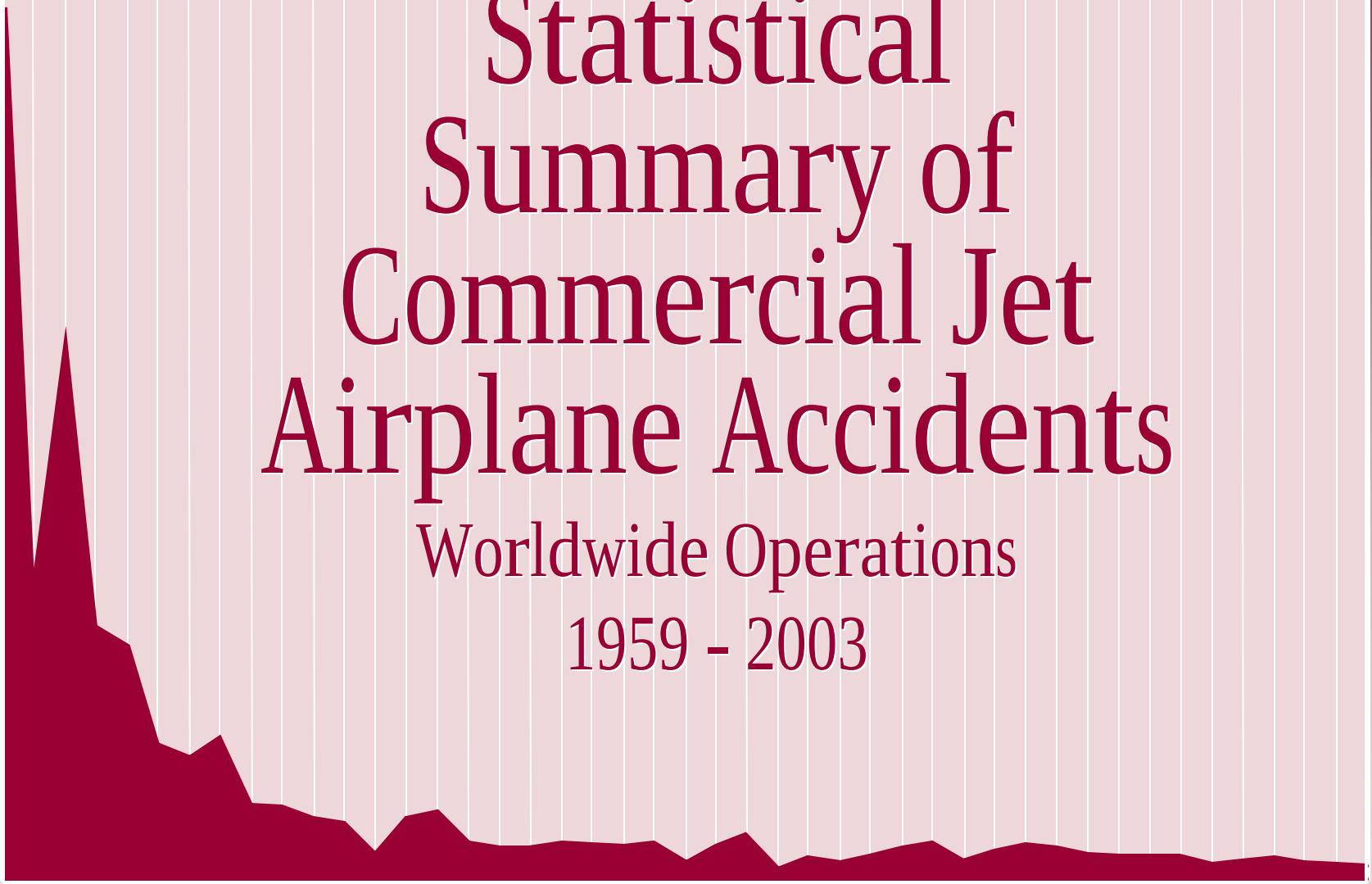
Statistical Summary of Commercial Jet Airplane Accidents

Worldwide Operations
1959 - 2003



1959

2003

Contents

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(425) 237-1692
E-mail: statsum@boeing.com
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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 and serious injury accidents; and ***Excluded Events***, outlining hostile actions, 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	CRJ-700/-900	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, RJ-70/-85/-100
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
			CRJ-700/-900

* These types are no longer in significant commercial service.

Terms and Exclusions

Regional identification: Events are identified by the operator's 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, 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.

