BOEING

Statistical Summary of Commercial Jet Airplane Accidents

Worldwide Operations | 1959 – 2017

2017

Contents

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Introduction

The accident statistics presented in this summary are confined to worldwide commercial jet airplanes that are heavier than 60,000 pounds maximum gross weight. Within that set of airplanes, there are two groups excluded:

1) Airplanes manufactured in the Commonwealth of Independent States (CIS) or the Union of Soviet Socialist Republics (USSR), excluded because of the lack of operational data.
2) Commercial airplanes operated in military service. (However, if a military-owned commercial jet transport is used for civilian commercial service, those data will be included in this summary.)

The following airplanes are included in the statistics:

707/720	717	A300	BAe 146	F28	Concorde	L-1011	BAC 1-11	Comet 4
727	DC-8	A300-600	Avro RJ70/85/100	F70				Trident
737	DC-9	A310	CRJ700/900/1000	F100				Caravelle
747	DC-10/MD-10	A320/321/319/318	C Series					Mercure
757	MD-11	A330	E170/175					CV-880/-990
767	MD-80/-90	A340	E190/195					VC10
777		A350						
787		A380						

Flight operations data for Boeing airplanes are developed internally from airline operator reports. Flight operations data for non-Boeing airplanes are compiled from https://www.flightglobal.com by FlightGlobal. The source of jet airplane inventory data is Jet Information Services, Inc.

Accident data are obtained, when available, from government accident reports. Otherwise, information is from operators, manufacturers, various government and private information services, and press accounts.

Readers may note that cumulative accident totals from year to year may not exactly correlate with the expected change from the previous year's accidents. This is a result of periodic audits of the entire accident history for updates to the data.

Definitions related to development of statistics in this summary are primarily based on corresponding International Civil Aviation Organization (ICAO), U.S. National Transportation Safety Board (NTSB), and Flight Safety Foundation (FSF) terms, as explained in the next section.

Definitions

Airplane Accident

An occurrence associated with the operation of an airplane that takes place between the time any person boards the airplane with the intention of flight and such time as all such persons have disembarked, in which

- The airplane sustains substantial damage.
- The airplane is missing or is completely inaccessible. An aircraft is considered to be missing when the official search has been terminated and the wreckage has not been located.
- Death or serious injury results from
  - Being in the airplane.
  - Direct contact with the airplane or anything attached thereto.
  - Direct exposure to jet blast.

Excluded Events

- Fatal and nonfatal injuries from natural causes.
- Fatal and nonfatal self-inflicted injuries or injuries inflicted by other persons.
- Fatal and nonfatal injuries of stowaways hiding outside the areas normally available to the passengers and crew.
- Nonfatal injuries resulting from atmospheric turbulence, normal maneuvering, loose objects, boarding, disembarking, evacuation, and maintenance and servicing.
- Nonfatal injuries to persons not aboard the airplane.

  The following occurrences are **not** considered airplane accidents: those that are the result of experimental test flights or the result of a hostile action, including sabotage, hijacking, terrorism, and military action.

Note: This is generally consistent with the ICAO and the NTSB definition of an accident. (See the Referenced ICAO and NTSB Definitions section.) The differences are

1) The ICAO and NTSB references to "aircraft" were changed to "airplane" and references to propellers and rotors were eliminated.
2) This publication excludes events that result in nonfatal injuries from atmospheric turbulence, normal maneuvering, etc.; nonfatal injuries to persons not aboard the airplane; and any events that result from an experimental test flight or from hostile action, such as sabotage, hijacking, terrorism, and military action.

Note: Within this publication, the term "accident" is used interchangeably with "airplane accident."

Definitions

Destroyed

The estimated or likely cost of repairs would have exceeded 50 percent of the new value of the airplane had it still been in production at the time of the accident.

Note: This definition is consistent with the FSF definition. NTSB defines “destroyed” as damaged due to impact, fire, or in-flight failures to an extent not economically repairable.

Fatal Injury

Any injury that results in death within 30 days of the accident.

Note 1: This is consistent with both the ICAO and the NTSB definitions.

Note 2: External fatalities include on-ground fatalities as well as fatalities on other aircraft involved.

Major Accident

An accident in which any of three conditions is met:

- The airplane was destroyed.
- There were multiple fatalities.
- There was one fatality and the airplane was substantially damaged.

Note: This definition is consistent with the NTSB definition. It also is generally consistent with FSF, except that the FSF definition specifies that fatalities include only occupants of the airplane. ICAO does not normally define the term “major accident.”

Serious Injury

An injury that is sustained by a person in an accident and that

- Requires hospitalization for more than 48 hours, commencing within seven days from the date the injury was received.
- Results in a fracture of any bone (except simple fractures of fingers, toes, or nose).
- Causes severe hemorrhage, nerve, muscle, or tendon damage.
- Involves injury to any internal organ.
- Involves second- or third-degree burns, or any burns affecting more than 5 percent of the body surface.
- Involves verified exposure to infectious substances or injurious radiation.

Note: This is generally consistent with the ICAO definition. It is also consistent with the NTSB definition except for the last bullet item, which is not included in the NTSB definition.

Definitions

Substantial Damage

Damage or failure that adversely affects the structural strength, performance, or flight characteristics of the airplane, and that would normally require major repair or replacement of the affected component.

Substantial damage is **not** considered to be

- Engine failure or damage limited to an engine, if only one engine fails or is damaged.
- Bent fairings or cowlings.
- Dents in the skin.
- Small puncture holes in the skin.
- Damage to wheels.
- Damage to tires.
- Damage to flaps.
- Damage to engine accessories.
- Damage to brakes.
- Damage to wingtips.

Note 1: This definition is generally consistent with the NTSB definition of substantial damage except it (1) deletes reference to “small puncture holes in the fabric” and “ground damage to rotor or propeller blades,” and (2) deletes “damage to landing gear” from the list of items not considered to be substantial damage.

Note 2: ICAO does not define the term “substantial damage.” Still, the above definition is generally consistent with the ICAO definition of damage or structural failure contained within part (B) of the ICAO accident definition.

Note 3: Boeing does not consider damage to be substantial if repairs to an event airplane enable it to be flown to a repair base within 48 hours of the event.

Boeing Terms

The terms on this page were created by Boeing for this publication and do not have corresponding equivalents in ICAO or NTSB.

