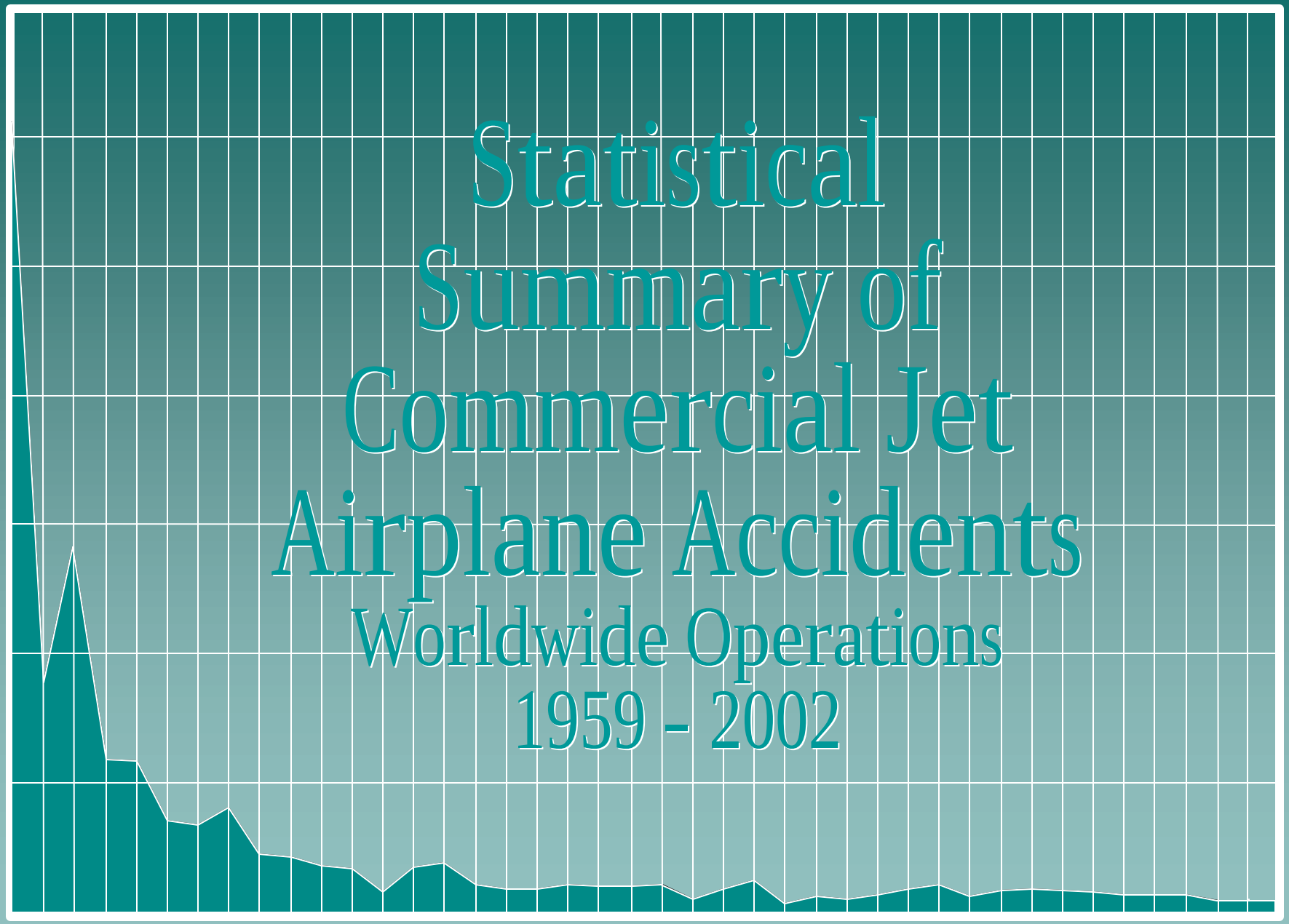

1959

2002

BOEING

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Introduction

The accident statistics presented in this document apply to worldwide commercial jet airplanes that are heavier than 60,000 pounds maximum gross weight. These statistics are presented in two distinct sections called ***Statistical Accidents*** which outlines hull loss, substantial damage, fatal injury, serious injury accidents, and ***Excluded Events***, outlining hostile action, and non-hostile events.

Not covered in this document are airplanes manufactured in the Commonwealth of Independent States (CIS) (former Soviet Union), which are excluded because of the lack of operational data. Statistics on commercial airplanes operated in military service are not covered in this document, however, when a military-owned commercial jet transport type is used for civilian commercial service, those data are contained within this document.

The following airplane types are included:

717	DC-8	A300	BAe 146	F-28	Concorde	L-1011	BAC 1-11	Comet 4
707, 720	DC-9	A300-600	RJ-70/-85/-100	F-70				Trident
727	DC-10	A310		F-100				Caravelle
737	MD-11	A320/319/321						Mercure
747	MD-80/-90	A330						CV-880/-990
757		A340						VC-10
767								
777								

Airplane flight time and departures are primarily obtained from airplane and engine manufacturer compilations. Flight operations data for non-Boeing-manufactured airplanes is augmented by the AirCraft Analytical System (ACAS) electronic database that is published by AvSoft, Limited, of Rugby, England.

Accident data are obtained, when available, from government accident reports. Otherwise, information is solicited from operators, manufacturers, various government and private information services, and press accounts. Definitions related to development of statistics in this book are primarily based on corresponding International Civil Aviation Organization (ICAO) terms as explained in the next section. Some variations to the ICAO definitions are applied to facilitate the purposes of this document.

Definitions

Events in this publication are classified according to the following definitions. These definitions are consistent with those of the National Transportation Safety Board (NTSB) and the International Civil Aviation Organization (ICAO).

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:

- Airplane sustains substantial damage.
- Death or serious injury results from:
  - Being in or upon the airplane.
  - Direct contact with the airplane or anything attached thereto.
  - Direct exposure to jet blast.

Hull loss: Airplane damage that is substantial and is beyond economic repair. Hull loss also includes events in which:

- Airplane is missing.
- Search for the wreckage has been terminated without it being located.
- Airplane is substantially damaged and inaccessible.

Substantial damage: Damage or structural failure that adversely affects the structural strength, performance, or flight characteristics of the airplane and 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 aerodynamic fairings.
- Dents in the skin.
- Damage to landing gear.
- Damage to wheels.
- Damage to tires.
- Damage to flaps.

Fatal accident: An accident that results in fatal injury.

Fatal injury: An injury that results in death within 30 days as a result of an accident.

Definitions (continued)

Serious injury: An injury sustained in an accident that:

- Requires hospitalization for more than 48 hours that begins within 7 days of the date of injury.
- Results in a fracture of any bone (except simple fractures of fingers, toes, or nose).
- Produces lacerations that result in severe hemorrhage or nerve, muscle, or tendon damage.
- Involves injury to any internal organ.
- Involves second or third degree burns over 5 percent or more of the body.
- Involves verified exposure to infectious substance or injurious radiation.

Generation: Airplane types are classified by generation groups in order of introduction to service as follows:

First	Second	Early Widebody	Current
707, 720	727	747-100/-200/-300/SP	MD-80/-90
DC-8	BAC 1-11	DC-10	767
Comet 4*	DC-9	L-1011	757
CV-880/-990*	737-100/-200	A300	BAe 146
Caravelle*	F-28		A310
Mercure*	Trident*		A300-600
	VC-10*		737-300/-400/-500
			A320/319/321
			F-100
			F-70
			747-400
			MD-11
			A340
			A330
			777
			737-600/-700/-800/-900
			717
			RJ-70/-85/-100

* These types are no longer in significant commercial service.

Terms and Exclusions

Regional identification: Events are identified by operators' national domicile and by event location.

Airplane collisions: Events involving two or more airplanes are counted as separate events, one for each airplane. For example, total destruction of two airplanes in a collision is considered two separate hull loss accidents.

Accident rates: In general, this expression is a measure of accidents per million departures. Departures (or flight cycles) are used as the basis for computing rates, since 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. 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 appear to vary between editions of this publication.

Excluded events:

- Fatal and nonfatal injuries from natural causes.
- Fatal and nonfatal self-inflicted injuries.
- Fatal and nonfatal injuries of stowaways hiding outside the areas normally available to the passengers and crew.
- Experimental test flight accidents. (Maintenance test flights, ferry, positioning, training and demonstration flights are included).
- Nonfatal injuries resulting from atmospheric turbulence, maneuvering, loose objects, boarding, disembarking, evacuation, and maintenance and servicing.
- Nonfatal injuries to persons not onboard the airplane.