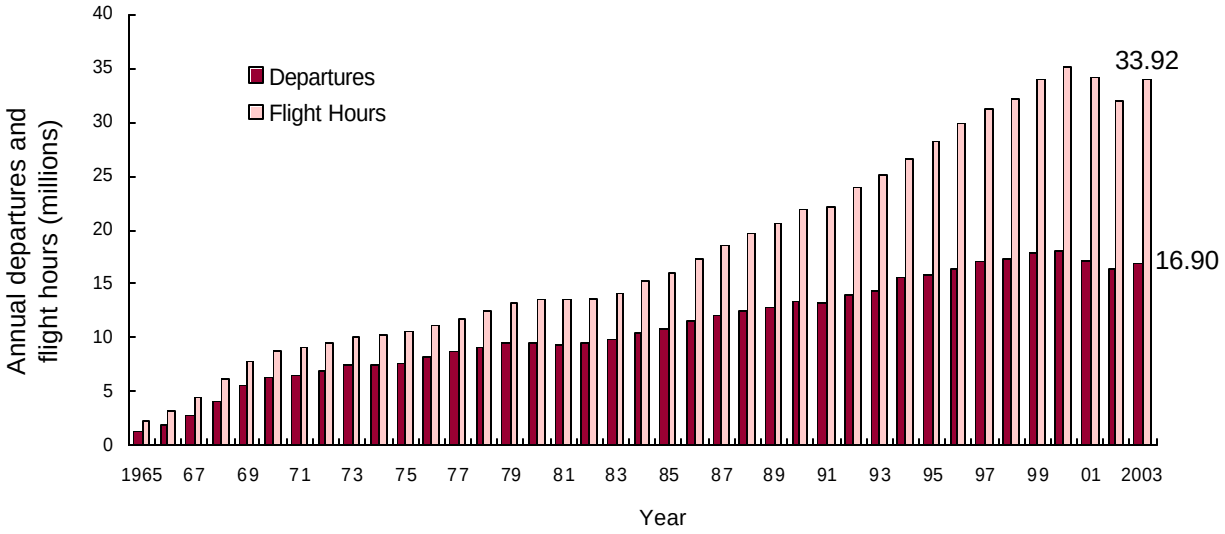
Airplane Accidents

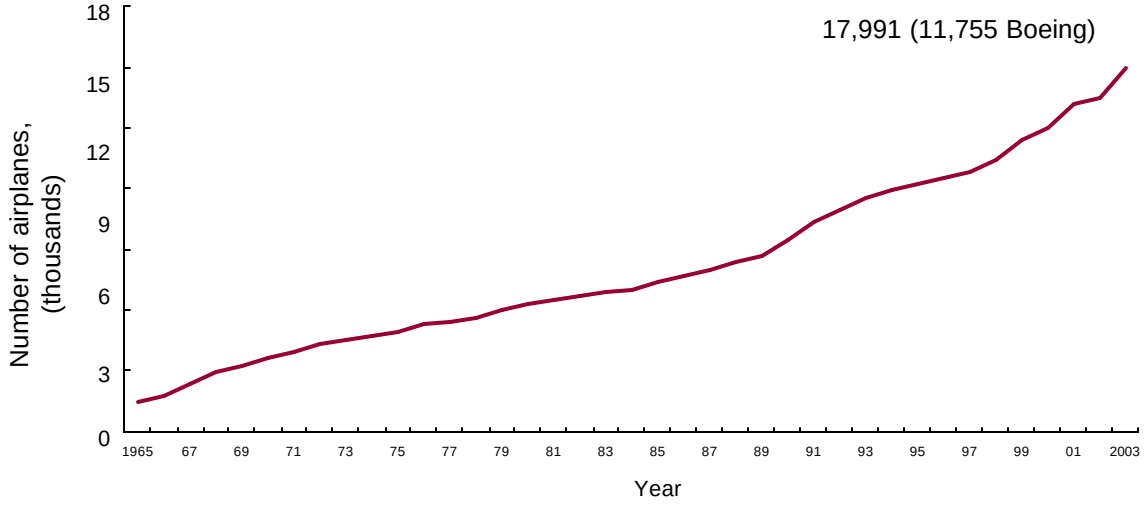
Worldwide Commercial Jet Fleet - 2003

Date	Airline	Airplane Type	Accident Location	Hull Loss	Fatalities	Phase	Description
1/8/2003	Turkish Airlines (THY)	RJ100	Diyarbakir, Turkey	X	75	Final approach	CFIT crashed into mountain
1/8/2003	TAN Airlines	F-28	Chachapoyas, Peru	X	46	Initial approach	CFIT crashed into mountain
1/17/2003	TAME	F-28	Quito, Ecuador		0	Takeoff	RTO/tunway excursion
1/23/2003	Star Air	737-200	Jakarta, Indonesia		0	Landing	Runway excursion
1/26/2003	VASP Airlines	737-200	Rio Branco, Brazil	X	0	Initial approach	Hit tree on approach to land
2/15/2003	Evergreen International Airlines	747-200	Catania, Italy		0	Landing	Runway overrun on landing
3/6/2003	Air Algerie	737-200	Tamanrasset, Algeria	X	103	Takeoff	Crashed after takeoff
3/12/2003	Singapore Airlines	747-400	Auckland, New Zealand		0	Takeoff	Tailstrike on takeoff
3/21/2003	Royal Air Maroc	737-400	Marrakech, Morocco		0	Landing	Landing overrun
3/21/2003	Transasia Airways	A321	Tainan, Taiwan		0	Landing	Runway excursion
3/26/2003	Royal Air Maroc	737-400	Oujda, Morocco		0	Landing	Runway excursion
3/31/2003	AirTran Airways	717-200	New York, USA		0	Parked	Evacuation injuries
4/18/2003	Wetrafa Airlift	DC-9-32	Brazzaville, Congo	X	0	Landing	Intentional off runway gear-up landing
6/17/2003	Onur Air	MD-88	Groningen, Netherlands		0	Takeoff	RTO overrun
7/6/2003	Cielos del Peru	DC-10-30	Curitiba, Brazil		0	Landing	Landing overrun
7/8/2003	Sudan Airways	737-200	Port Sudan, Sudan	X	116	Initial climb	Crashed after takeoff
7/11/2003	Air Memphis	707-300C	Dacca, Bangladesh	X	0	Takeoff	RTO overrun
8/11/2003	Garuda Indonesia	F-28	Jakarta, Indonesia		0	Landing	LMLG collapse
8/15/2003	EasyJet	737-300	Geneva, Switzerland		0	Climb	Hail damage in flight
9/12/2003	Northwest Airlines	DC-9-15	Norfolk, USA		1	Tow	Tug driver fatally injured
10/1/2003	Cargo Air Lines	747-200C	Liege, Belgium		0	Landing	Landing overrun
10/3/2003	Garuda Indonesia	737-500	Semarang, Indonesia		0	Landing	Runway departure
11/1/2003	EgyptAir	A321-230	Moscow, Russia		0	Taxi	Skidded off runway
11/6/2003	TAME	A320	Florianopolis, Brazil		0	Landing	Runway offside excursion
11/29/2003	Hydro Air	747-258C	La Guaira, Venezuela		0	Landing	Runway offside excursion
12/7/2003	East African Safari Air	F-28	Lokichokio, Kenya	X	0	Landing	Runway excursion
12/13/2003	Aero Continente	737-200	Lima, Peru		0	Landing	Landed with all landing gear retracted
12/18/2003	FedEx	MD-10-10	Memphis, USA	X	0	Landing	RMLG collapse, fuselage burned
12/18/2003	Lineas Aereas Suramericanas	DC-9-15F	Mitu, Colombia	X	3	Descent	Crashed into jungle
12/19/2003	Air Gabon	737- 300	Libreville, Gabon	X	0	Landing	Landing overrun during heavy rain
12/20/2003	GOL Transportes Aereos Ltda	737- 700	Navegantes, Brazil		0	Landing	Landing overrun
12/25/2003	Union Des Transports Africains	727- 200	Cotonou, Benin	X	139	Takeoff	Hit building on takeoff
32				12	483		

Departures, Flight Hours, and Jet Airplanes in Service*

Worldwide Operations 1965 Through 2003





- 429.9 million cumulative departures (354.2 million on Boeing airplanes)
- 712.1 million cumulative flight hours (595.9 million on Boeing airplanes)
- 7 manufacturers – 33 significant types (13 Boeing) in service as of 12/31/2003