Accident Rates

In general, this expression is a measure of accidents per million departures. Departures (or flight cycles) are used as the basis for calculating rates because there is a stronger statistical correlation between accidents and departures than there is between accidents and flight hours, or between accidents and the number of airplanes in service, or between accidents and passenger miles or freight miles. Airplane departures data are continually updated and revised as new information and estimating processes become available. These form the baseline for the measure of accident rates and, as a consequence, rates may vary between editions of this publication.

Airplane Collisions

Events involving two or more airplanes are counted as separate events, one for each airplane. For example, destruction of two airplanes in a collision is considered to be two separate accidents.

Fatal Accident

An accident that results in fatal injury.

Hull Loss

Airplane totally destroyed or damaged and not repaired. Hull loss also includes, but is not limited to, events in which

- The airplane is missing. An aircraft is considered to be missing when the official search has been terminated and the wreckage has not been located.
- The airplane is completely inaccessible.

Exclusions

Certain airplanes and events are excluded from consideration as accidents in this summary. This is a complete list of those exclusions.

Excluded Airplanes

Airplanes manufactured in the Commonwealth of Independent States (CIS) or the Union of Soviet Socialist Republics (USSR) are excluded because of the lack of operational data. Commercial airplanes operated in military service are also excluded. (However, if a military-owned commercial jet transport is used for civilian commercial service, those data are included in this summary.)

Excluded Events

- Fatal and nonfatal injuries from natural causes.
- Fatal and nonfatal self-inflicted injuries or injuries inflicted by other persons.
- Fatal and nonfatal injuries of stowaways hiding outside the areas normally available to the passengers and crew.
- Nonfatal injuries resulting from atmospheric turbulence, normal maneuvering, loose objects, boarding, disembarking, evacuation, and maintenance and servicing.
- Nonfatal injuries to persons not aboard the airplane.
- Experimental test flights. (However, maintenance test flights, ferry, positioning, training, and demonstration flights are not excluded.).
- Sabotage, hijacking, terrorism, and military action.

Referenced ICAO and NTSB Definitions

International Civil Aviation Organization (ICAO) and National Transportation Safety Board (NTSB) definitions are included below for reference.

Accident

ICAO defines an "accident" as follows:

Accident. An occurrence associated with the operation of an aircraft which, in the case of a manned aircraft, takes place between the time any person boards the aircraft with the intention of flight until such time as all such persons have disembarked, or in the case of an unmanned aircraft, takes place between the time the aircraft is ready to move with the purpose of flight until such time as it comes to rest at the end of the flight and the primary propulsion system is shut down, in which:

A) A person is fatally or seriously injured as a result of:

- Being in the aircraft, or
- Direct contact with any part of the aircraft, including parts which have become detached from the aircraft, or
- Direct exposure to jet blast,

  except when the injuries are from natural causes, self-inflicted or inflicted by other persons, or when the injuries are to stowaways hiding outside the areas normally available to the passengers and crew, or

B) The aircraft sustains damage or structural failure which:

- Adversely affects the structural strength, performance, or flight characteristics of the aircraft, and
- Would normally require major repair or replacement of the affected component,

  except for engine failure or damage, when the damage is limited to a single engine (including its cowlings or accessories), to propellers, wingtips, antennas, probes, vanes, tires, brakes, wheels, fairings, panels, landing gear doors, windscreens, the aircraft skin (such as small dents or puncture holes), or for minor damages to main rotor blades, tail rotor blades, landing gear, and those resulting from hail or bird strike (including holes in the radome).

C) The aircraft is missing or is completely inaccessible.

NTSB defines an "aircraft accident" as follows:

Aircraft accident means an occurrence associated with the operation of an aircraft which takes place between the time any person boards the aircraft with the intention of flight and all such persons have disembarked, and in which any person suffers death or serious injury, or in which the aircraft receives substantial damage. For purposes of this part, the definition of "aircraft accident" includes "unmanned aircraft accident," as defined in 49 CFR 830.2.

Referenced ICAO and NTSB Definitions

Serious Injury

ICAO defines "serious injury" as follows:

Serious Injury. An injury that is sustained by a person in an accident and which:

A) Requires hospitalization for more than 48 hours, commencing within seven days from the date the injury was received; or

B) Results in a fracture of any bone (except simple fractures of fingers, toes or nose); or

C) Involves lacerations that cause severe hemorrhage, nerve, muscle, or tendon damage; or

D) Involves injury to any internal organ; or

E) Involves second- or third-degree burns, or any burns affecting more than 5 percent of the body surface; or

F) Involves verified exposure to infectious substances or injurious radiation.

NTSB defines "serious injury" as follows:

Serious injury means any injury that

1) Requires hospitalization for more than 48 hours, commencing within 7 days from the date the injury was received;

2) Results in a fracture of any bone (except simple fractures of fingers, toes, or nose);

3) Causes severe hemorrhages, nerve, muscle, or tendon damage;

4) Involves any internal organ; or

5) Involves second- or third-degree burns, or any burns affecting more than 5 percent of the body surface.

Substantial Damage

NTSB defines "substantial damage" as follows:

Substantial damage means damage or failure that adversely affects the structural strength, performance, or flight characteristics of the aircraft, and which would normally require major repair or replacement of the affected component. Engine failure or damage limited to an engine if only one engine fails or is damaged, bent fairings or cowling, dented skin, small puncture holes in the skin or fabric, ground damage to rotor or propeller blades, and damage to landing gear, wheels, tires, flaps, engine accessories, brakes, or wingtips are not considered "substantial damage" for the purpose of this part.

ICAO does not define the term "substantial damage."