Airplane Accidents

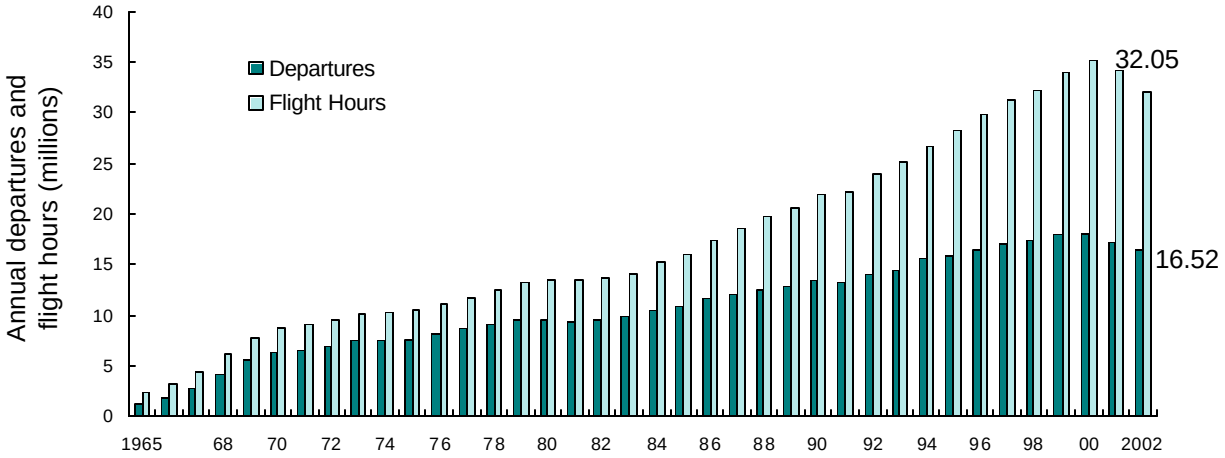
Worldwide Commercial Jet Fleet - 2002

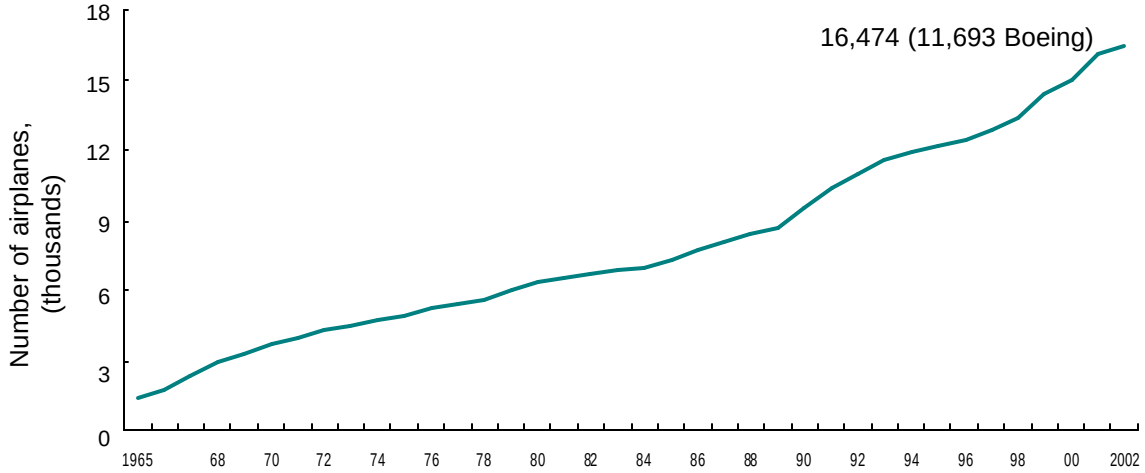
Date	Airline	Airplane Type	Accident Location	Hull Loss	Fatalities	Phase	Description
14-Jan-02	Lionair	737-200	Pekanbaru, Indonesia	X		Takeoff	RTO/Departed end of runway
16-Jan-02	Garuda Indonesia	737-300	Yogyakarta, Indonesia	X	1	Initial Approach	Emergency landing (ditching into river)
24-Jan-02	Northwest Airlines	DC-9-41	Indianapolis, IN, USA			Taxi	#2 engine fire during taxi
28-Jan-02	TAME	727-100	Tulcan, Ecuador	X	92	Initial Approach	Airplane crashed on approach
28-Feb-02	Fine Air	DC-8-62C	Singapore, Singapore			Taxi	Airplane ran into ditch
18-Mar-02	Varig Cargo Airlines	727-30C	Belo Horizonte, Brazil	X		Landing	Airplane departed runway on landing
21-Mar-02	Northwest Airlines	DC-10-30	Miami to Amsterdam			In Flight	Turbulence injury
02-Apr-02	Egyptair	A320	Cairo, Egypt			Landing	Hard landing
15-Apr-02	Air China	767-200	Pusan, South Korea	X	122	Initial Approach	CFIT into mountainside
26-Apr-02	Hewa Bora Airways	707-366C	Kinshasa, Rep. of the Congo	X		Landing	Crashed on landing
27-Apr-02	Challenge Air Cargo	DC-10-40F	San Salvador, El Salvador			Takeoff	Airplane damage from debris on runway
04-May-02	EAS Airlines	BAC 1-11	Kano, Nigeria	X	149	Initial Climb	Crashed after takeoff
07-May-02	Egyptair	737-500	Tunis, Tunisia	X	18	Final Approach	Crashed on hillside while attempting to land
22-May-02	Monarch Airlines	757-200	Gibraltar, Gibraltar			Landing	Hard landing
25-May-02	China Airlines	747-209B	Taipei to Hong Kong	X	225	Cruise	Aircraft broke up in flight
03-Jun-02	Northwest Airlines	DC-9-31	Minneapolis, MN, USA			Landing	Right main landing gear collapse
14-Jun-02	Intercontinental de Aviacion	DC-9	Neiva, Colombia			Landing	Runway excursion
26-Jun-02	All Nippon Airways	767-281	Shimojishima, Japan			Landing	Tailstrike during training flight
01-Jul-02	DHL Airways	757-23APF	Uberlingen, Germany	X	71*	Cruise	Mid-air collision with TU-154
04-Jul-02	New Gomair	707-123B	Banguil, Central African Rep.	X	23	Initial Approach	Crashed during emergency landing
06-Jul-02	Air France	A320	Paris, France			Takeoff	Uncontained engine failure & fire
26-Jul-02	Federal Express	727-200	Tallahassee, FL, USA	X		Final Approach	Landed short of runway
27-Jul-02	Olympic Airways	737-300	Athens, Greece			Parked	Damaged by gusty winds
28-Aug-02	America West Airlines	A320	Phoenix, USA			Landing	Nose gear collapsed on landing
30-Aug-02	TAM	F-100	Aracatuba, Brazil	X		Landing	Forced landing/fuel exhaustion
30-Aug-02	TAM	F-100	Sao Paulo, Brazil			In Flight	Hydraulic system malfunction
12-Oct-02	Avianca	757-200	Bogota, Colombia		1	Tow	Ground technician fatally injured
31-Oct-02	Aeromexico	DC-9	Monterrey, Mexico	X		Landing	Landing overrun
09-Nov-02	American Airlines	MD-80-82	New York, USA			Taxi	Smoke/fumes in cabin/evacuation
13-Dec-02	Arrow Air	DC-8-62C	Singapore, Singapore			Landing	Landing overrun
30	Total Accidents			14	702		

*Includes fatalities for both airplanes (2 on 757, 69 on TU-154)

Departures, Flight Hours, and Jet Airplanes in Service*

Worldwide Operations 1965 Through 2002





- 412.0 million cumulative departures (342.3 million on Boeing airplanes)
- 676.5 million cumulative flight-hours (571.4 million on Boeing airplanes)
- 7 Manufacturers - 33 significant types (13 Boeing) in service as of 12/31/2002

*Certified jet airplanes greater than 60,000 pounds maximum gross weight, including those in temporary non-flying status and those in use by non-airline operators. Excluded are military airplanes and CIS-(Soviet Union) manufactured airplanes.