*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

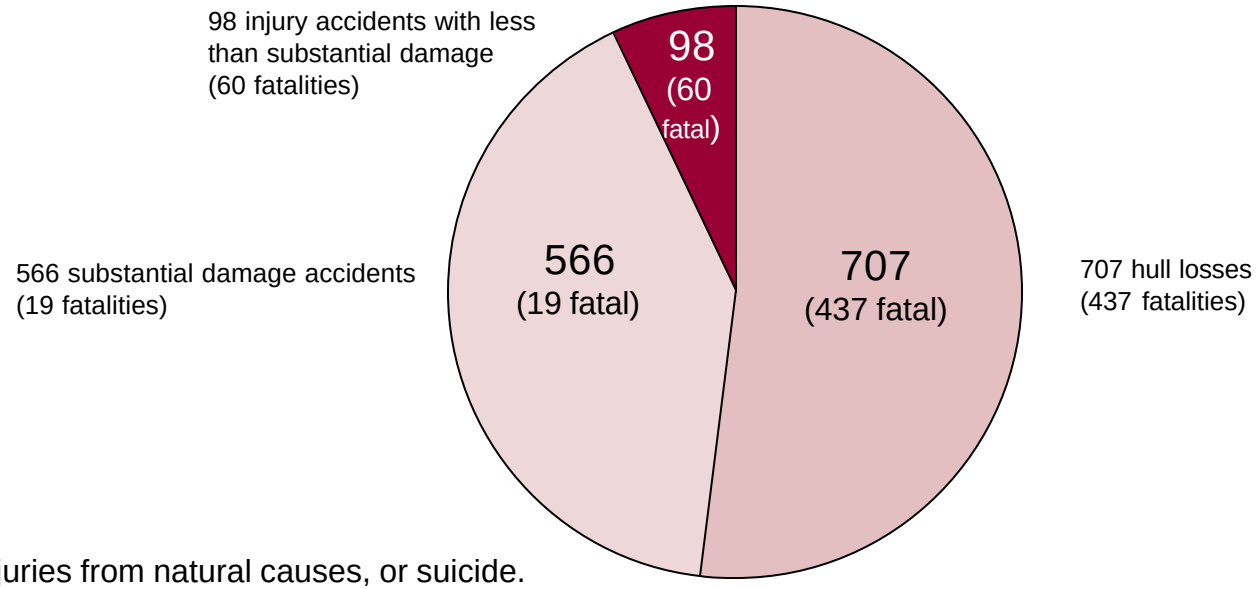
Type of operation	All Accidents		Hull loss and/or fatal accidents		Onboard fatalities	
	1959-2003	1994-2003	1959-2003	1994-2003	1959-2003	1994-2003
Passenger	1,083	291	598	145	25,387	6,415
Cargo	182	77	125	51	220	46
Ferry, test	104	13	61	8	189	23
Other*	2	0	2	0	11	0
Totals	1,371	381	786	204	25,807	6,484
US. & Canada operators	460	92	223	41	6,081	1,052
Rest of the world	911	289	563	163	19,726	5,432
Totals	1,371	381	786	204	25,807	6,484

*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 2003

1,371 accidents worldwide

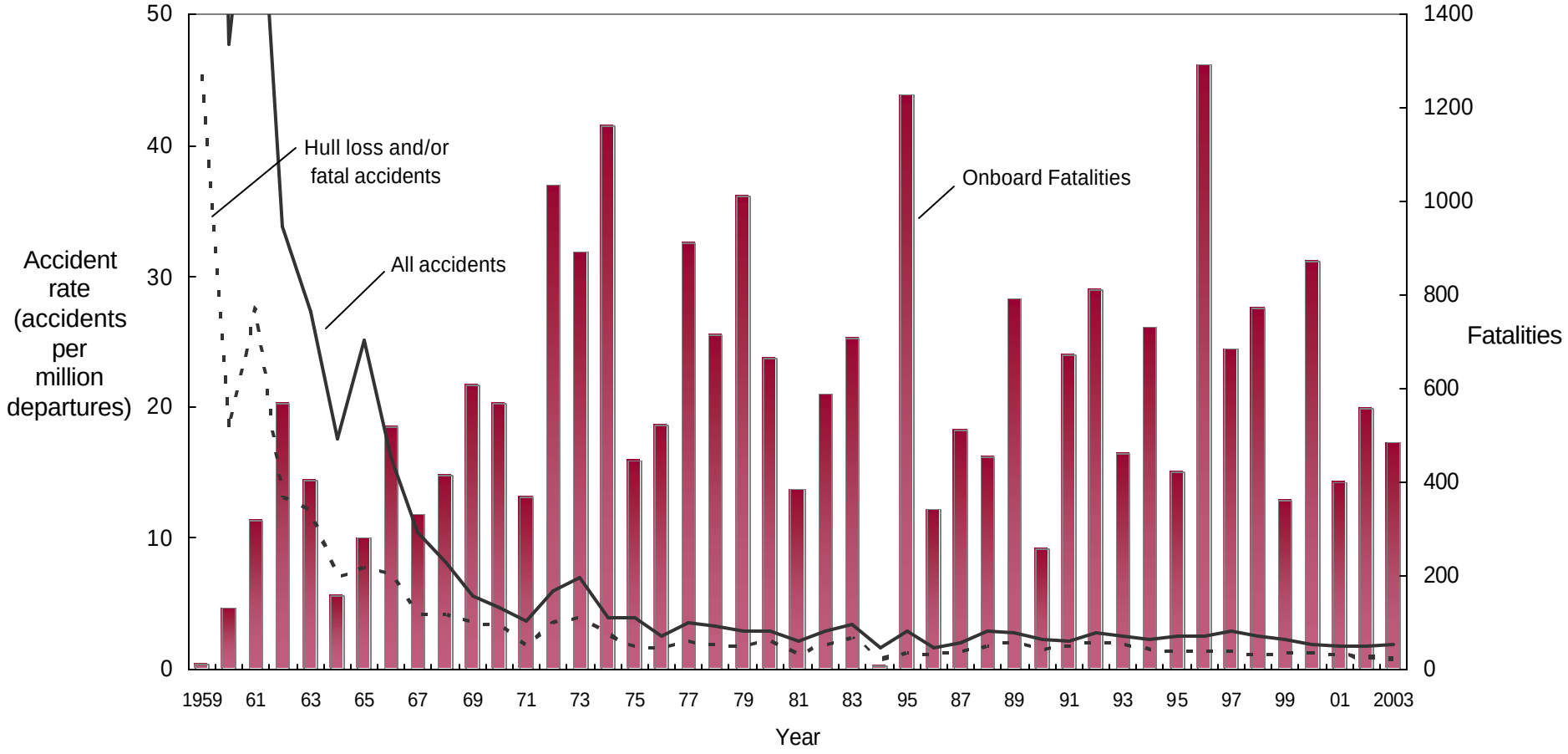


Excludes:

- 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 2003



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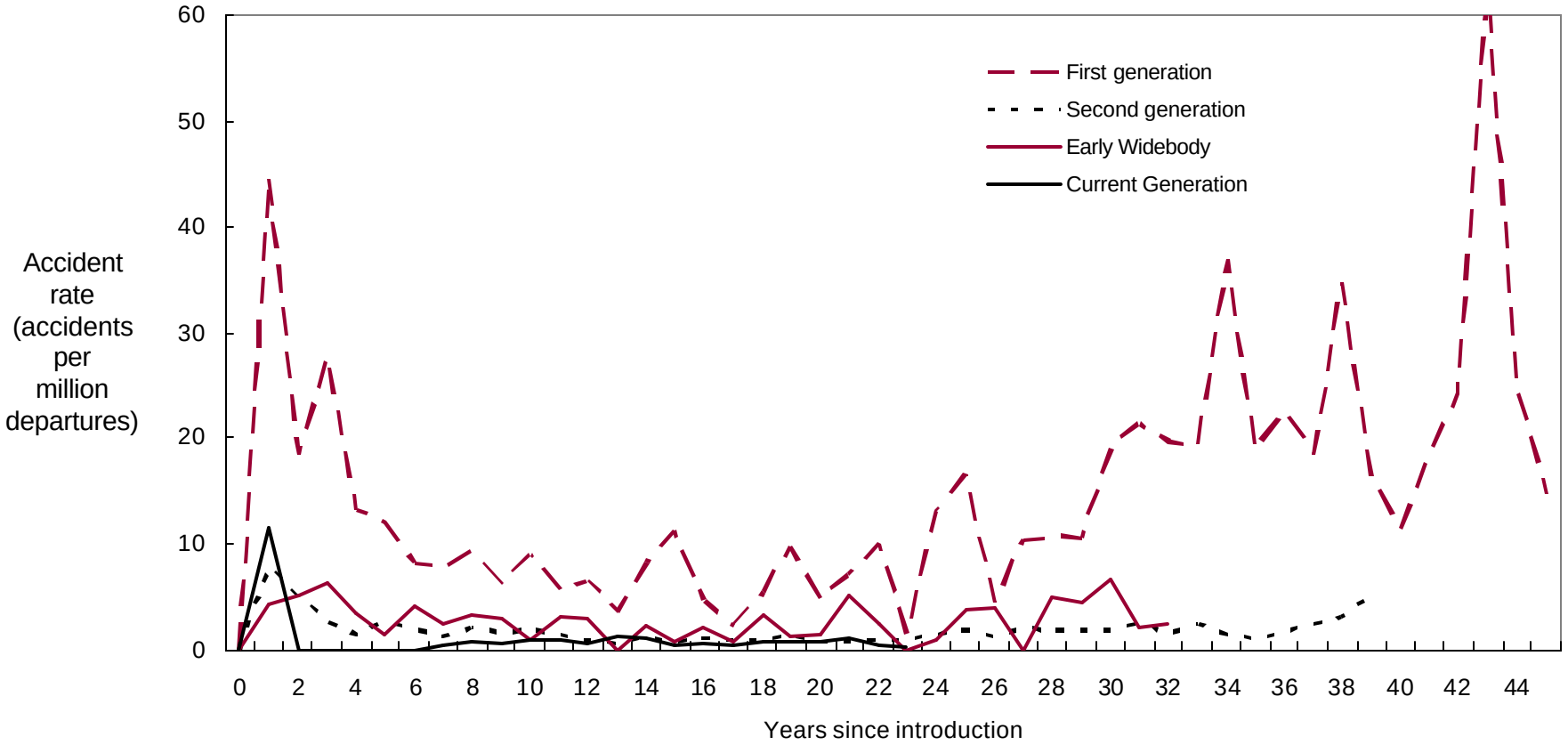
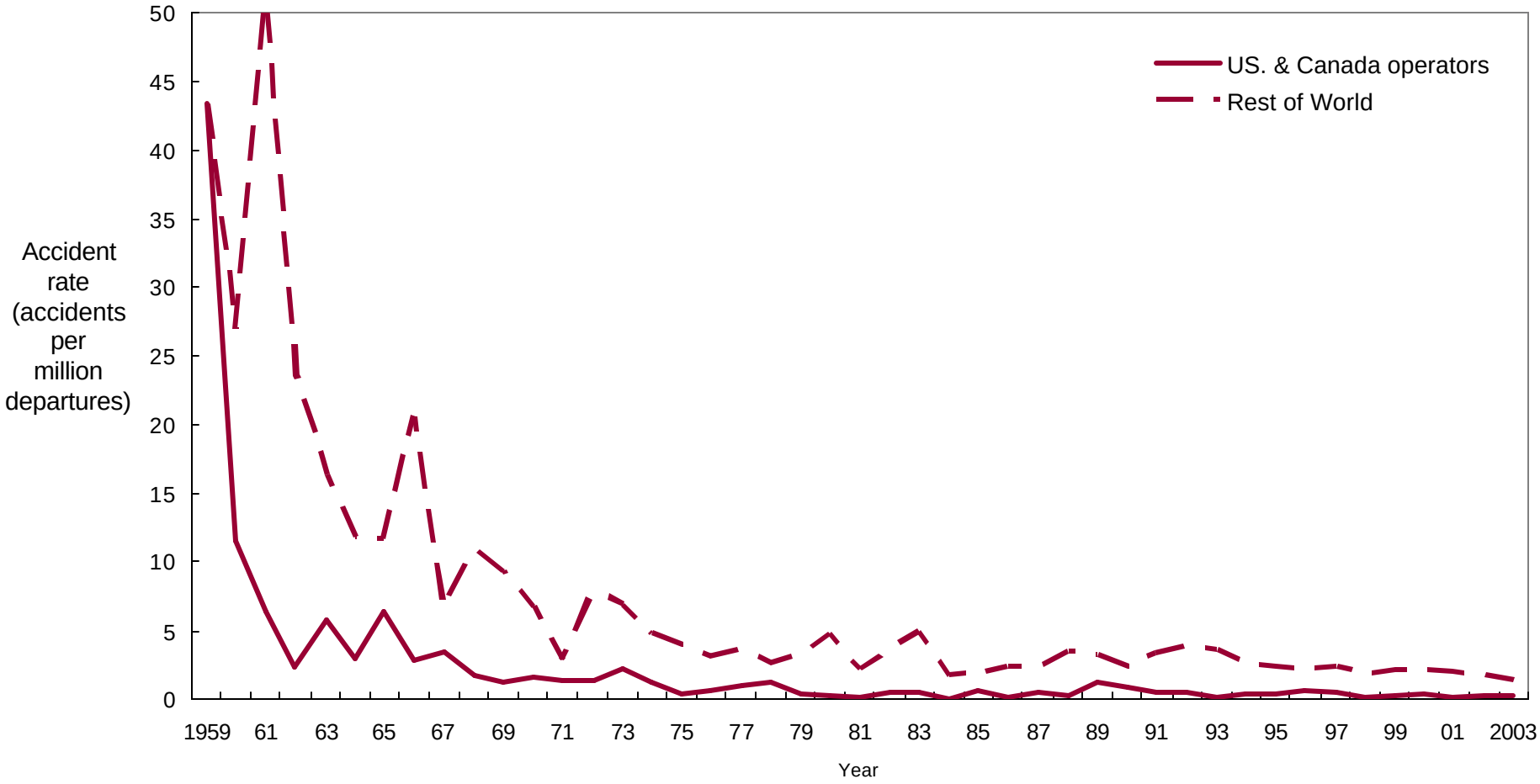
Accident Rates by Years Following Introduction