2017 Airplane Accidents

All Accidents | Worldwide Commercial Jet Fleet

Event Date	Airline	Model (Age in Years)	Type of Operation	Accident Location	Phase of Flight	Event Description	Damage Category	Hull Loss	Injury Category	Onboard Fatalities/ Occupants (External Fatalities)	Major Accident
3-Jan-17	Aeroflot	A321 (2)	Sched Pax	Kaliningrad, Russia	Landing	It was reported that airplane landed in a heavy crosswind and subsequently veered off the runway, incurring substantial damage.	Substantial				
10-Jan-17	Philippine Airlines	A320 (9)	Sched Pax	Kalibo, Philippines	Landing	The preliminary investigative report states that the airplane touched down to the left of the paved runway, then re-entered the paved runway surface. There was heavy damage. There were no reported injuries.	Substantial				
14-Jan-17	Ryanair	737-800 (7)	Sched Pax	Manchester, United Kingdom	Descent	During descent, a cabin crew member received a fractured ankle during airplane handling associated with shifting winds.	None		Serious		
16-Jan-17	ACT Airlines	747-400 (13)	Sched Cargo	Bishkek, Kyrgyzstan	Go Around	The airplane overflew the runway during a precision approach, impacted terrain, then impacted a residential area.	Destroyed	X	Fatal	4/4 (35)	X
25-Jan-17	Air New Zealand	A320 (4)	Sched Pax	Christchurch, New Zealand	Landing	It was reported that a hard landing occurred, resulting in heavy damage. There were no reported injuries.	Substantial				
28-Jan-17	AerCaribe	737-400 (26)	Charter Cargo	Leticia, Colombia	Landing	After landing, the airplane came to rest on soft ground past the end of the runway. There was heavy damage. There were no reported injuries.	Substantial				
30-Jan-17	Zest Airways Inc	A320 (12)	Sched Pax	Manila, Philippines	Landing	It was reported that a hard landing occurred, resulting in heavy damage. There were no reported injuries.	Substantial				
1-Feb-17	Garuda Indonesia	737-800 (2)	Sched Pax	Yogyakarta, Indonesia	Landing	After landing, the airplane veered to the left and departed the runway surface onto soft ground. There was heavy damage. There were no reported injuries.	Substantial				
17-Feb-17	VIM Airlines	737-500 (19)	Sched Pax	Riga, Russia	Takeoff	During takeoff roll, the airplane departed the right side of the runway onto soft ground, and came back onto the runway, resulting in heavy damage. There were no reported injuries.	Substantial	X			
28-Feb-17	Omni Air International	767-300 (21)	Charter Pax	Amman, Jordan	Landing	It was reported that a tail strike occurred during landing. There was heavy damage. There were no reported injuries.	Substantial				
8-Mar-17	Ameristar Air Cargo	MD-83 (24)	Sched Pax	Detroit, USA	Takeoff	The airplane was damaged after overrunning the end of the runway after a rejected takeoff, resulting in extensive damage. One passenger was reported to have received minor injuries during the subsequent evacuation.	Substantial	X			
13-Mar-17	Qantas	737-800 (4)	Sched Pax	Canberra, Australia	Descent	During descent, a cabin crew member received a fractured leg during airplane handling associated with shifting winds.	None		Serious		
27-Mar-17	Taban Air	737-400 (18)	Sched Pax	Ardabil, Iran	Landing	The airplane had a hard and overweight landing, followed by a collapse of the right main landing gear, incurring heavy damage. One passenger was reported to have received minor injuries during the subsequent evacuation.	Substantial				

2017 Airplane Accidents

All Accidents | Worldwide Commercial Jet Fleet

Event Date	Airline	Model (Age in Years)	Type of Operation	Accident Location	Phase of Flight	Event Description	Damage Category	Hull Loss	Injury Category	Onboard Fatalities/ Occupants (External Fatalities)	Major Accident
28-Mar-17	Peruvian Airlines.	737-300 (25)	Sched Pax	Jauja, Peru	Landing	After landing, the airplane experienced a shimmy event and veered off the runway. The airplane was subsequently consumed by fire. There were no reported injuries.	Destroyed	X			X
8-Apr-17	Malaysia Airlines	737-800 (2)	Sched Pax	Sibu, Malaysia	Landing	After landing in a heavy rain, the airplane veered off of the runway, incurring heavy damage. There were no reported injuries.	Substantial				
10-Apr-17	Jet2.com Ltd	757-200 (29)	Sched Pax	Alicante, Spain	Landing	The airplane was damaged during a landing tail strike. There were no reported injuries.	Substantial				
10-Apr-17	Mango	737-800 (16)	Sched Pax	Cape Town, South Africa	Takeoff	The airplane was heavily damaged by a bird strike after takeoff. The bird struck the horizontal stabilizer. There were no reported injuries.	Substantial				
28-Apr-17	Nesma Airlines	A320 (11)	Sched Pax	Abha, Saudi Arabia	Landing	It was reported that after landing, the airplane overran the end of the runway, resulting in FOD damage to both engines. There were no reported injuries.	Substantial				
30-Apr-17	TAAG (Angola Airlines)	737-700 (10)	Sched Pax	Soyo, Angola	Taxi	After landing, the landing gear was inadvertently retracted, resulting in a nose gear collapse and damage. There were no reported injuries.	Substantial				
31-May-17	Sriwijaya Air	737-300 (29)	Sched Pax	Manokwari, Indonesia	Landing	After landing, the airplane overran the end of the runway, resulting in a nose gear collapse and heavy damage. There were no reported injuries.	Substantial	X			
3-Jul-17	easyJet	A319 (11)	Sched Pax	Munich, Germany	Landing	During a hard landing, the landing gear was substantially damaged.	Substantial				
12-Jul-17	Caribbean Airlines Limited	737-800 (16)	Sched Pax	St. Maarten, Netherlands Antilles	Takeoff	It was reported that a non-occupant onlooker was fatally injured by jet blast during the takeoff.	None		Fatal	0/0 (1)	
18-Jul-17	Tri M.G. Airlines	737-300 (29)	Sched Cargo	Wamena, Indonesia	Landing	During landing, the airplane touched down hard, veered to the left, and came to rest on rough terrain with the landing gear collapsed, incurring heavy damage. There were no reported injuries.	Destroyed	X			X
23-Jul-17	Kenya Airways	737-800 (8)	Sched Pax	Nairobi, Kenya	Tow	The airplane was impacted by a tug during pushback, incurring heavy damage. There were no reported injuries.	Substantial				
3-Aug-17	Lion Air	737-900 (4)	Sched Pax	Medan, Indonesia	Landing	A ground collision with another airplane occurred after landing, incurring damage. There were no reported injuries on either airplane.	Substantial				
20-Aug-17	Ethiopian Airlines	777-200 (4)	Sched Pax	Addis Ababa, Ethiopia	Taxi	While taxiing, the airplane collided with another airplane. There were no reported injuries.	Substantial				
20-Aug-17	Ethiopian Airlines	A350-900 (1)	Sched Pax	Addis Ababa, Ethiopia	Taxi	After pushback, the airplane was struck by another taxiing airplane. There were no reported injuries.	Substantial				
5-Sep-17	Air India Express	737-800 (8)	Sched Pax	Cochin, India	Taxi	After Landing, the airplane taxied into a drainage canal, incurring heavy damage. There were no reported injuries.	Substantial				