Accident Summary by Type of Operation

Worldwide Commercial Jet Fleet

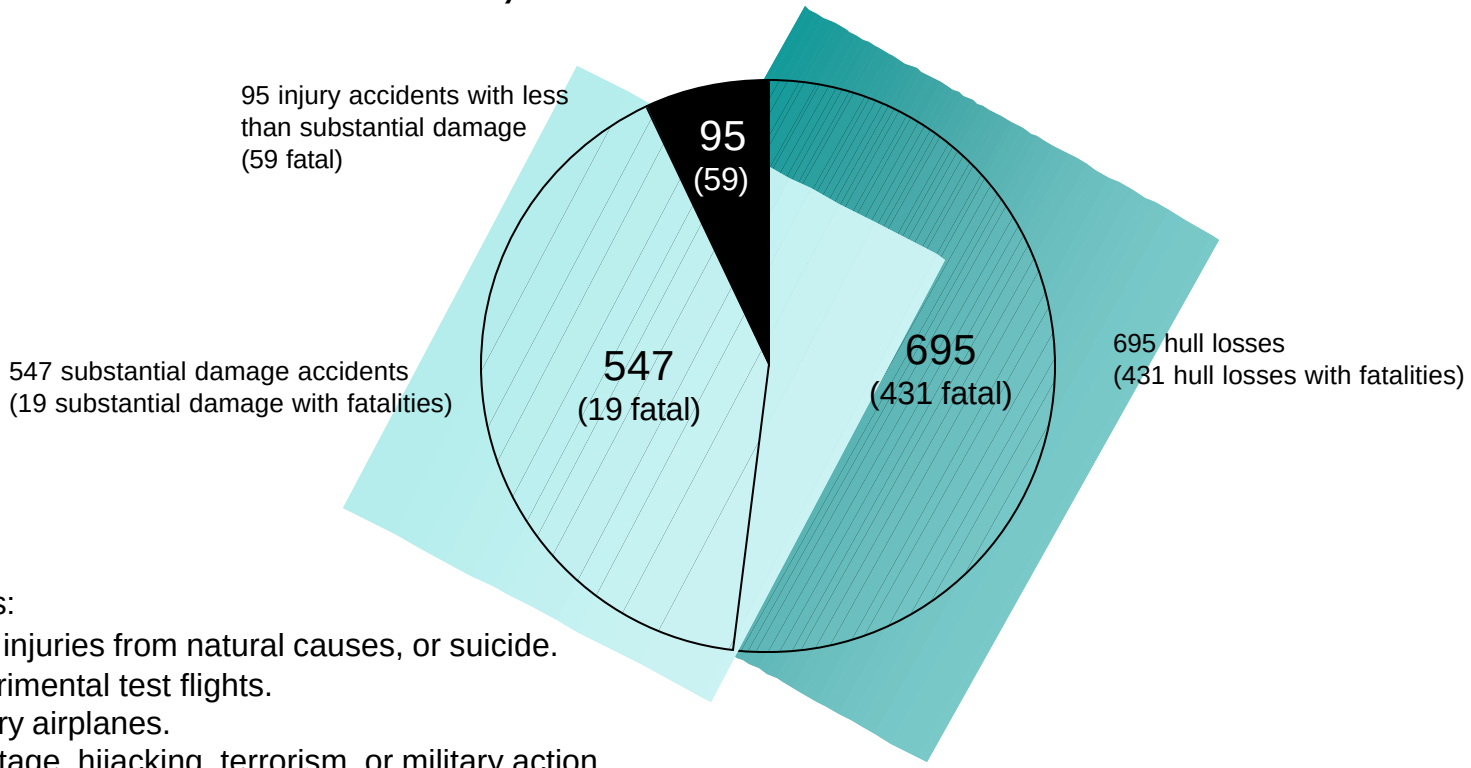
Type of operation	All Accidents		Hull loss and/or fatal accidents		Onboard fatalities	
	1959-2002	1993-2002	1959-2002	1993-2002	1959-2002	1993-2002
Passenger	1,056	296	588	158	24,907	6,384
Cargo	175	73	122	50	217	43
Ferry, test	104	16	61	10	189	34
Other*	2	0	2	0	11	0
Totals	1,337	385	773	218	25,324	6,461
US. & Canada operators	455	94	221	42	6,081	1,052
Rest of the world	882	292	552	176	19,243	5,409
Totals	1,337	385	773	218	25,324	6,461

*Military-owned commercial jet transport types used in civilian commercial service.

Accident Summary by Damage and Injury

All Accidents - Worldwide Commercial Jet Fleet - 1959 through 2002

1,337 accidents worldwide

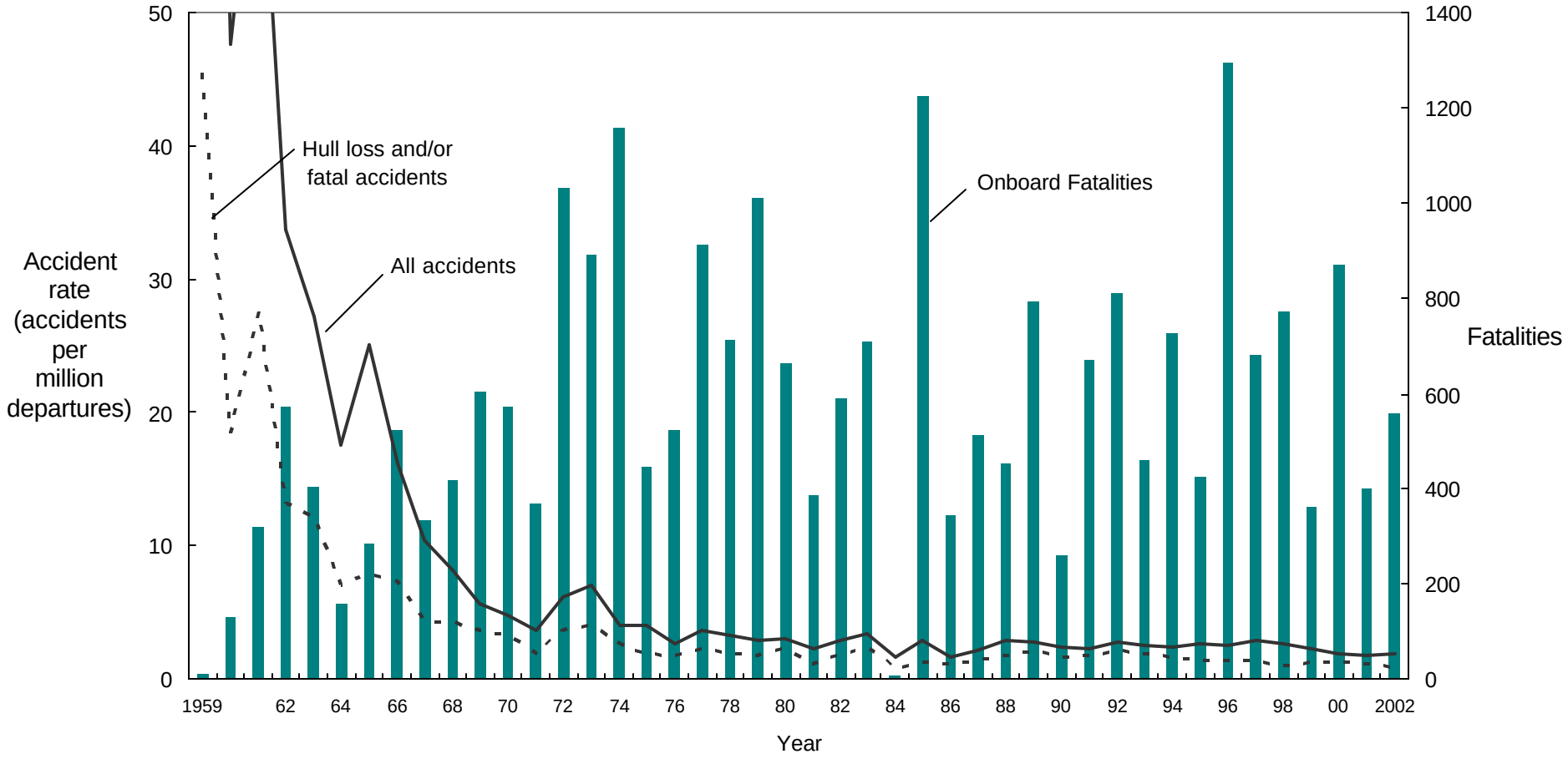


Excludes:

- Fatal injuries from natural causes, or suicide.
- Experimental test flights.
- Military airplanes.
- Sabotage, hijacking, terrorism, or military action.
- Non-fatal injuries involving:
  - Atmospheric turbulence, maneuvering, or loose objects.
  - Boarding, disembarking, or evacuation.
  - Maintenance or servicing.
  - Persons not onboard the airplane.