Hull Loss and/or Fatal accidents - Worldwide Commercial Jet Fleet - 1959 through 2003



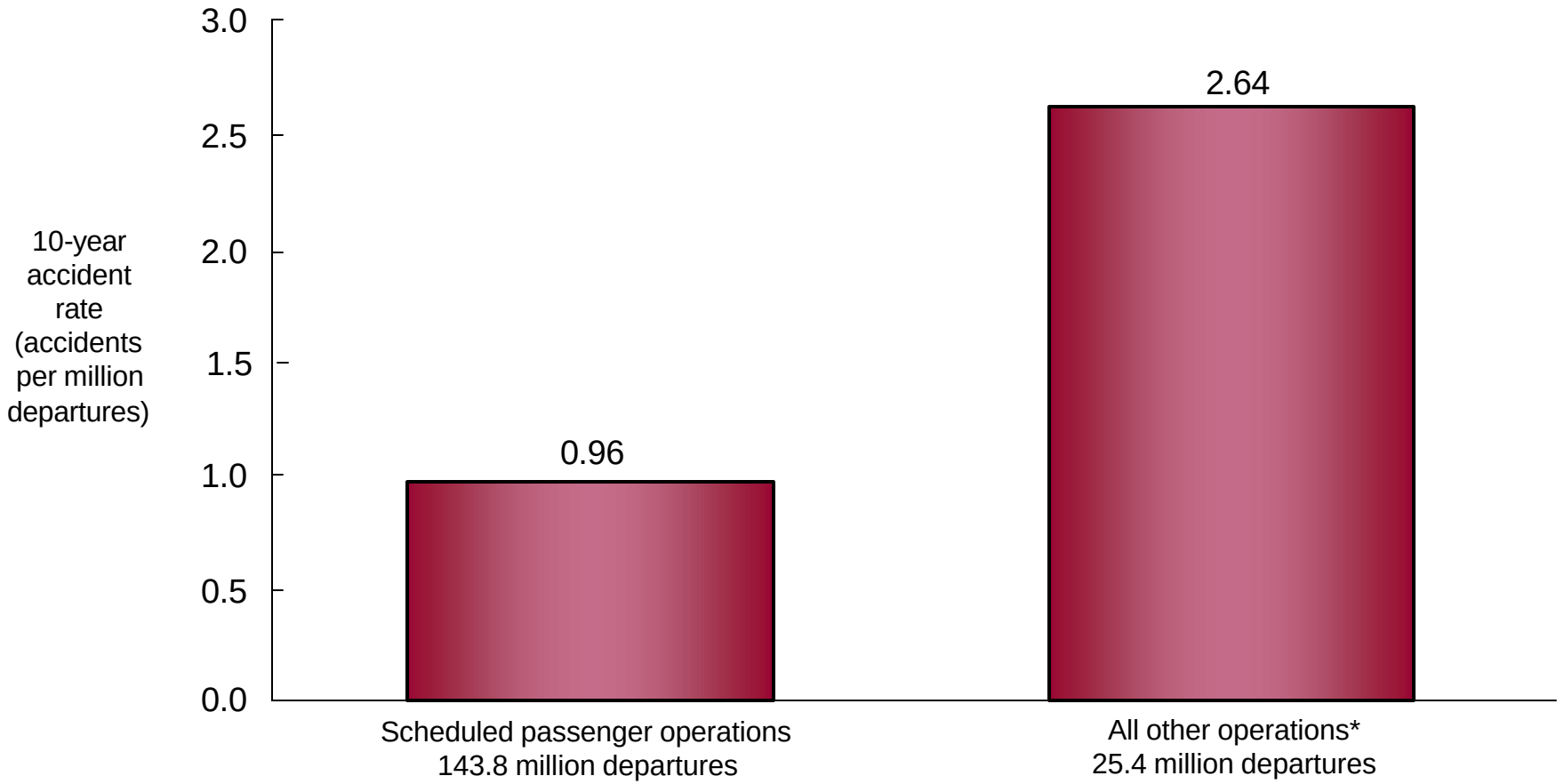
U.S.A. and Canadian Operators Accident Rates

Hull Loss and/or Fatal accidents - Worldwide Commercial Jet Fleet - 1959 through 2003