2017 Airplane Accidents

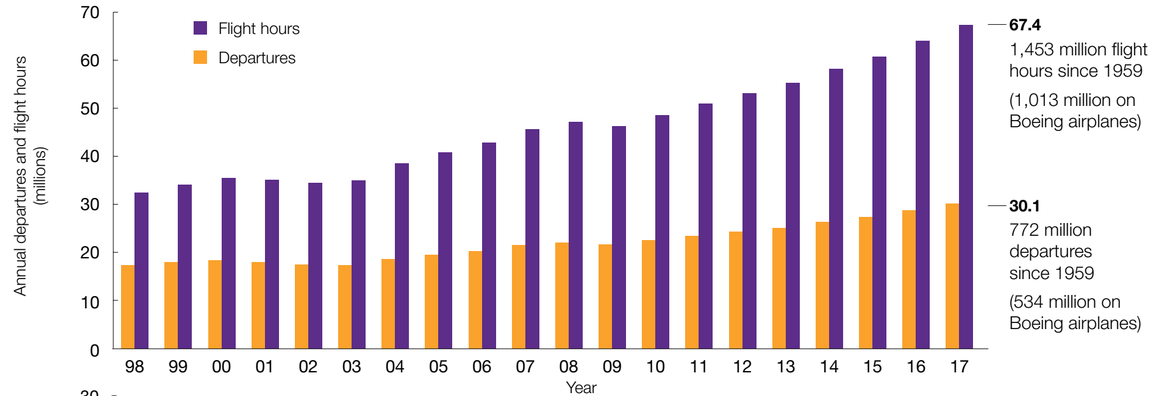
All Accidents | Worldwide Commercial Jet Fleet

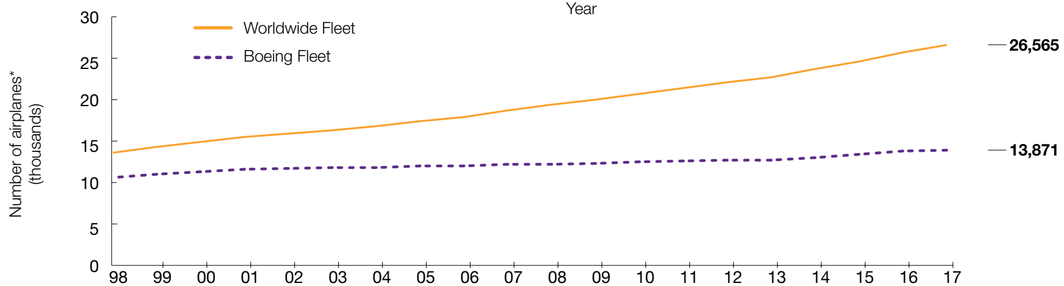
Event Date	Airline	Model (Age in Years)	Type of Operation	Accident Location	Phase of Flight	Event Description	Damage Category	Hull Loss	Injury Category	Onboard Fatalities/ Occupants (External Fatalities)	Major Accident
5-Sep-17	China Eastern Airlines	737-800 (1)	Sched Pax	Wenzhou, China	Go Around	During a go-around, the airplane experienced a damaging tail strike. There were no reported injuries.	Substantial				
12-Sep-17	Air Canada	767-300 (28)	Sched Pax	Los Angeles, USA	Taxi	The airplane, while stopped and awaiting marshaling instructions, was struck by a taxiing airplane.	Substantial				
24-Sep-17	Badr Airlines	737-500 (23)	Sched Pax	Khartoum, Sudan	Final Approach	It is reported that during final approach, the airplane hit a large bird, causing heavy damage to the radome and airplane structure. There were no reported injuries.	Substantial				
28-Sep-17	Ural Airlines	A321 (14)	Sched Pax	Leningrad, Russia	Load/ Unload	While exiting the airplane after a flight, a parent and infant fell when the external stairway collapsed. The parent was seriously injured and the infant received fatal injuries.	None		Fatal	0/Unknown (1)	
30-Sep-17	Air France	A380 (7)	Sched Pax	Goose Bay, Canada	Cruise	It was reported that during cruise, an uncontained engine failure resulted in heavy damage to the airplane with subsequent diversion. There were no reported injuries.	Substantial				
13-Oct-17	Cebu Pacific Air	A320 (5)	Sched Pax	Iloilo, Philippines	Landing	It was reported that after landing, the airplane veered to the right off the runway and came to a stop on soft ground with the nose gear collapsed. There were no reported injuries.	Substantial				
24-Oct-17	China Eastern Airlines	737-800 (3)	Sched Pax	Shenzhen, China	Parked	Media reports state that a flight attendant fell from an aft entry door, resulting in serious injury.	None		Serious		
8-Nov-17	Swaziland Airlink	BAe 146-RJ85 (20)	Sched Pax	Johannesburg, South Africa	Cruise	It was reported that an uncontained engine failure caused substantial damage to, and shutdown of, a second engine. There were no reported injuries.	Substantial				
11-Nov-17	ACT Airlines	747-400 (15)	Sched Cargo	Maastricht, Netherlands	Takeoff	During takeoff, an engine failure resulted in a rejected takeoff (RTO). The airplane then veered off the runway, incurring heavy damage. There were no reported injuries.	Substantial				
15-Nov-17	Swaziland Airlink	BAe 146-RJ85 (21)	Sched Pax	Johannesburg, South Africa	Not Reported	It was reported that the airplane had inflight hail damage severe enough to result in a hull loss. There were no reported injuries.	Substantial	X			
27-Nov-17	EgyptAir	777-300 (7)	Sched Pax	New York, USA	Taxi	The airplane collided with another airplane during taxi, incurring damage. There were no reported injuries.	Substantial				
2-Dec-17	EVA Air	777-300 (3)	Sched Pax	Toronto, Canada	Taxi	During taxi, the airplane's wing was substantially damaged when contacting an airport lighting pole. There were no reported injuries.	Substantial				
40	Total Accidents							7		4 Onboard (37 External)	3

Note: At the time this statistical summary was compiled, missing Malaysia Airlines Flight 370 did not meet the criteria for being categorized as an airplane accident, in accordance with the definition of this publication.

Departures, Flight Hours, and Jet Airplanes in Service*

Worldwide Commercial Jet Fleet | 1998 through 2017





Source: Jet Information Services, Inc.

