

The *Significant Incidents and Close Calls in Human Spaceflight* graphic is primarily focused on human spaceflight incidents that have occurred while a crew was onboard a space vehicle. It includes suborbital, orbital, and lunar missions. The two ground facility events and two atmospheric flight events are included due to the significance of the events to spaceflight. The pressure chamber O₂ fire in Russia occurred prior to the loss of the Apollo 1 crew in an O₂ fire and could have served as a lesson learned had it been known in the US. The EMU fire resulted in the redesign of the EMU and heightened awareness of design and materials selection for man-rated systems using high-pressure O₂. The M2-F2 lifting body accident occurred during the development of the space shuttle and yielded human engineering lessons learned. The SR-71 accident is the highest and fastest vehicle breakup on record that was survivable, and it represents the demonstrated limit of crew survival with currently fielded technologies.

New in this edition: STS-114 and STS-93 entries have been revised. Soyuz TM9 and Soyuz 18-1 dates have been verified and corrected.

Note: This document is a work in progress. It is continually under review and frequently updated. Please direct comments and questions to the JSC Flight Safety Office contacts listed below.

Significant Incidents and Close Calls in Human Spaceflight

S&MA Flight Safety Office

Safety & Mission Assurance Support Services Contract
 OSMA Assessment Team
 Rapid Information Page

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Abbreviations and Acronyms					
APU	Auxiliary Power Unit	GIRA	Galley Iodine Removal Assembly	O₂	Oxygen
ATO	Abort to Orbit	GPC	General Purpose Computer	OM	Orbital Module
CDRA	Carbon Dioxide Removal System	GPS	Global Positioning System	OSMA	Office of Safety & Mission Assurance (NASA HQ)
CMG	Control Moment Gyroscope	H₂	Hydrogen	PAL	Protuberance Air Load
CO	Carbon Monoxide	ISS	International Space Station	PASS	Primary Avionics Software System
CO₂	Carbon Dioxide	LH₂	Liquid Hydrogen	RCS	Reaction Control System/Subsystem
DM	Descent Module	LOC	Loss of Crew	RIP	Rapid Information Page
EMU	Extravehicular Mobility Unit	LOV	Loss of Vehicle	S&MA	Safety & Mission Assurance
EPS	Electrical Power System	MDF	Minimum Duration Flight	SM	Service Module
EV	Extravehicular	ME	Main Engine	SRB	Solid Rocket Booster
EVA	Extravehicular Activity	MetOx	Metal Oxide	SSME	Space Shuttle Main Engine
FC	Flight Control	MMOD	Micro-Meteoroid Orbital Debris	SSP	Space Shuttle Program
FSO	Flight Safety Office	N₂O₄	Nitrogen Tetroxide	TPS	Thermal Protection System

Rapid Information Pages (RIPs) are a product of the JSC S&MA Flight Safety Office (FSO) and the OSMA Assessment Team. RIPs assemble and clarify best available data from multiple sources to help S&MA decision makers quickly develop a fully informed and holistic perspective of key factors involved in the risk-based decision process. For further information, please contact:

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