitigate risk of recurring docking anomaly. Docking successful.
 Crew: 3

Apollo 13 4/13/1970
 Explosion due to electrical short. Loss of O₂ and EPS.
 Crew: 3
 Loss of Mission

ISS Increment 38 12/11/2013
 ITCS configuration errors resulted in near freezing and potential rupture of water-to-ammonia heat exchanger.
 Crew: 6

Soyuz TMA-18 (22S) 9/23/2010
 First attempt to separate from ISS failed; ISS crew succeeded in bypassing faulty sensor.
 Crew: 3
 ISS 3

ISS Increment 17 4/30/2008
 Freon 218 leaked from SM AC.
 Crew: 3

ISS Increment 15 6/10-6/18/2007
 Power switch failures caused loss of ISS propulsive attitude control capability.
 Crew: 10

ISS Increment 13 8/2006
 Trial coolant leak in SM.
 Crew: 3

ISS Increment 10 2/2005
 Potential acid preservative aerosol escape from Russian urinal.
 Crew: 2

ISS Increment 5&6 mid-2002-2/03
 Formaldehyde periodically exceeded long-term limits.
 Crew: 3-10

ISS Increment 2-4 4/2001-3/2002
 Freon 218 leaked from SM AC.
 Crew: 3

ISS Increment 4 2/2002
 MeIOx regeneration caused noxious air.
 Crew: 3

ISS 8/2001
 Extremely high methanol levels in FGB air sample.
 Crew: 3

STS-104 7/2001
 EMU battery leaked hazardous KOH. Discovered during EMU checkout.
 Crew: 5

Mir 7/17/1997
 Accidental unplugging of computer power cable led to loss of attitude control and loss of power.
 Crew: 3

STS-83 4/6/1997
 Failure of fuel cell number 2 resulted in MDF being declared. The 15-day mission was shortened to 3 days.
 Crew: 7
 Minimum Duration Flight
 Loss of Mission

STS-51 9/12/1993
 Both port-side primary and secondary SUPER*ZIP explosive cords fired, resulting in containment tube failure and damage in the payload bay.
 Crew: 5

STS-33 4/12/1979
 Main engine anomaly caused final rendezvous abort.
 Crew: 2
 Loss of Mission

Soyuz 21 8/24/1976
 Separation from Salyut failed; ground command succeeded in opening latches.
 Crew: 2

Soyuz 1 4/23/1967
 Failures in attitude control and electrical power systems resulted in a loss of mission. The launch of the intended docking target, Soyuz 2, was scrubbed.
 Crew: 1
 Loss of Mission

Gemini 8 3/16-3/17/1966
 Stuck thruster caused loss of control and led to 1st U.S. emergency de-orbit.
 Crew: 2
 Emergency De-orbit

Mercury MA-9 5/16/1963
 Electrical faults caused loss of some systems and need to perform manual entry. Also experienced high PPOC levels in suit during entry operations.
 Crew: 1
 Manual Entry

Apollo 10 5/22/1969
 Switch misconfiguration resulted in lunar module control problems.
 Crew: 2

Apollo 11 7/21/1969
 Engine arm circuit breaker knob broke off. Circuit breaker successfully reset allowing ascent.
 Crew: 2

STS-44 11/24/1991
 Failure of IMU 2 caused MDF to be declared. 10-day mission shortened to 7 days.
 Crew: 6
 Minimum Duration Flight

STS-32 1/9/1990
 Erroneous state vector up-linked to flight control system, causing immediate and unpredictable attitude control problems.
 Crew: 3
 Loss of Attitude Control

STS-9 12/8/1983
 Two GPCs failed during reconfiguration for entry. One GPC could not be recovered.
 Crew: 3

STS-2 11/12/1981
 Failure of fuel cell resulted in a MDF being declared.
 • The fuel cell failure also resulted in hydrogen in the drinking water leading to crew dehydration.
 Crew: 2
 Mission Terminated

Soyuz 33 4/12/1979
 Main engine anomaly caused final rendezvous abort.
 Crew: 2
 Loss of Mission

STS-21 8/24/1976
 Separation from Salyut failed; ground command succeeded in opening latches.
 Crew: 2

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 Accidental unplugging of computer power cable led to loss of attitude control and loss of power.
 Crew: 3

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 Crew: 5

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 Crew: 3

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 Crew: 7
 Minimum Duration Flight
 Loss of Mission

STS-51 9/12/1993
 Both port-side primary and secondary SUPER*ZIP explosive cords fired, resulting in containment tube failure and damage in the payload bay.
 Crew: 5

STS-33 4/12/1979
 Main engine anomaly caused final rendezvous abort.
 Crew: 2
 Loss of Mission

Soyuz 21 8/24/1976
 Separation from Salyut failed; ground command succeeded in opening latches.
 Crew: 2

Soyuz 1 4/23/1967
 Failures in attitude control and electrical power systems resulted in a loss of mission. The launch of the intended docking target, Soyuz 2, was scrubbed.
 Crew: 1
 Loss of Mission

STS-133 2/26/2011
 Experienced significant misalignment between orbiter and ISS during post-capture free drift due to gravity-gradient-induced motion.
 Crew: 6

STS-130 2/10/2010
 Experienced significant misalignment between orbiter and ISS during post-capture free drift due to gravity-gradient-induced motion.
 Crew: 6