* Certified jet airplanes greater than 60,000 pounds maximum gross weight, including those in temporary nonflying status and those in use by non-airline operators. Excluded are commercial airplanes operated in military service and CIS- or USSR-manufactured airplanes.

Accident Summary by Type of Operation

Worldwide Commercial Jet Fleet

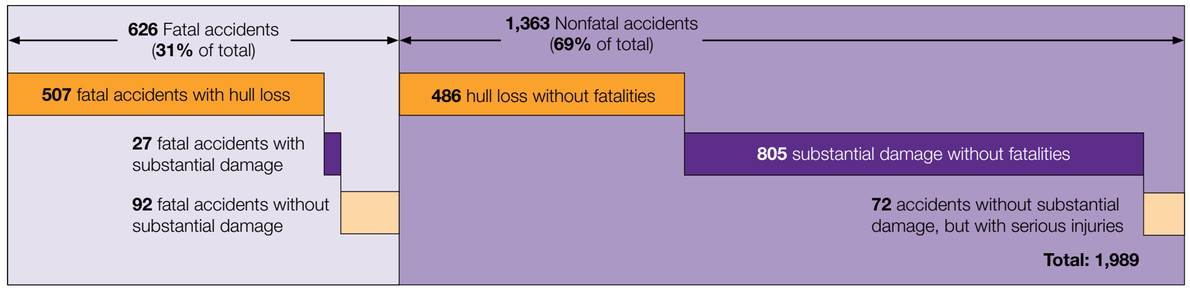
Type of Operation	All Accidents		Fatal Accidents		Onboard Fatalities (External Fatalities)*		Hull-Loss Accidents	
	1959–2017	2008–2017	1959–2017	2008–2017	1959–2017	2008–2017	1959–2017	2008–2017
Passenger	1,585	316	500	37	29,298 (803)	2,199 (67)	730	101
▪ *Scheduled*	*1,462*	*299*	*453*	*35*	*25,101*	*2,116*	*659*	*95*
▪ *Charter*	*123*	*17*	*47*	*2*	*4,197*	*83*	*71*	*6*
Cargo	281	61	82	15	282 (385)	45 (58)	188	35
Maintenance test, ferry, positioning, training, and demonstration	123	10	44	3	208 (66)	17 (0)	75	7
Total	**1,989**	**387**	**626**	**55**	**29,788 (1,254)**	**2,261 (125)**	**993**	**143**
U.S. and Canadian operators	581	65	182	9	6,202 (381)	26 (4)	234	25
Rest of the world	1,408	322	444	46	23,586 (873)	2,235 (121)	759	118
Total	**1,989**	**387**	**626**	**55**	**29,788 (1,254)**	**2,261 (125)**	**993**	**143**

* External fatalities include on-ground fatalities as well as fatalities on other aircraft involved.