Accident Rates and Fatalities by Year

All Accidents - Worldwide Commercial Jet Fleet - 1959 through 2002



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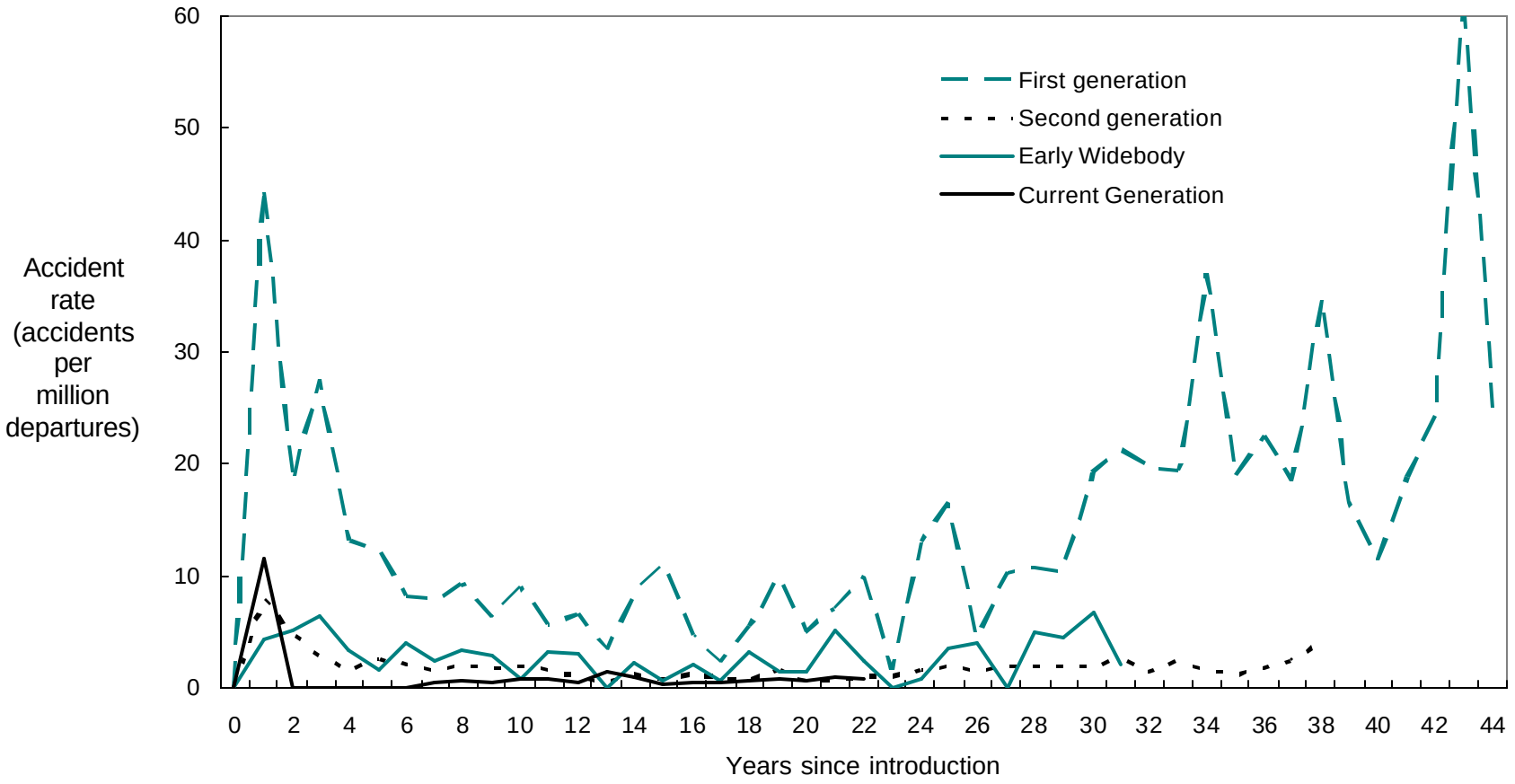
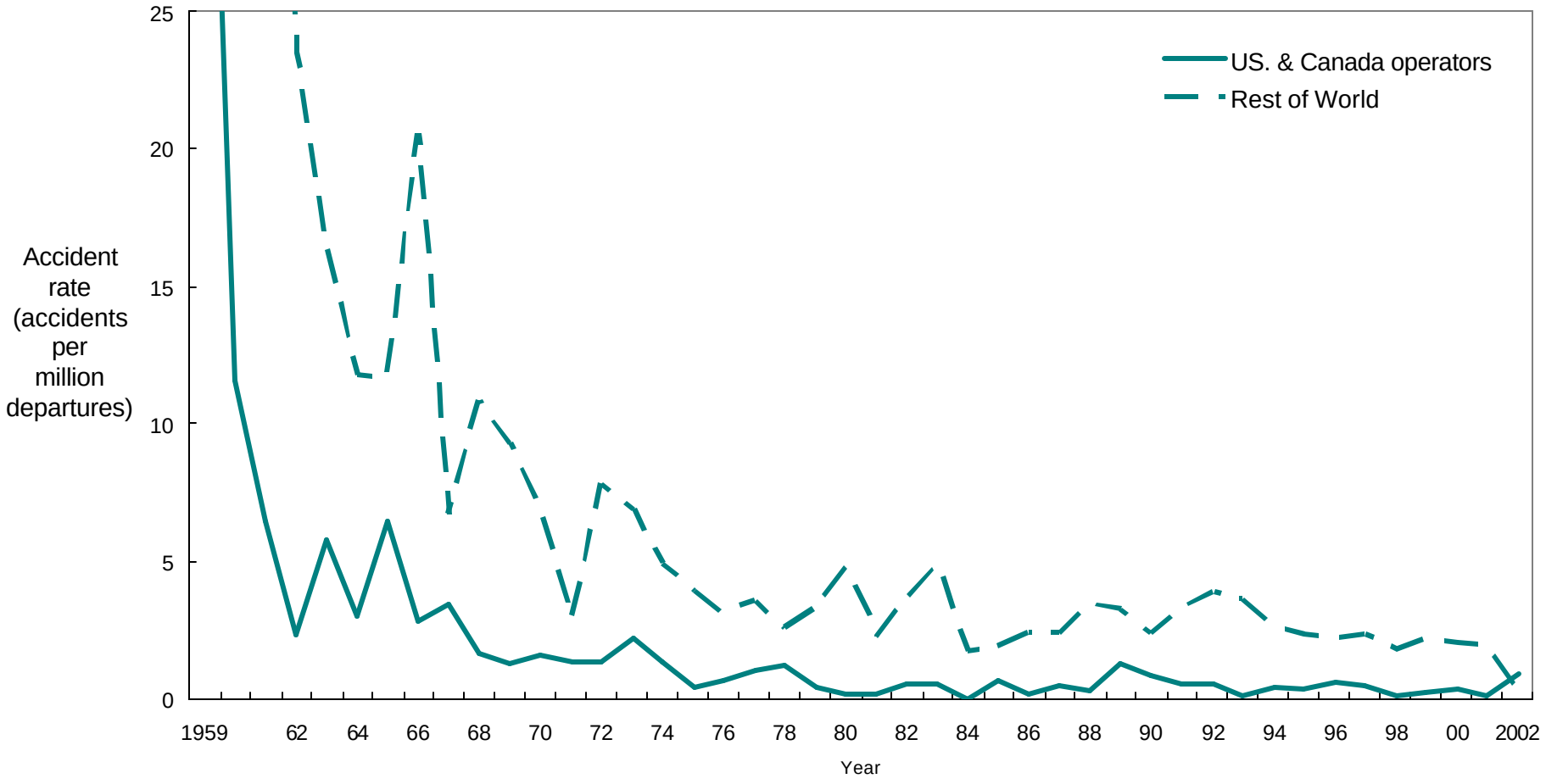
Accident Rates by Years Following Introduction

Hull Loss and/or Fatal accidents - Worldwide Commercial Jet Fleet - 1959 through 2002