Apollo ASTP 7/24/1975
 N₂O in crew cabin. Crew hospitalized for 2 weeks.
 Crew: 3
 Crew Injury

Mercury MA-7 5/24/1962
 RCS depletion at 80,000 ft.
 Crew: 1

Soyuz TM-25 8/17/1997
 Landing rockets fired at heat shield separation rather than at landing.
 Crew: 3

Apollo 12 11/24/1969
 Harder than normal splashdown knocked loose a camera. The camera knocked lunar module pilot unconscious.
 Crew: 3

Mercury MR-4 7/21/1961
 Inadvertent hatch pyrotechnic firing. Capsule sunk. Astronaut nearly drowned.
 Crew: 1
 Loss of Capsule

Soyuz 1 4/24/1967
 Main and reserve parachutes failed.
 Crew: 1
 Loss of Crew

Soyuz 36 7/31/1980
 Landing rockets failed to fire resulting in ~30 g impact.
 Crew: 2

Soyuz T-7 12/10/1982
 Landed on hillside and rolled downhill. One cosmonaut thrown from seat.
 Crew: 2

Soyuz 23 10/16/1976
 Landed on frozen lake during blizzard. Delayed recovery.
 Crew: 2

Soyuz 18-1 (18a) 4/5/1975
 After ascent abort, capsule landed on snowy slope above cliff. Parachute snagged and prevented fall.
 Crew: 2
 Crew Injury

Soyuz 5 1/18/1969
 Landing rockets failed to fire, resulting in a hard landing.
 Crew: 1
 Crew Injury

Soyuz 1 4/24/1967
 Main and reserve parachutes failed.
 Crew: 1
 Loss of Crew

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 Crew: 1
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 Main and reserve parachutes failed.
 Crew: 1
 Loss of Crew

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 After ascent abort, capsule landed on snowy slope above cliff. Parachute snagged and prevented fall.
 Crew: 2
 Crew Injury

Soyuz 5 1/18/1969
 Landing rockets failed to fire, resulting in a hard landing.
 Crew: 1
 Crew Injury

SR-71 1/25/1966
 Loss of control at high speed and altitude.
 Crew: 2
 Loss of Crew (1)

SpaceShipTwo, PF04 10/31/2014
 Vehicle breakup during powered flight.
 Crew: 2
 Loss of Crew (1)

SpaceShipOne, Flight 11P 12/17/2003
 Left main landing gear collapsed.
 Crew: 1

M21-D21 7/30/1966
 D21 drone collided with M21 during launch, causing M21 breakup. Crew survived breakup but one was lost after water landing.
 Crew: 2
 Loss of Crew (1)

Soyuz TM-5 9/6/1988
 Two de-orbit attempts failed. Crew confined to DM due to OIM being jettisoned prior to 1st de-orbit attempt. Crew prevented erroneous firing of SM separation pyrotechnics.
 Crew: 2

Soyuz T-11 10/22/1984
 Partial failure of atmospheric entry control system.
 Crew: 3

Soyuz 33 4/12/1979
 Backup engine burned 25 seconds too long on de-orbit. Ballistic entry.
 Crew: 2

SkyLab 4 2/8/1974
 Incorrect circuit breakers opened, resulting in the loss of the automatic control.
 Crew: 3

Soyuz 11 6/30/1971
 Pyrotechnic system failure resulted in crew module rapid depress.
 Crew: 3
 Loss of Crew

Gemini 5 8/29/1965
 Erroneous entry data uplinked; crew manually corrected entry flight profile.
 Crew: 2

Gemini 4 6/7/1965
 Erroneous entry data uplinked; crew manually corrected entry flight profile.
 Crew: 2

Voskhod 2 3/19/1965
 Automatic descent system malfunctioned. Issues with manual entry resulted in off-target, rough terrain landing. Delayed crew recovery.
 Crew: 2

Mercury MA-7 5/24/1962
 Pitch horizon scanner failed, resulting in manual entry and off-target landing. Delayed crew recovery.
 Crew: 1

Mercury MA-6 2/20/1962
 False landing-bag indicator light led to entry with retroprop in place as a precaution.
 Crew: 1

STS-134 6/1/2011
 Brief fire observed between the left main landing gear fires during runway rollout.
 Crew: 7

STS-108 12/17/2001
 Violation of minimum landing weather requirements.
 Crew: 7

STS-90 5/3/1998
 Hard, fast landing due to human factors and rogue wind gust. Hardest shuttle landing.
 Crew: 7

STS-37 4/11/1991
 Several factors contributed to a low-energy landing 623 feet prior to the threshold of the runway at the backup landing location.
 Crew: 5
 Low Energy Landing

STS-9 12/8/1983
 A. Two APUs caught fire during rollout.
 B. GPC failed on touchdown.
 C. Incorrect flight control re-channelization on rollout.
 Crew: 7

Soyuz TM-15 2/1/1993
 Rollover during hillside.
 Crew: 2

Soyuz TM-14 8/10/1992
 Hard landing impact. Hatch jammed, requiring cosmonauts to use tools to pry open.
 Crew: 3

Soyuz TM-12 10/10/1991
 Hard impact. News team reported capsule as "very dented."
 Crew: 3

Soyuz TM-7 4/27/1989
 Double-impact "hard landing."
 Crew: 2
 Crew injury (1)

Soyuz T-7 12/10/1982