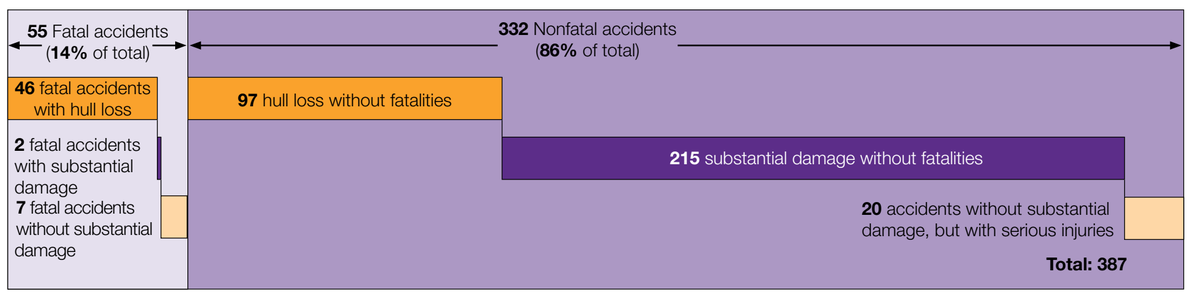
Accident Summary by Injury and Damage

Worldwide Commercial Jet Fleet

Number of Accidents | 1959 through 2017

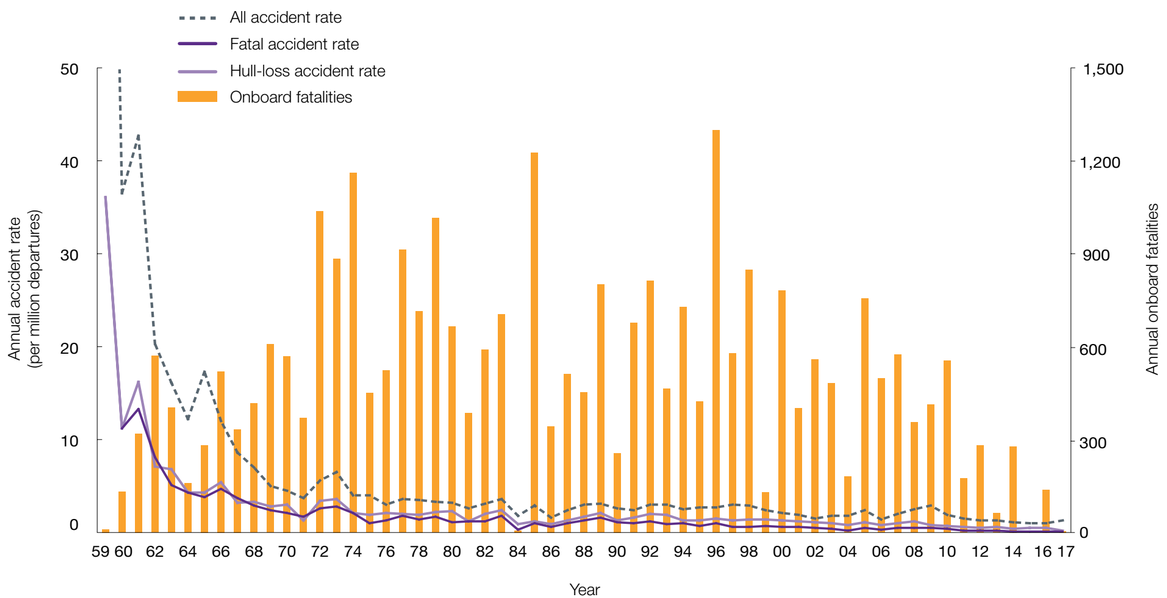


Number of Accidents | 2008 through 2017



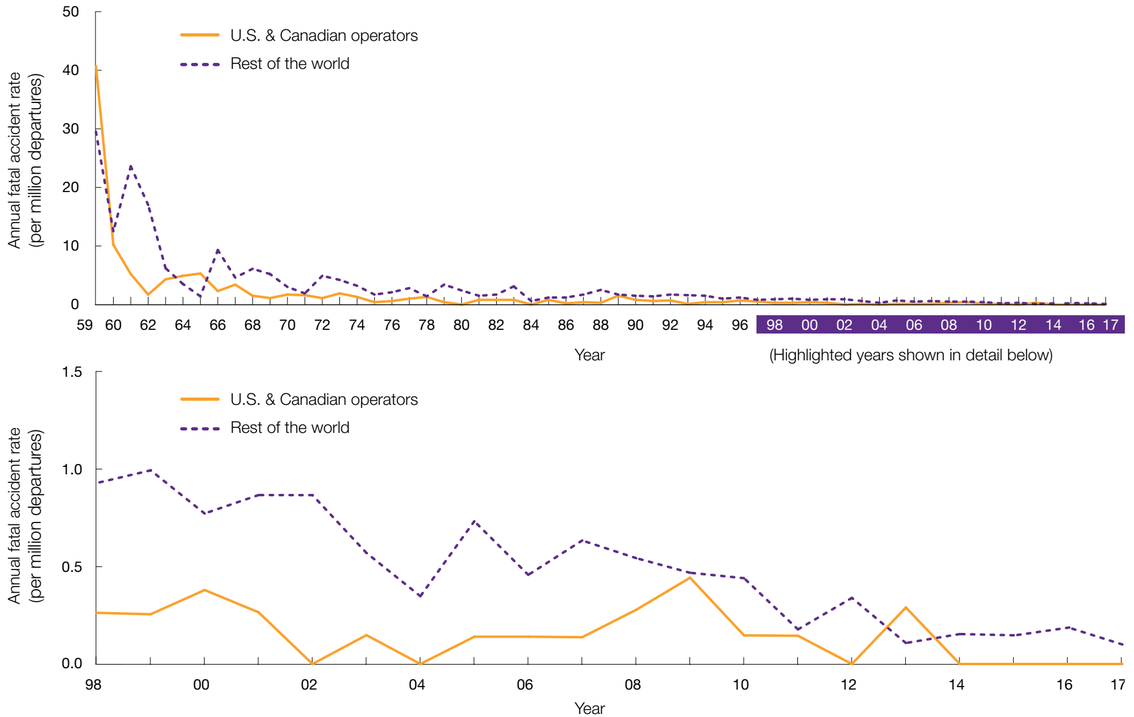
Accident Rates and Onboard Fatalities by Year

Worldwide Commercial Jet Fleet | 1959 through 2017



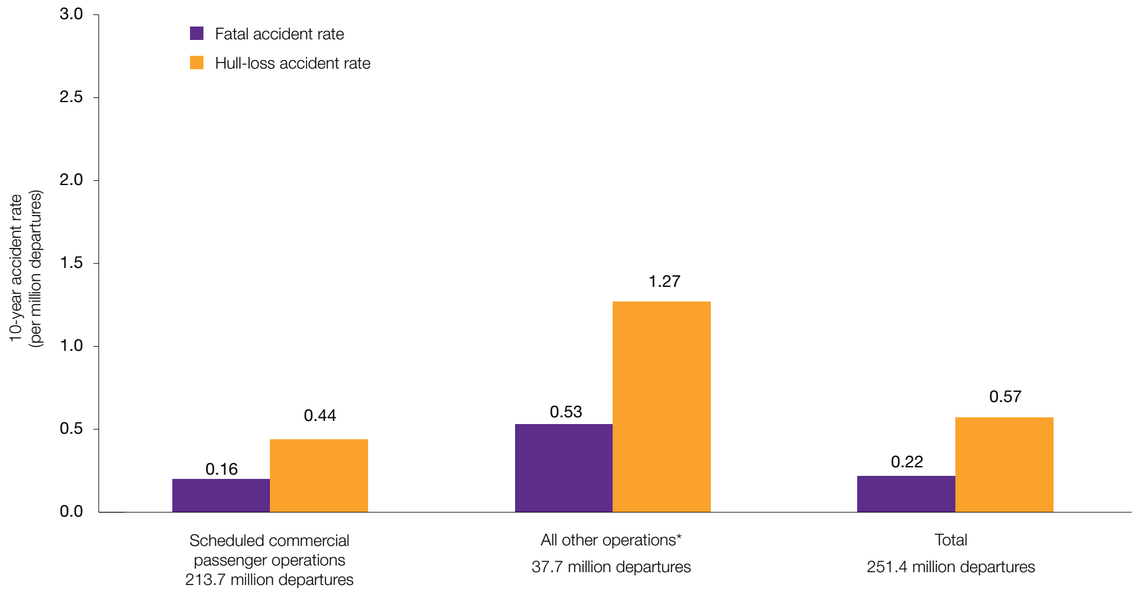
U.S. and Canadian Operators Accident Rates by Year

Fatal Accidents | Worldwide Commercial Jet Fleet | 1959 through 2017



Accident Rates by Type of Operation

Fatal and Hull-Loss Accidents | Worldwide Commercial Jet Fleet | 2008 through 2017