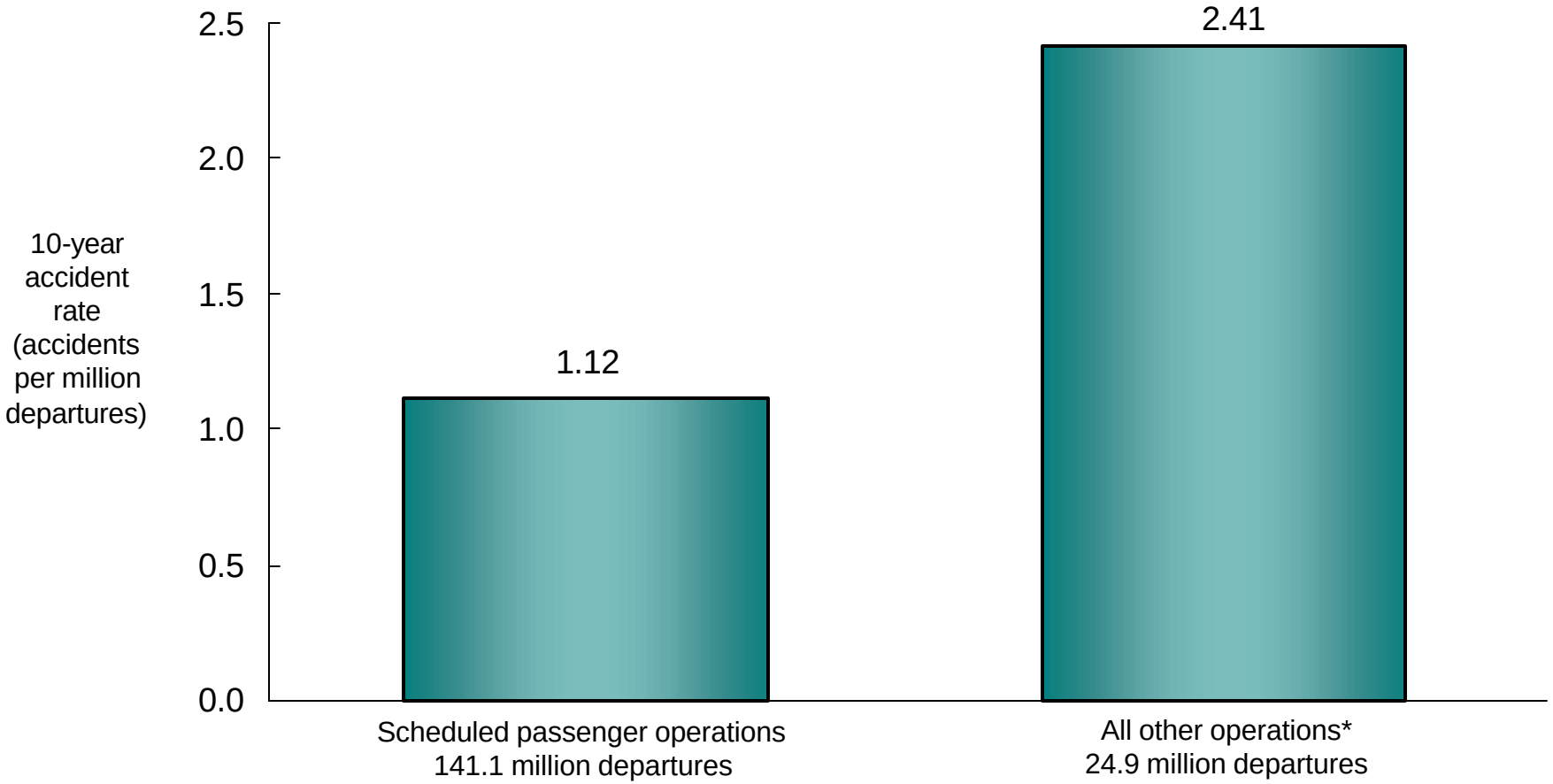
U.S.A. and Canadian Operators Accident Rates

Hull Loss and/or Fatal accidents - Worldwide Commercial Jet Fleet - 1959 through 2002



Accident Rates by Type of Operation

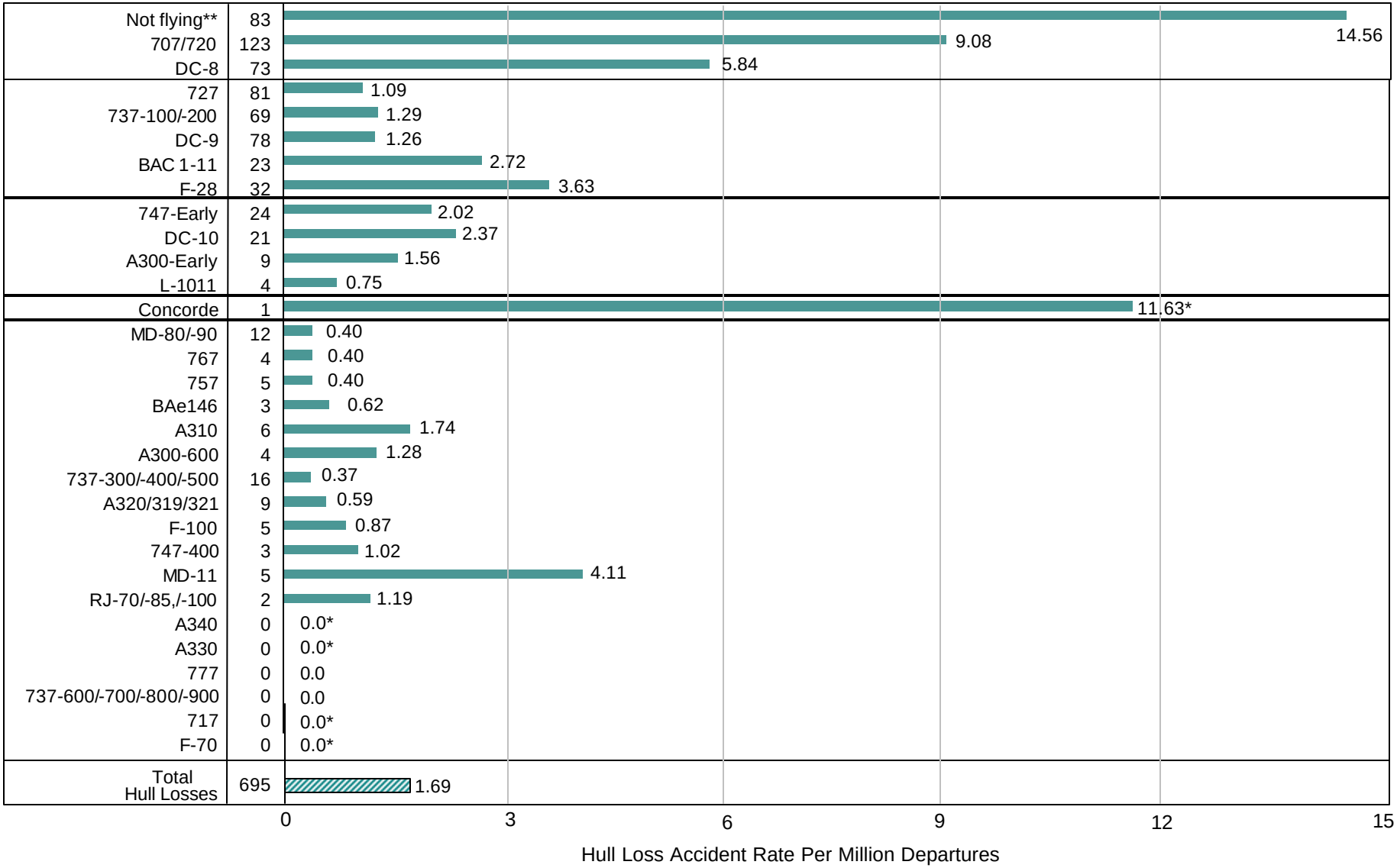
Hull Loss and/or Fatal accidents - Worldwide Commercial Jet Fleet - 1993 through 2002



*Unscheduled passenger and charter, cargo, ferry, test, training, and demonstration.

Accident Rates by Airplane Type

Hull Loss Accidents - Worldwide Commercial Jet Fleet - 1959 through 2002



** The Comet, CV880/990, Caravelle, Trident & VC-10 are no longer in commercial service, and are combined in the "Not Flying" bar.

* These types have accumulated fewer than 1 million departures .