Accident Rates by Type of Operation

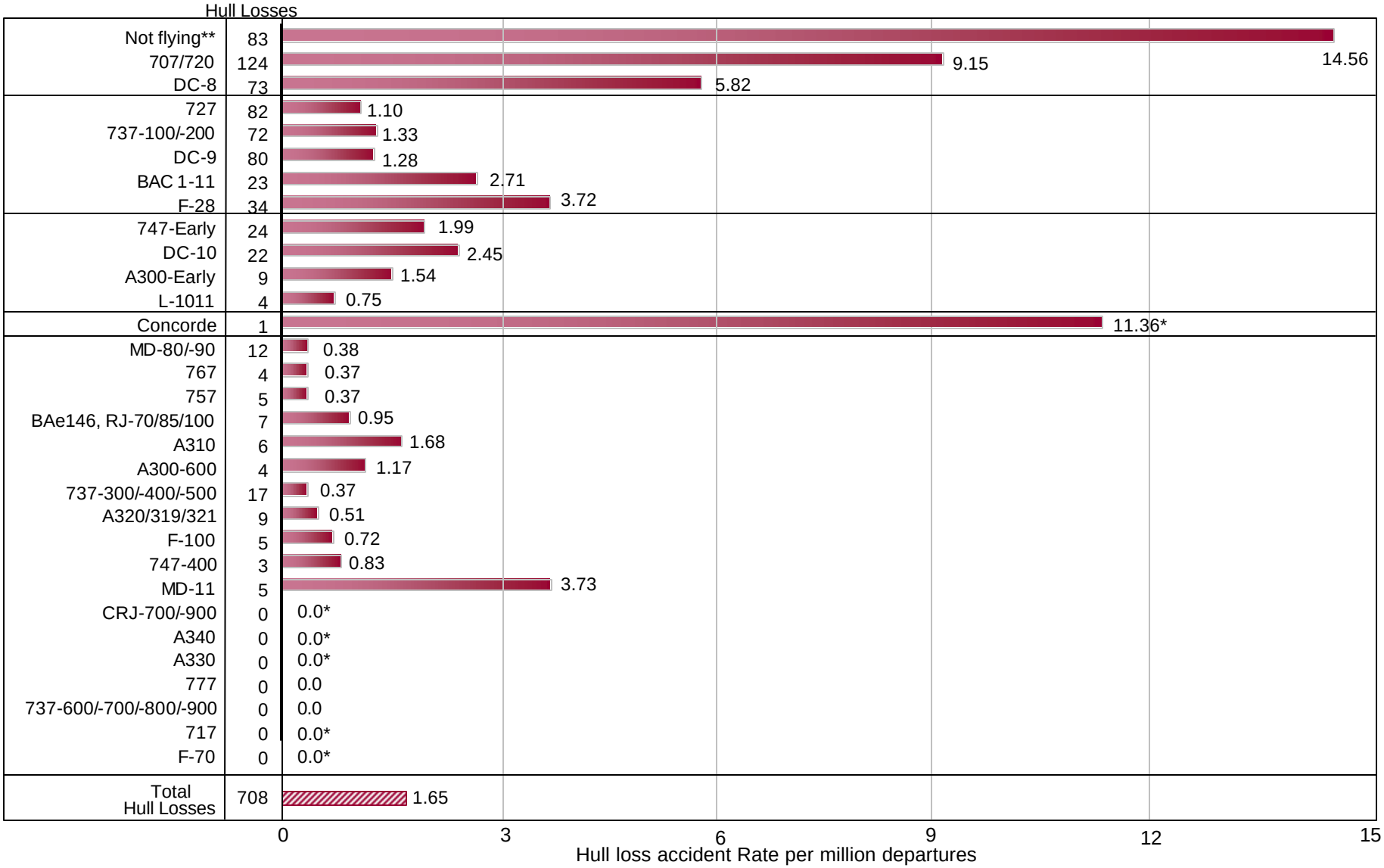
Hull Loss and/or Fatal accidents - Worldwide Commercial Jet Fleet - 1993 through 2003



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

Accident Rates by Airplane Type

Hull Loss Accidents - Worldwide Commercial Jet Fleet - 1959 through 2003



** The Comet, CV880/990, Caravelle, Trident and 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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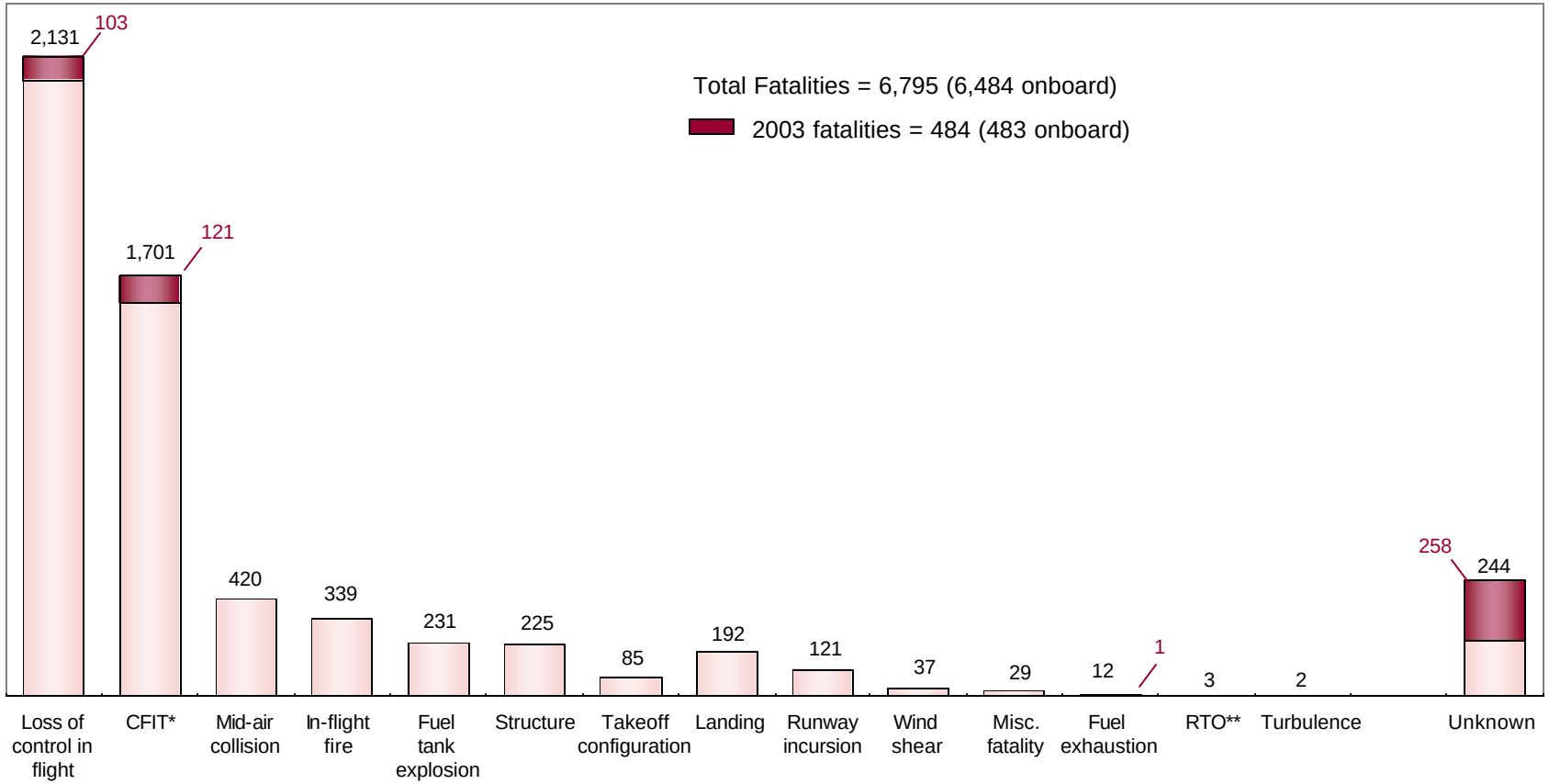
Fatalities by Accident Category