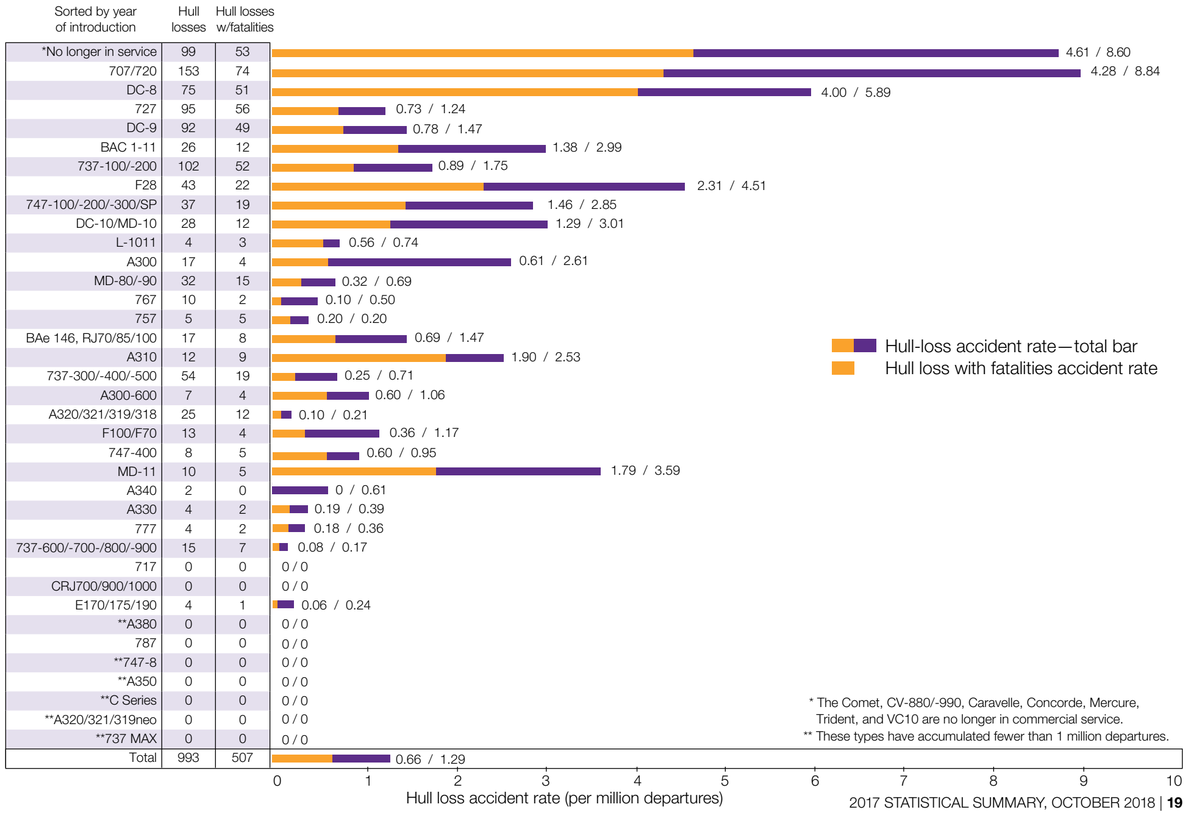


* Charter passenger, charter cargo, scheduled cargo, maintenance test, ferry, positioning, training, and demonstration flights

Accident Rates by Airplane Type

Hull-Loss Accidents | Worldwide Commercial Jet Fleet | 1959 through 2017

Sorted by year of introduction	Hull losses	Hull losses w/fatalities	
*No longer in service	99	53	4.61 / 8.60
707/720	153	74	4.28 / 8.84
DC-8	75	51	4.00 / 5.89
727	95	56	0.73 / 1.24
DC-9	92	49	0.78 / 1.47
BAC 1-11	26	12	1.38 / 2.99
737-100/-200	102	52	0.89 / 1.75
F28	43	22	2.31 / 4.51
747-100/-200/-300/SP	37	19	1.46 / 2.85
DC-10/MD-10	28	12	1.29 / 3.01
L-1011	4	3	0.56 / 0.74
A300	17	4	0.61 / 2.61
MD-80/-90	32	15	0.32 / 0.69
767	10	2	0.10 / 0.50
757	5	5	0.20 / 0.20
BAe 146, RJ70/85/100	17	8	0.69 / 1.47
A310	12	9	1.90 / 2.53
737-300/-400/-500	54	19	0.25 / 0.71
A300-600	7	4	0.60 / 1.06
A320/321/319/318	25	12	0.10 / 0.21
F100/F70	13	4	0.36 / 1.17
747-400	8	5	0.60 / 0.95
MD-11	10	5	1.79 / 3.59
A340	2	0	0 / 0.61
A330	4	2	0.19 / 0.39
777	4	2	0.18 / 0.36
737-600/-700-/800/-900	15	7	0.08 / 0.17
717	0	0	0 / 0
CRJ700/900/1000	0	0	0 / 0
E170/175/190	4	1	0.06 / 0.24
**A380	0	0	0 / 0
787	0	0	0 / 0
**747-8	0	0	0 / 0
**A350	0	0	0 / 0
**C Series	0	0	0 / 0
**A320/321/319neo	0	0	0 / 0
**737 MAX	0	0	0 / 0
Total	993	507	0.66 / 1.29

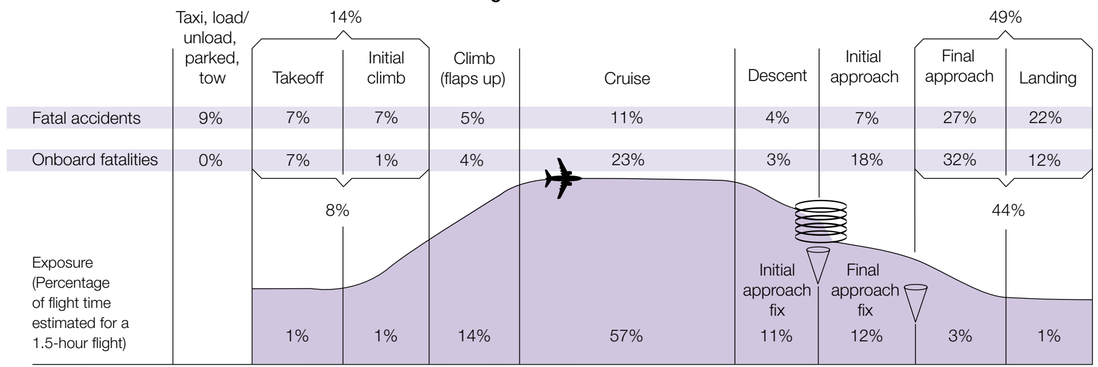


* The Comet, CV-880/-990, Caravelle, Concorde, Mercure, Trident, and VC10 are no longer in commercial service.
** These types have accumulated fewer than 1 million departures.