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Accident Categories by Airplane Generation

All accidents - Worldwide Commercial Jet Operations – 1993 through 2002

Generation	Controlled flight into terrain	Loss of control	Mid-air collision	In-flight fire	Fuel tank explosion	Landing: Off end on landing	Landing: Offside on landing	Landing: Hard landing	Landing: Landed short	Gear collapse/fail/up	Ice/snow	Fuel management/exhaustion	Windshear	Takeoff configuration	Refused takeoff - off end	Offside on takeoff	Runway incursion vehicle/people	Wing strike	Engine failure/separation	Ground collision	Ground crew injury	Boarding/deplaning	Turbulence fatality	Miscellaneous*	Fire on ground	Aircraft structure	Unknown	Total
First	3	6	0	1	0	7	3	3	3	6	0	2	0	1	1	0	0	2	1	0	0	0	0	2	1	0	2	44
Second	16	5	0	4	0	17	23	11	10	12	2	2	1	1	6	1	1	1	1	2	1	0	0	3	1	2	4	127
Early widebody	3	0	1	1	1	4	2	5	1	5	1	1	0	0	3	2	0	0	5	3	1	0	1	3	3	2	0	48
Current	11	12	1	1	1	24	14	35	3	15	1	2	1	2	3	3	8	0	4	4	1	2	1	8	3	2	4	167
Total	33	23	2	7	2	52	42	54	17	38	4	7	2	4	13	6	9	3	11	9	3	2	2	16	8	6	10	385

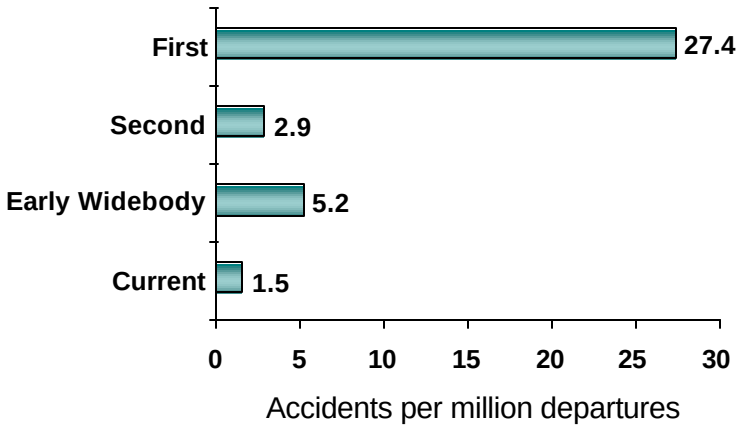
Generation

First	Comet 4, 707/720, DC-8, CV-880/-990, Caravelle, Mercure
Second	727, Trident, VC-10, BAC 1-11, DC-9, 737-100/-200, F-28
Early widebody	747-100/-200/-300/SP, DC-10, L-1011, A300
Current	MD-80/-90, 767, 757, A310, Bae 146, A300-600, 737-300/-400/-500, F-70, F-100, A320/319/321, 747-400, MD-11,RJ-70/-85/-100, A340, A330, 777, 737-600/-700/-800/-900, 717

*Miscellaneous Accidents

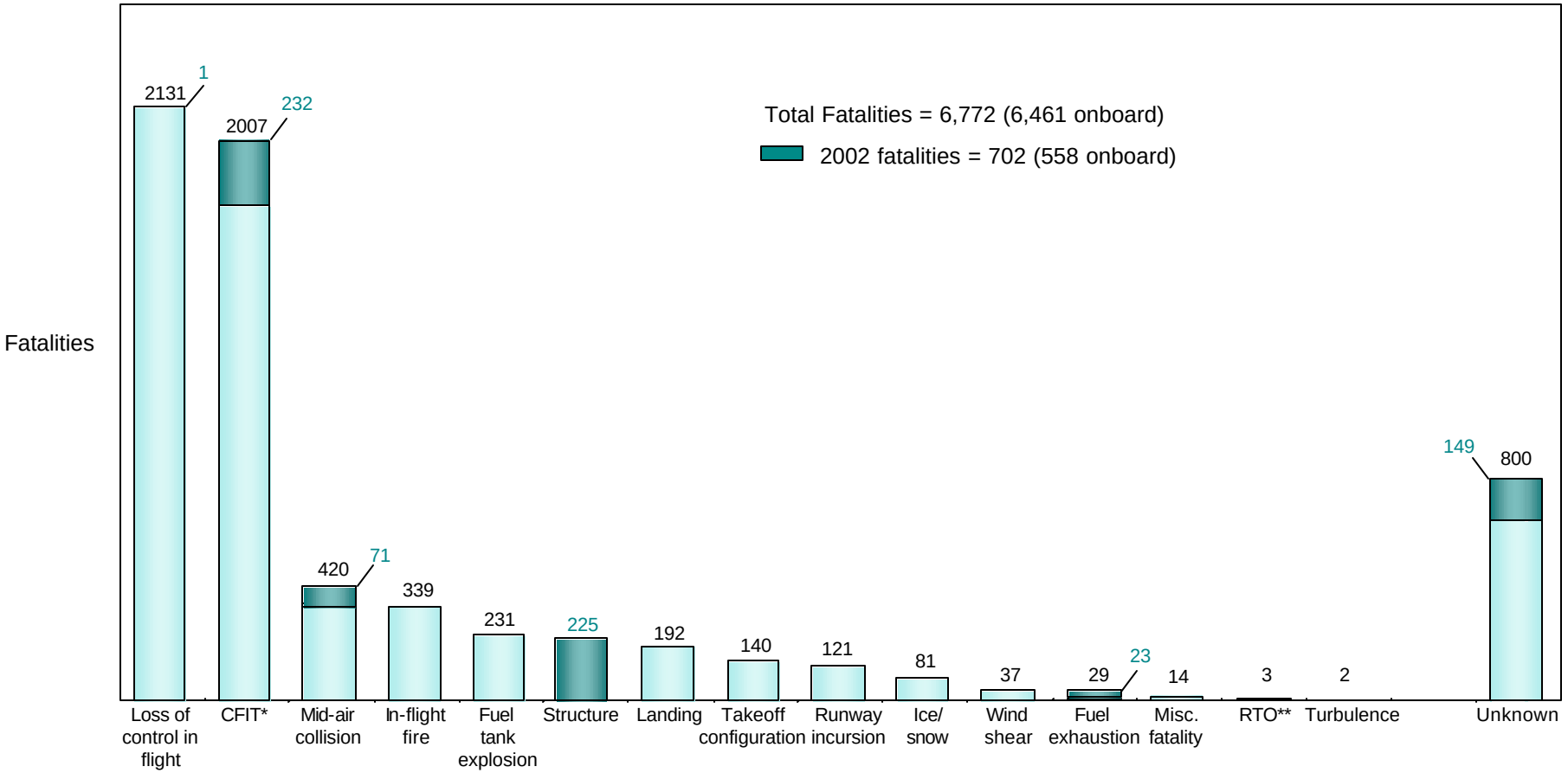
Coffee maker explosion
Instrument Error
Flight attendant fell from door
Jet blast
Pilot incapacitated
Turbulence Injury

