

Asymmetrical Thrust Induced Loss of Control (ATILOC) Accident Data (with other notable accidents and incidents)

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Information page and legend - Read this first!

Thank you for viewing this spreadsheet, where I have compiled hundreds of notable accidents as a critical part of my aviation safety research project. All of these accidents were found utilizing the National Transportation Safety Board (NTSB) Aviation Accident Database, primarily using the CAROL query search tool. Due to the nature of the NTSB accident investigation process, only domestic (United States and its territories) accidents have been included. While there are notable accidents which have occurred in foreign countries with foreign pilots, such accidents are not investigated under the jurisdiction of the NTSB, and as such, very little information is provided about these accidents in the Aviation Accident Database. However, information about certain foreign ATILOC accidents may be included in the aviation safety report where the investigations are relevant. Although the primary purpose of this research was to study the characteristics of ATILOC accidents, several other types of accidents were also added to the spreadsheet as they are relevant to other aspects of flying multi-engine airplanes safely. Please read the following sections to understand how the data was collected and organized. As the spreadsheet is still a work in progress, it is being updated frequently and may also contain errors or sections which are incomplete. The spreadsheet is available for download in both Microsoft Excel and Adobe PDF formats at atmesafety.com/accident-data. If you have any questions or comments about the data, including accidents which you think are missing from the list, please let me know. Email me at alex@atmesafety.com

Event Type Legend

Event Type (with color code)	Description
ATILOC	High Energy ATILOC is categorized as an "ATILOC" in the accident spreadsheet which differentiates it from the two less severe types of ATILOC accidents. It is aptly named as it is the highest energy level of ATILOC accident, characterized by the most severe aircraft damage and injuries, which are usually fatal.
RE-ATILOC	Reduced Energy ATILOC. These accidents are characterized by a reduced amount of kinetic (impact speed) and potential energy (accumulated height above the surface), which usually results in less severe aircraft damage and injuries, however, the risk of serious injury is still high. The reduction of impact energy may also be caused by a situation where control inputs immediately before or during the accident sequence prevented a more violent crash.
G-ATILOC	Ground ATILOC. As the name implies, this type of ATILOC occurs with the airplane on the ground, or, it is only airborne very briefly with the lowest overall kinetic and potential energy. Most are accidents as they result in substantial damage, however a limited number may be classified as incidents by the NTSB (less than substantial damage). Regardless, most occupants escape with no injuries or minor injuries.
ATIUR	Asymmetrical Thrust Induced Upset Recovery. An ATIUR is the result of the pilot's intentional action to remove asymmetrical thrust forces following a Thrust Asymmetry Event in which an ATILOC accident was imminent, thus resulting in a landing without engine power. This is the conventional multi-engine training concept of "recovery" from the V_{MC} demonstration maneuver. However, as the ATIUR is often a far from ideal type of forced landing, the risk of serious injury or death is still almost as high as with ATILOC accidents.
LOTIFL	Loss Of Thrust Induced Forced Landing. A LOTIFL results from insufficient one engine inoperative climb performance which occurs either after takeoff, rejected landing (go-around), or during landing approach while close to the surface, which results in the pilot being forced into executing a landing off-airport. Most of these accidents are survivable, as the LOTIFL is characterized by a landing made under control, however, substantial damage and injury is still possible.
LOTP	Loss Of Thrust Performance. This is characterized by insufficient performance following a loss of engine power or thrust, similar in nature to a LOTIFL. However, the LOTP category is characterized by more severe aircraft damage and injury as a result of a landing made under little or no control.
CTME LOTP	Centerline Thrust Multi-Engine Loss of Thrust Performance. Same as above, except for CTME airplanes.