Fatal Accidents - Worldwide Commercial Jet Fleet - 1994 Through 2003

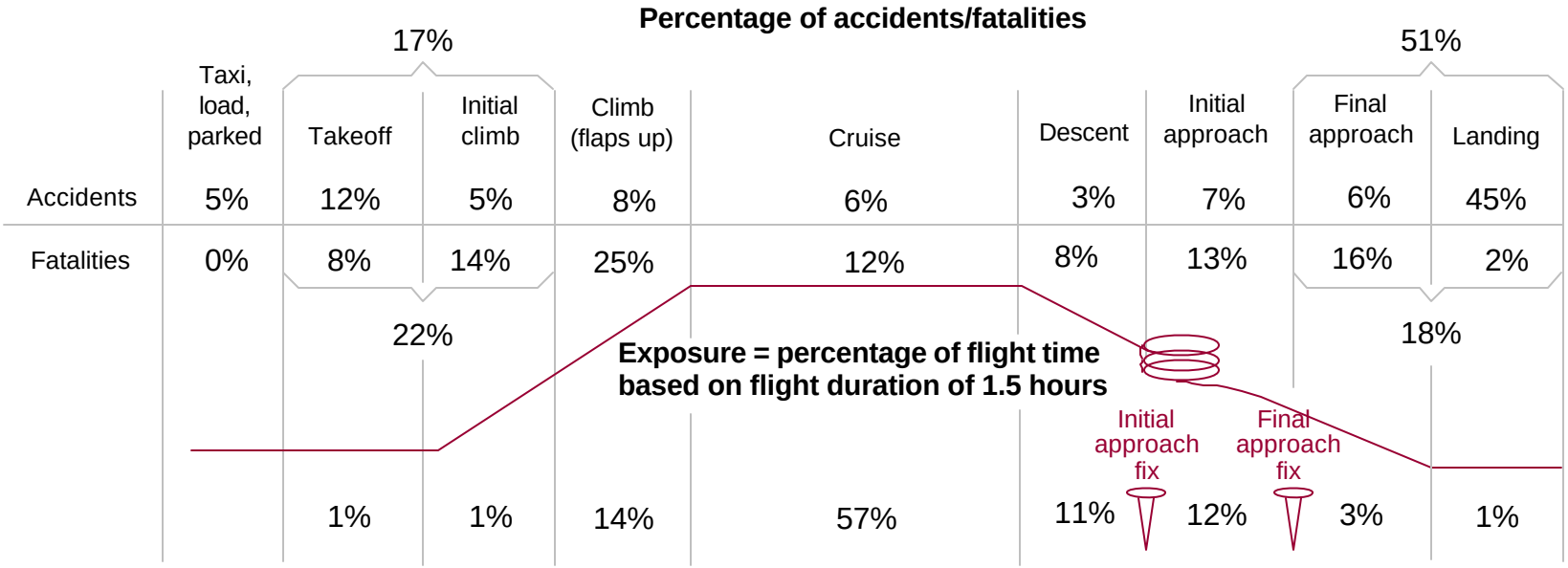


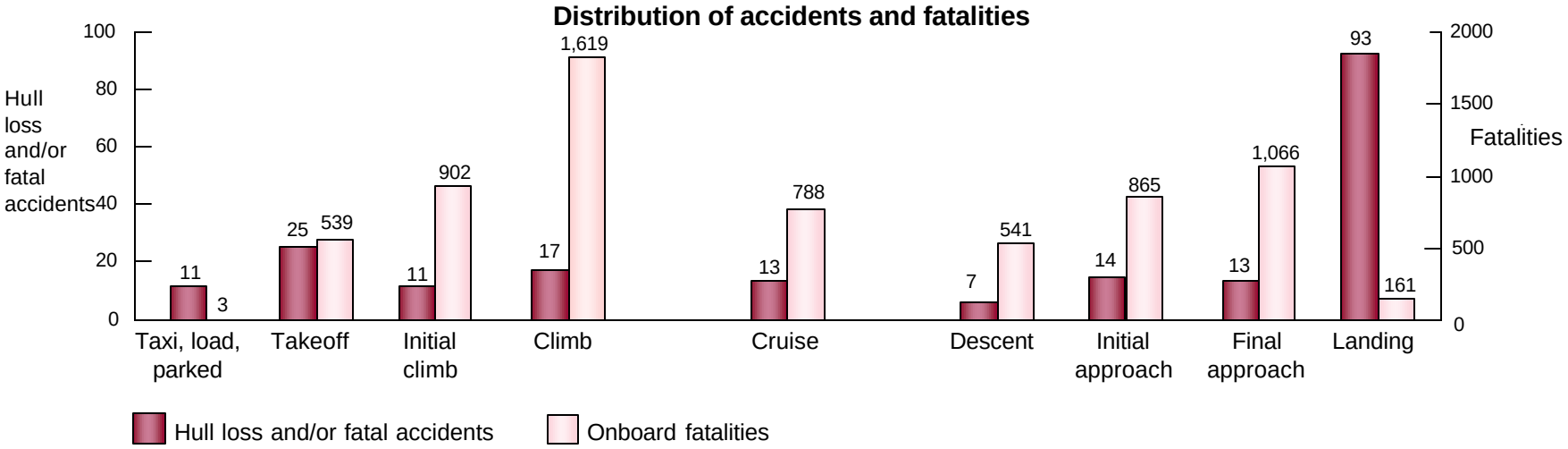
Note: Accidents involving multiple, non-onboard fatalities are included
Accidents involving single, non-onboard fatalities are excluded
Fatalities/accidents are placed in one category only.

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

Accidents and Onboard Fatalities by Phase of Flight

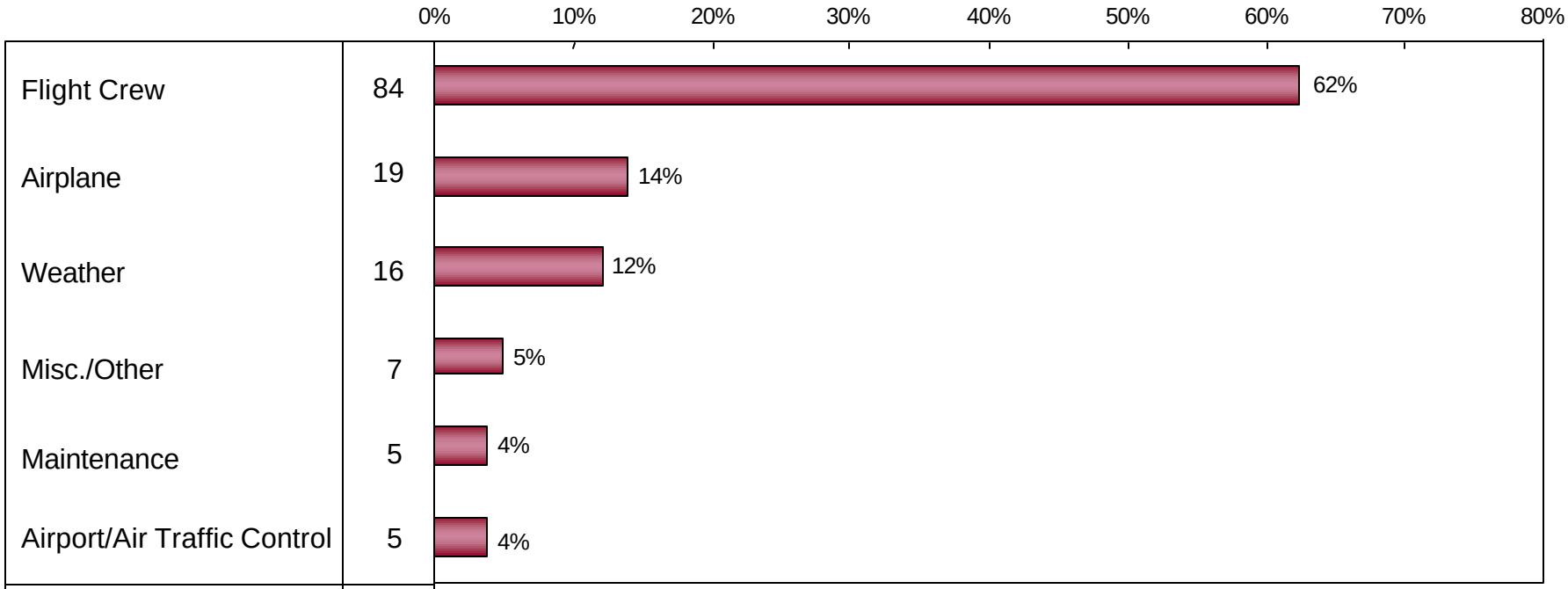
Hull Loss and/or Fatal Accidents - Worldwide Commercial Jet Fleet - 1994 - 2003