10-Year Accident Rate



Fatalities by Accident Category

Fatal Accidents - Worldwide Commercial Jet Fleet - 1993 Through 2002

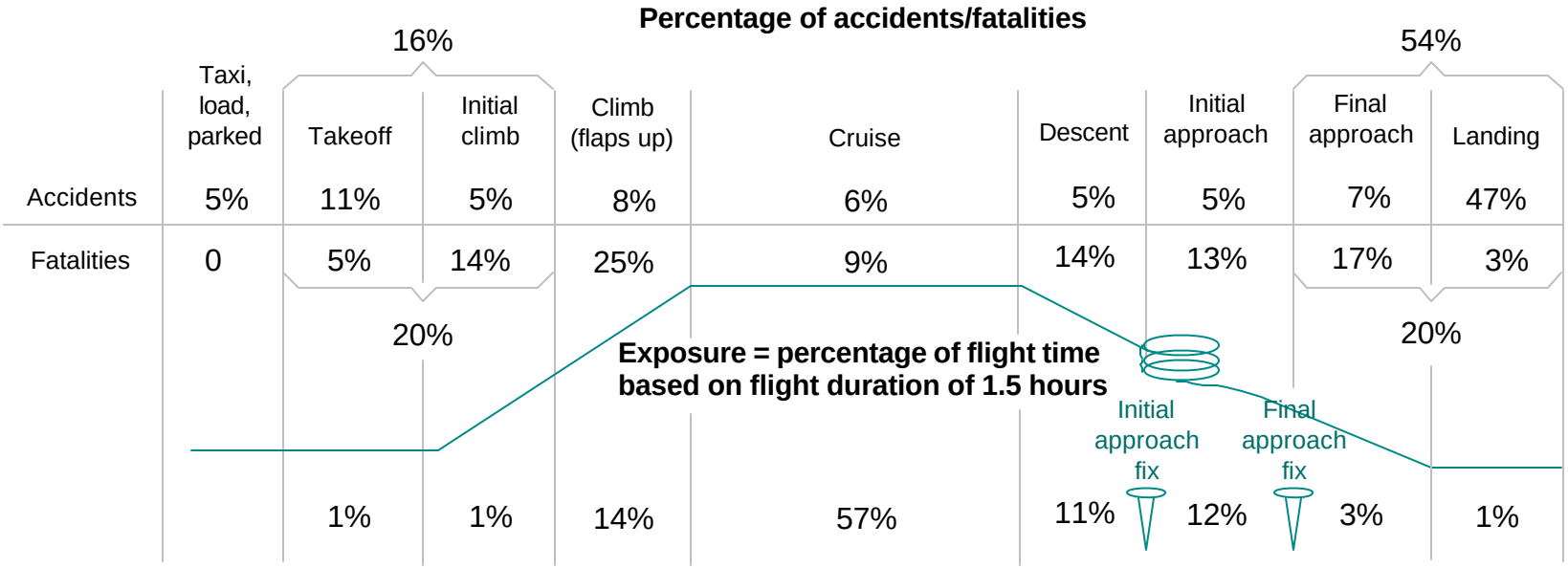


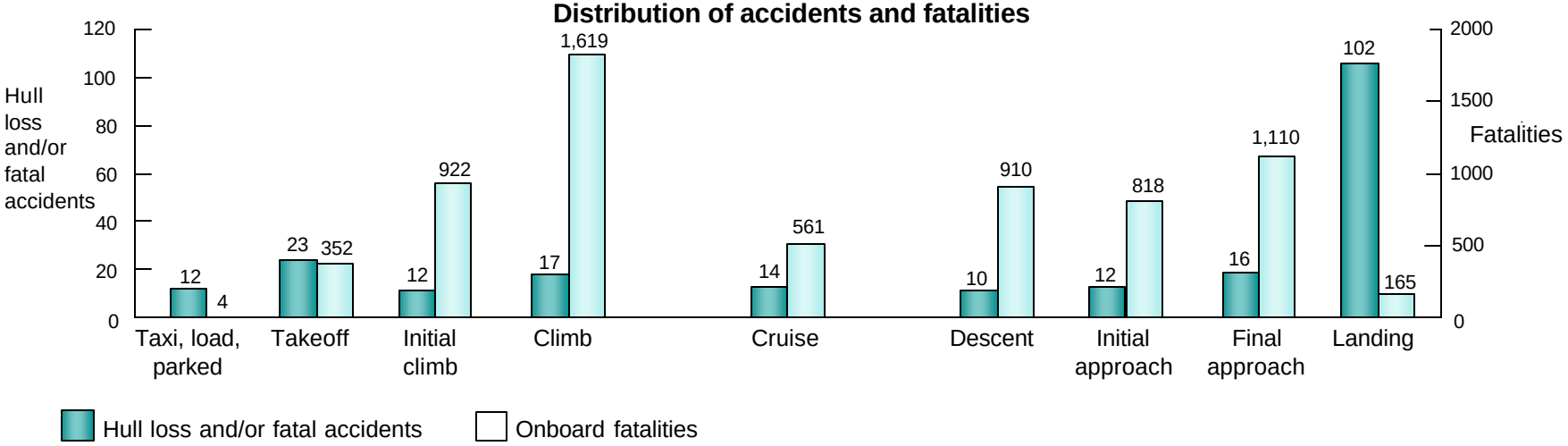
Note: Accidents involving multiple, non-onboard fatalities are included
Accidents involving single, non-onboard fatalities are excluded
Fatalities/accidents are placed in one category only.

* CFIT = Controlled Flight Into Terrain
** RTO = Refused Takeoff

Accidents and Onboard Fatalities by Phase of Flight

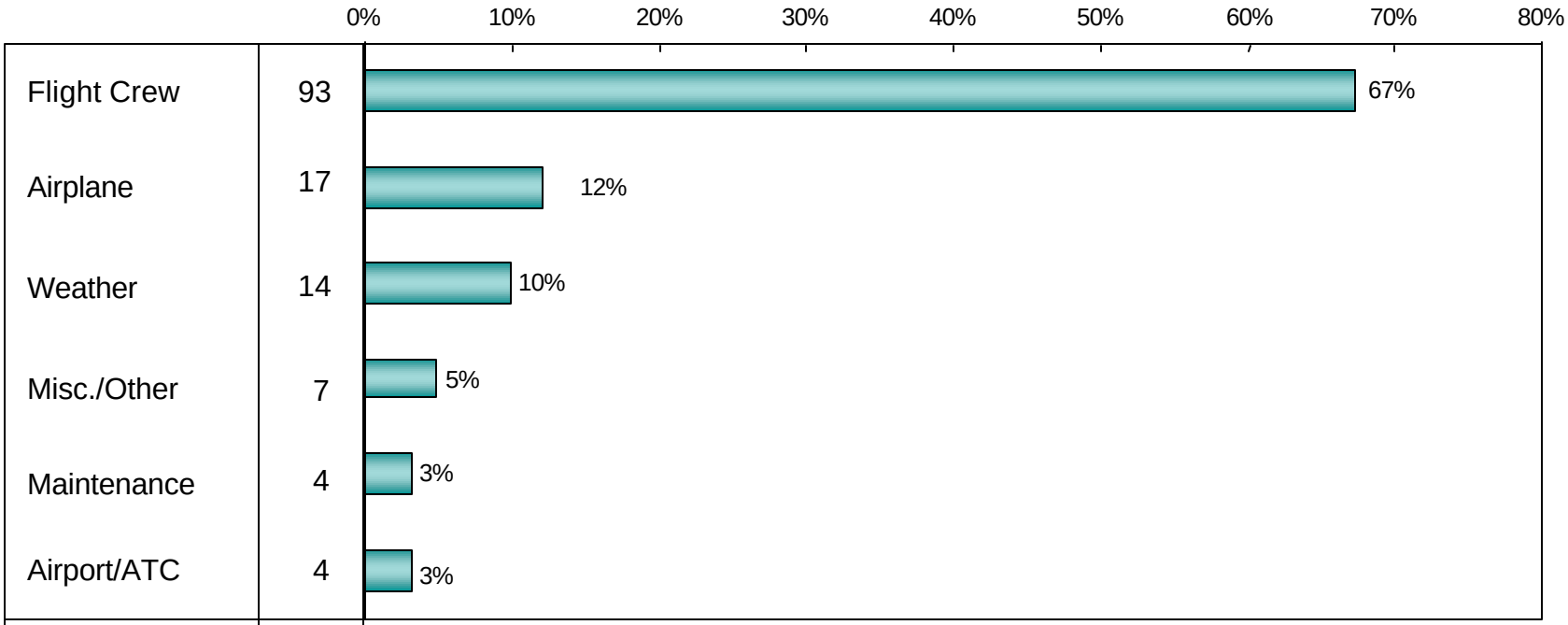
Hull Loss and/or Fatal Accidents - Worldwide Commercial Jet Fleet - 1993 - 2002





Accidents by Primary Cause*

Hull Loss - Worldwide Commercial Jet Fleet - 1993 through 2002



Total with known causes	139
Unknown or awaiting reports	59
Total	198

*As determined by the investigating authority, percent of accidents with known causes.

Excluded Events

Worldwide Commercial Jet Fleet

The following 4 pages, Hostile Actions and Non-Hostile Events, are excluded from the statistical analysis in the preceding portions of the document and may not be a complete listing due to incomplete reporting.