RTRO	Rejected Takeoff Runway Overrun. A rejected takeoff which results in a runway overrun or forced excursion to the side of the runway due to insufficient runway remaining for stopping.
OEILRO	One Engine Inoperative Landing Runway Overrun. An OEILRO results when an engine inoperative approach and landing results in a runway overrun or forced excursion to the side of the runway due to excessive landing energy and/or a long landing.
Part 121 Critical TAE	Thrust Asymmetry Event (TAE) in a critical phase of flight for a Part 121 operator. These are rare events (incidents) which are important to the aviation safety report as Thrust Asymmetry Events in the airlines are hypothesized to be a significant safety hazard.
TBD	Event type is yet to be determined because additional information is not yet available. Event may not be relevant to the research project and may therefore be subsequently deleted.
Spreadsheet Legend	
Column	Description
Event Type	Type of accident or incident as best determinable from the available information. For more details on all of the event types, please see the event type legend. In some cases, a reasonably conclusive determination of the applicable event type is not possible even when considering all of the information available from accident reports and dockets. In these cases, the accident may be completely excluded from the list, or, if there is some evidence to suggest that a particular event type is applicable, an asterisk will be added to the event type, which designates it as a "possible" event. In addition, there may be evidence which suggests that multiple event types could have been responsible for the accident, which will be designated by inclusion of "with other" in the event type column. These event type modifiers help to separate incontrovertible accidents from those which provide less certainty as to the true cause. Both "possible" events and "with other" events are excluded from the data analysis sheet.
Possible Event	This cell will be marked with a "Y" when the Event Type cannot be conclusively determined with reasonable certainty, but when the event type cannot be ruled out either. This may be due to incomplete information as currently available from the NTSB due to an ongoing accident investigation, or it could also be a result of inconclusive information even if a final report and accident docket is available.
NTSB Record	This is each accident's NTSB identification. Blue cell shading indicates an accident which may be discussed in greater detail in the final aviation safety report or in a dedicated case study.
NTSB Report Type	Report types include: No Report, Preliminary, Factual, and Final. In some cases, an accident description will be created without an NTSB identification being generated. This will be marked as No Report, and it will be updated when available. Preliminary reports include a synopsis of the accident, with varying degrees of detail. Accident Dockets may or may not yet be available with Preliminary reports. In some cases, event type can be conclusively determined using the information provided in the Preliminary report and/or Docket. Factual reports expand upon the preliminary report and include release of the accident Docket. Final reports indicate conclusion of the NTSB's investigation and they include an accident Docket.
Powerplant Type	Powerplant types, as relevant to accident classification, include: Piston engine powered - counter rotating propellers (PCR), Piston engine powered - non-counter rotating propellers (PNCR), Turboprop engine powered - counter rotating propellers (TCR), Turboprop engine powered - non-counter rotating propellers (TNCR), and Jet engine powered (J). For CTME airplanes, the powerplant types includes only: CTME piston engine powered - counter rotating propellers (CPCR).
Injury Severity	NTSB injury severity categories include: Fatal, Serious, Minor, and None. Only the injuries of the airplane occupants are considered in this column and in the injury count columns. Injuries to persons on ground will be listed in the Event Summary.

HE-ATILOC injury severity	Fatal	Serious	Minor	None	Total
	64	12	2	0	78
	82.1%	15.4%	2.6%	0.0%	

RE-ATILOC injury severity	Fatal	Serious	Minor	None	Total
	3	4	5	4	16
	18.8%	25.0%	31.3%	25.0%	

G-ATILOC injury severity	Fatal	Serious	Minor	None	Total
	0	0	4	14	18
	0.0%	0.0%	22.2%	77.8%	

All ATILOC categories injury severity	Fatal	Serious	Minor	None	Total
	67	16	11	18	112
	59.8%	14.3%	9.8%	16.1%	

HE-ATILOC by severity and phase of flight (% of Injury Severity, and % Overall)	F/T	F/R/L	F/L	F/A	F/OLA	F/HA	All Fatal	S/T	S/R/L	S/L	S/A	S/OLA	S/HA	All Serious	M/T	M/R/L	M/L	M/A	M/OLA	M/HA	All Minor	N/T	N/R/L	N/L	N/A	N/OLA	N/HA	All None	All
	38	0	3	16	1	0	64	6	1	2	3	0	0	12	0	2	0	0	0	0	2	0	0	0	0	0	0	0	78
	59.4%	0.0%	12.5%	25.0%	1.6%	0.0%	82.1%	50.0%	8.3%	16.7%	25.0%	0.0%	0.0%	15.4%	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	2.6%	None	None	None	None	None	None	0.0%	
	0.0%	0.0%	10.3%	20.5%	1.3%	0.0%	18.8%	25.0%	6.3%	12.5%	25.0%	0.0%	0.0%	25.0%	0.0%	6.3%	12.5%	12.5%	0.0%	0.0%	31.3%	0.0%	0.0%	75.0%	25.0%	0.0%	0.0%	0.0%	