Fatal Accidents and Onboard Fatalities by Phase of Flight

Fatal Accidents | Worldwide Commercial Jet Fleet | 2008 through 2017

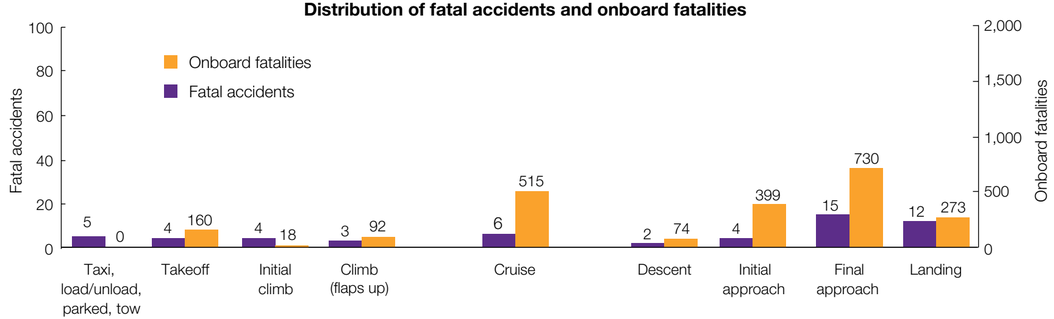
Percentage of fatal accidents and onboard fatalities



	Taxi, load/ unload, parked, tow	Takeoff	Initial climb	Climb (flaps up)	Cruise	Descent	Initial approach	Final approach	Landing
Fatal accidents	9%	7%	7%	5%	11%	4%	7%	27%	22%
Onboard fatalities	0%	7%	1%	4%	23%	3%	18%	32%	12%
Exposure (Percentage of flight time estimated for a 1.5-hour flight)		1%	1%	14%	57%	11%	12%	3%	1%

Note: Percentages may not sum to 100% because of numerical rounding.

Distribution of fatal accidents and onboard fatalities



CAST/ICAO Common Taxonomy Team Aviation Occurrence Categories

The International Civil Aviation Organization (ICAO) and the Commercial Aviation Safety Team (CAST), which includes government officials and aviation industry leaders, have jointly chartered the CAST/ICAO Common Taxonomy Team (CICTT). CICTT includes experts from several air carriers; aircraft manufacturers; engine manufacturers; pilot associations; regulatory authorities; transportation safety boards; ICAO; and members from Canada, the European Union, France, Italy, the Netherlands, the United Kingdom, and the United States. CICTT is co-chaired by one representative each from ICAO and CAST.

The team is charged with developing common taxonomies and definitions for aviation accident and incident reporting systems. Common taxonomies and definitions establish a standard industry language, thereby improving the quality of information and communication. With this common language, the aviation community's capacity to focus on common safety issues is greatly enhanced.

The CICTT Aviation Occurrence Taxonomy is designed to permit the assignment of multiple categories as necessary to describe the accident or incident. Since 2001, the Safety Indicator Steering Group (SISG) has met annually to assign CICTT occurrence categories to the prior year's accidents.

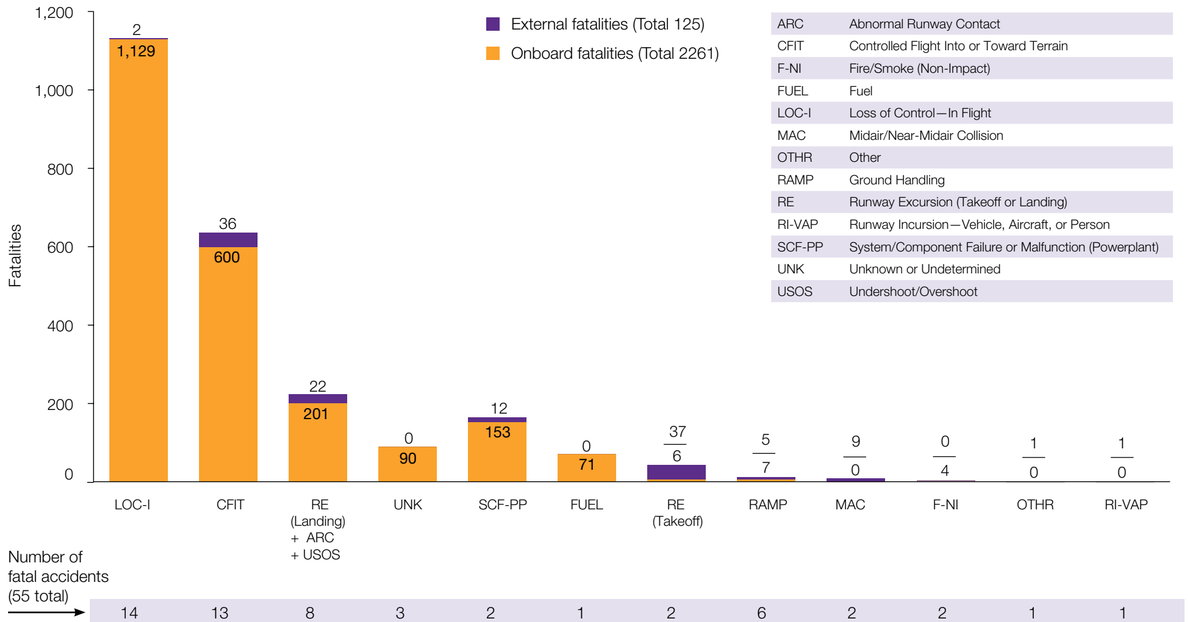
In a separate activity, the CAST assigned each fatal accident to a single principal category. Those accident assignments and a brief description of the categories are reported in the following chart.

The CAST use of principal categories has been instrumental in focusing industry and government efforts and resources on accident prevention. Charts using principal categories are used by CAST to identify changes to historical risk and to help to determine if the safety enhancements put in place are effective.

For a complete description of the categories, go to www.intlaviationstandards.org.

Fatalities by CICTT Aviation Occurrence Categories

Fatal Accidents | Worldwide Commercial Jet Fleet | 2008 through 2017



ARC	Abnormal Runway Contact
CFIT	Controlled Flight Into or Toward Terrain
F-NI	Fire/Smoke (Non-Impact)
FUEL	Fuel
LOC-I	Loss of Control—In Flight
MAC	Midair/Near-Midair Collision
OTHR	Other
RAMP	Ground Handling
RE	Runway Excursion (Takeoff or Landing)
RI-VAP	Runway Incursion—Vehicle, Aircraft, or Person
SCF-PP	System/Component Failure or Malfunction (Powerplant)
UNK	Unknown or Undetermined
USOS	Undershoot/Overshoot

Note: Principal categories as assigned by CAST.
For a complete description of CAST/ICAO Common Taxonomy Team (CICTT) Aviation Occurrence Categories, go to www.intlaviationstandards.org.

Notes

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