Accidents by Primary Cause*

Hull Loss - Worldwide Commercial Jet Fleet - 1994 through 2003



Total with known causes	136
Unknown or awaiting reports	50
Total	186

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

Excluded Events

Worldwide Commercial Jet Fleet

The following 3 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 Action Events

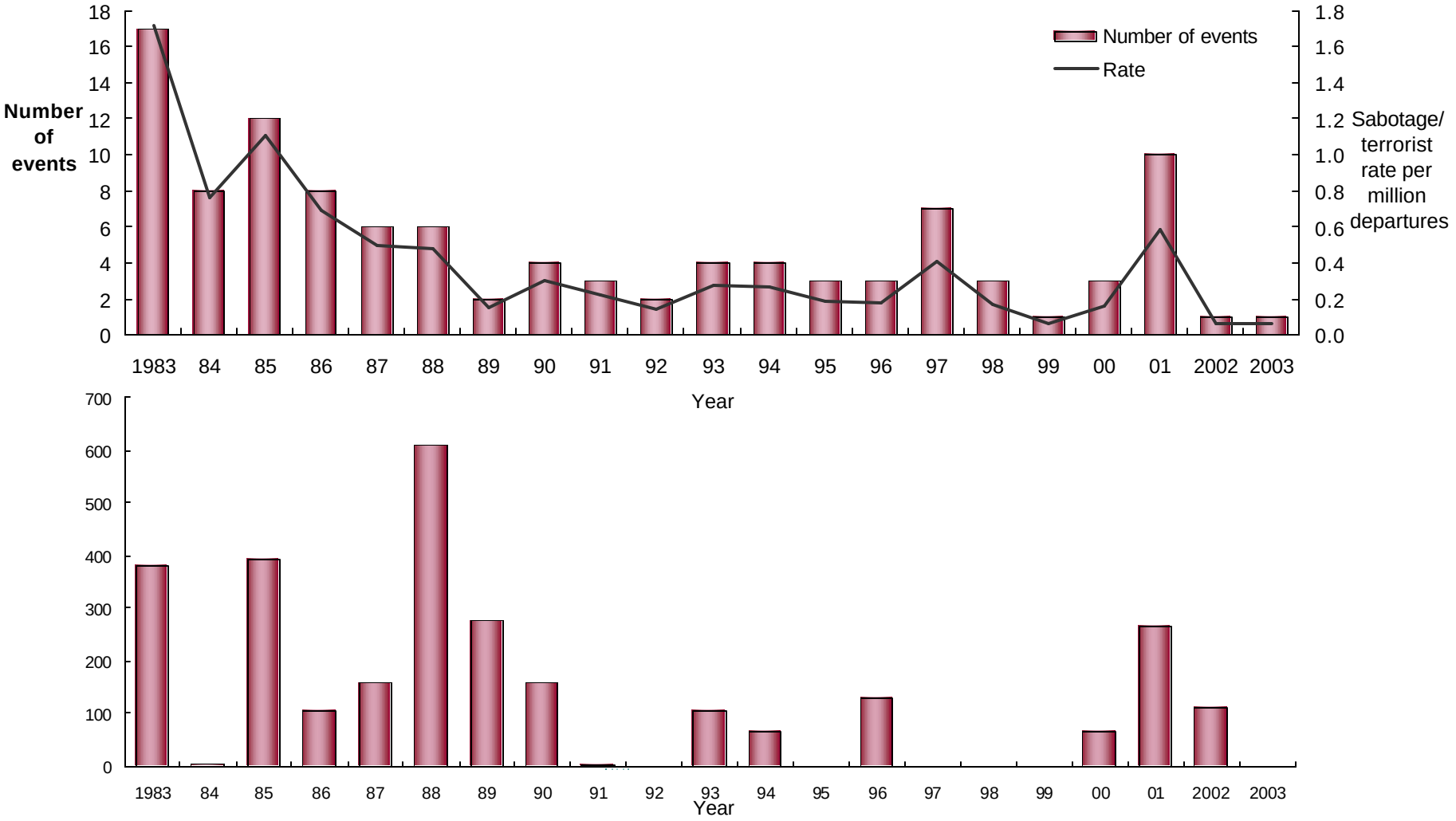
Worldwide Commercial Jet Fleet - 2003

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
22-Nov-03	DHL Airways	A300	Baghdad, Iraq	0	0	The airplane sustained damage to the left wing by a ground-launched missile.
1	Total events			0	0	

Hostile Actions

Worldwide Commercial Jet Fleet — 1983 Through 2003



Non-Hostile Events

Worldwide Commercial Jet Fleet

Events Occurring In 2003

Severe turbulence:
- No injury – 7 events
- Flight attendant injury – 12 events
- Passenger injury – 11 events
- Passenger and flight attendant injury – 8 events

Emergency evacuation:
- Minor injury – 6 events

Pushback:
- Airplane towed into de-icing truck – 1 event

Ground operations:
- Engine struck jetway – 1 event
- Airplane damaged while taxiing - inadvertently hit other airplane, tug, jetway – 1 event
- Airplane damaged from foreign object debris – 5 events
- Tug driver fatally injured – 1 event

Events Occurring From 1994 Through 2003