RE-ATILOC by severity and phase of flight (% of Injury Severity, and % Overall)	F/T	F/R/L	F/L	F/A	F/OLA	F/HA	All Fatal	S/T	S/R/L	S/L	S/A	S/OLA	S/HA	All Serious	M/T	M/R/L	M/L	M/A	M/OLA	M/HA	All Minor	N/T	N/R/L	N/L	N/A	N/OLA	N/HA	All None	All
	0	0	3	0	0	0	3	1	2	1	0	0	0	4	1	2	2	0	0	0	5	0	3	1	0	0	0	4	16
	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%	18.8%	25.0%	50.0%	25.0%	0.0%	0.0%	0.0%	25.0%	20.0%	40.0%	40.0%	0.0%	0.0%	0.0%	31.3%	0.0%	18.8%	6.3%	0.0%	0.0%	0.0%	25.0%	
	0.0%	0.0%	18.8%	0.0%	0.0%	0.0%	0.0%	None	0.0%	0.0%	0.0%	0.0%	None	0.0%	50.0%	0.0%	50.0%	0.0%	0.0%	0.0%	22.2%	0.0%	71.4%	21.4%	7.1%	0.0%	0.0%	0.0%	

G-ATILOC by severity and phase of flight (% of Injury Severity, and % Overall)	F/T	F/R/L	F/L	F/A	F/OLA	F/HA	All Fatal	S/T	S/R/L	S/L	S/A	S/OLA	S/HA	All Serious	M/T	M/R/L	M/L	M/A	M/OLA	M/HA	All Minor	N/T	N/R/L	N/L	N/A	N/OLA	N/HA	All None	All
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	0	0	4	10	3	1	0	0	0	14	18
	None	None	None	None	None	None	0.0%	None	0.0%	0.0%	0.0%	0.0%	None	0.0%	0.0%	50.0%	0.0%	50.0%	0.0%	0.0%	22.2%	71.4%	21.4%	7.1%	0.0%	0.0%	0.0%	77.8%	
	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	50.0%	0.0%	50.0%	0.0%	0.0%	22.2%	71.4%	21.4%	7.1%	0.0%	0.0%	0.0%	77.8%	

HE-ATILOC by phase of flight (total, fatal)	T	RL	L	A	OLA	HA	Total
	44	3	10	19	1	0	77
	57.1%	3.9%	13.0%	24.7%	1.3%	0.0%	
	38	0	8	16	1	0	
	86.4%	0.0%	80.0%	84.2%	100.0%	#DIV/0!	

RE-ATILOC by phase of flight (total, fatal)	T	RL	L	A	OLA	HA	Total
	2	7	7	0	0	0	16
	12.5%	43.8%	43.8%	0.0%	0.0%	0.0%	
	0	0	0	0	0	0	
	0.0%	0.0%	42.9%	None	None	None	

G-ATILOC by phase of flight (total, fatal)	T	RL	L	A	OLA	HA	Total
	12	3	3	0	0	0	18
	66.7%	16.7%	16.7%	0.0%	0.0%	0.0%	
	0	0	0	0	0	0	
	0.0%	0.0%	0.0%	None	None	None	

ATILOC (all categories) by phase of flight (total, fatal)	T	RL	L	A	OLA	HA	Total
	58	13	20	19	1	0	111
	52.3%	11.7%	18.0%	17.1%	0.9%	0.0%	
	38	0	11	16	1	0	
	65.5%	0.0%	55.0%	84.2%	100.0%	#DIV/0!	

HE-ATILOC by airplane powerplant	P	PCR	T	TCR	Jet	Total
	50		6		3	59
	84.7%					

RE-ATILOC by airplane powerplant	Piston	Turboprop	Jet	Total
	12	1	0	13
	92.3%			

G-ATILOC by airplane powerplant	Piston	Turboprop	Jet	Total
	14	0	0	14
	100.0%			

ATILOC (all categories) by airplane powerplant	Piston	Turboprop	Jet	Total
	76	7	3	86
	88.4%			

Fatalities	HE-ATILOC	RE-ATILOC	G-ATILOC	Total
	133	3	0	136