Hostile Actions

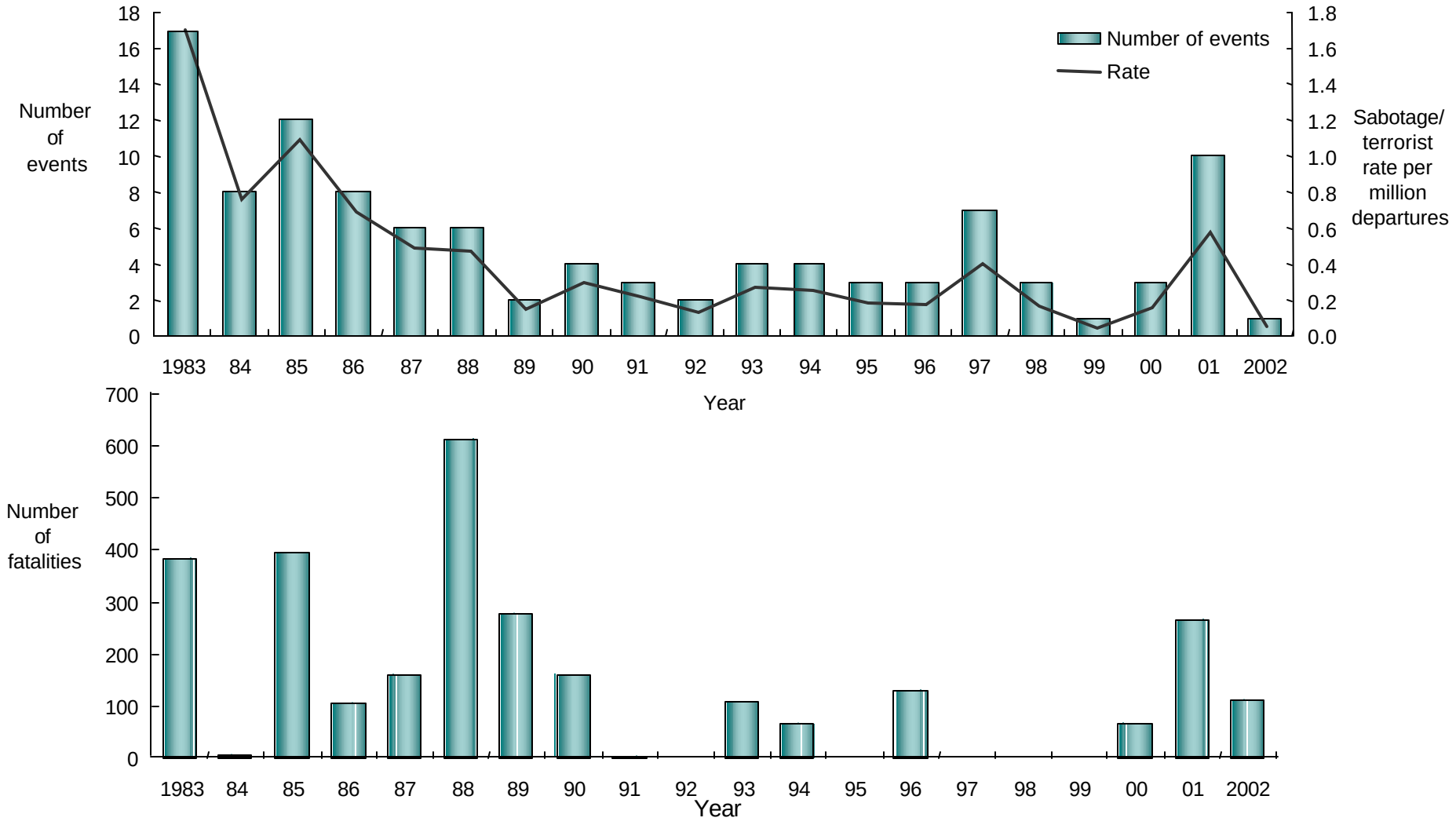
List of 2002 Events

Events which occur as a result of a premeditated, overt act originating from terrorism, sabotage or suicide.

Date	Airline	Airplane Type	Accident Location	Hull Loss	Onboard	Description
07-May-02	China Northern Airlines	MD-82	Dalian, China	X	112	Chinese authorities are investigating this accident as possible criminal action
	Total Events			1	112	

Hostile Actions

Worldwide Commercial Jet Fleet — 1983 Through 2002



Non-Hostile Events

Accidents Occurring in 2002

Severe turbulence:

- No Injury - 7 events
- Flight attendant injury – 5 events
- Passenger injury – 6 events
- Passenger and flight attendant injury - 8 events

Emergency evacuation:

- Minor injury events - 6 events

Pushback:

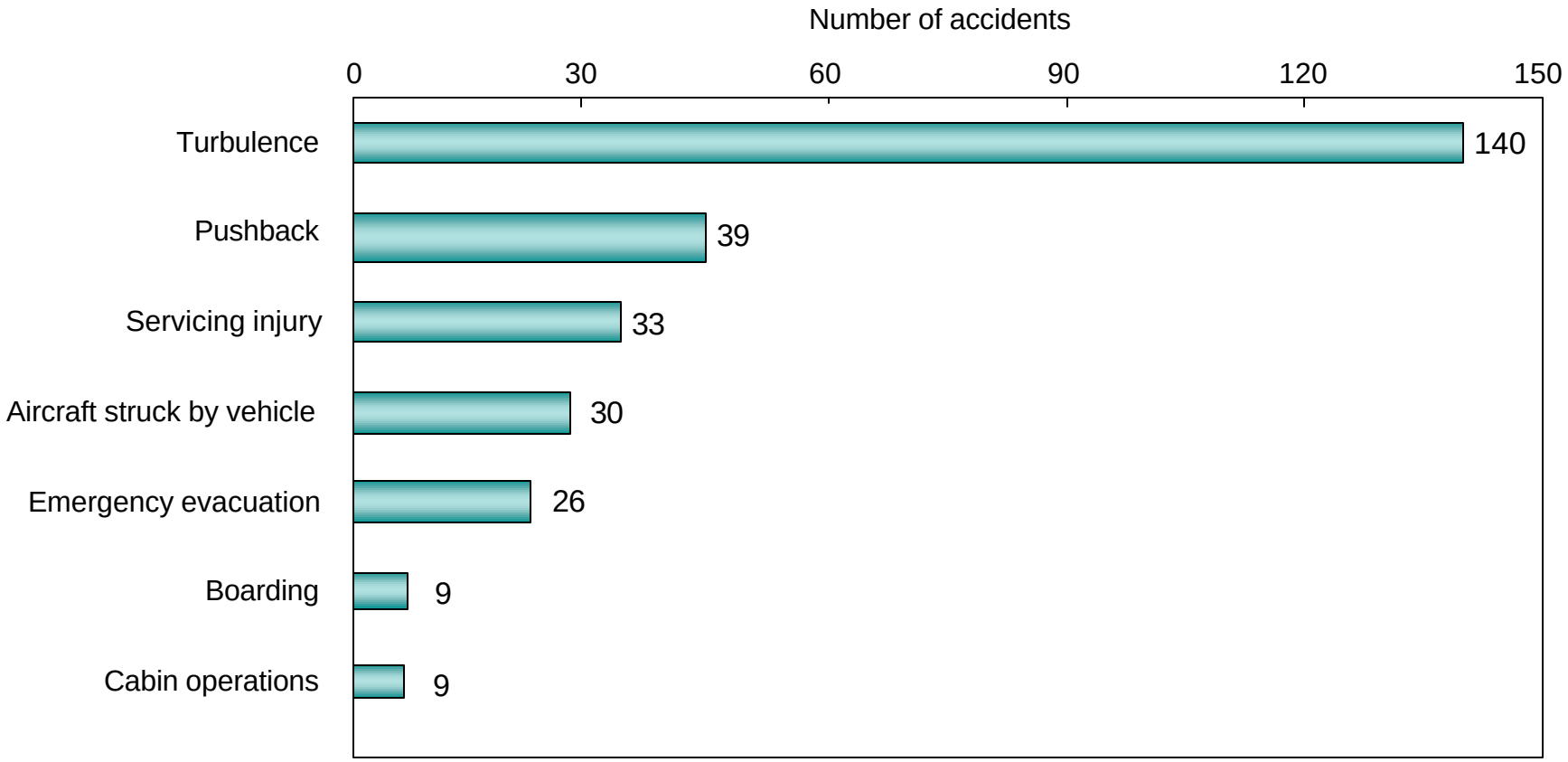
- Tug slid into airplane - airplane damage – 1 event
- Towbar failed - airplane damage – 1 event
- Towbar disconnected from airplane - flight attendant injured – 1 event

Ground operations:

- Bus struck airplane – 1 event
- Airplane damaged while towing - towed into building – 1 event
- Airplane damaged from FOD – 1 event
- Flight attendant injured by coffee maker – 1 event
- Maintenance worker ingested into engine – 1 event
- Wing walker fatally injured – 1 event

Non-Hostile Events

Accidents Occurring from 1993 Through 2002



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