IATA Safety Report (Jet) 2000

Issued 2001

International Air Transport Association

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Prepared by the IATA Safety Committee

Issued 2001

International Air Transport Association
Montreal – Geneva

IATA Safety Report (Jet) 2000
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EXECUTIVE SUMMARY

OVERVIEW

The IATA Safety Report (Jet) 2000 focuses mainly on accidents suffered by Western-built jet airliners operating in airline service with a Maximum Takeoff Weight (MTOW) of more than 15,000 kg. Unlike other safety reviews, this report does not dwell on the number of casualties resulting from aviation accidents. Rather it aims to identify and address the underlying factors that cause fatal accidents and substantial damage to property. It will present the facts, set out the contributory factors, and then make recommendations.

Accidents involving jet transport aircraft operated by non-airline concerns, such as private operators, brokers, the government or the military, are excluded. For comparison, figures from the previous year are shown in square brackets [ ].

In the year 2000, there were 59 [81] accidents in this MTOW category involving Western-built jet transport aircraft of which 50 [53] were operational accidents. Of these 50, eight were fatal accidents. There was an additional fatal accident which did not result in either a Total Loss (TL) or Substantial Damage (SD). Of the 50 accidents occurring in operational service, 20 [23] were TLs. Of these, 4 [8] were cargo aircraft. Three accidents resulted from ferry flights. A further 30 [32] jet transport airliners in operational service incurred SD, each of more than USD1M.

ANALYSIS OF OPERATIONAL JET AIRLINER ACCIDENTS

	TOTAL LOSS	SUBSTANTIAL DAMAGE	TOTAL
Passenger	15 [13]	24 [29]	39 [42]
Cargo	4 [8]	4 [3]	8 [11]
Ferry	1	2	3
TOTALS	**20 [21]**	**30 [32]**	**50 [53]**
Fatal	8 [11]	0 [0]	8 [11]
Fatalities	778 [348]	0 [0]	778 [348]

- **The Total Losses per million sectors was 0.94 compared with 1.07 last year, this being the lowest rate during the past 10 years.**
- The 8 fatal accidents, resulted in 778 fatalities (52 crew and 726 passengers). This compares with 11 fatal accidents which resulted in 348 fatalities (49 crew and 299 passengers) for 1999. One additional accident occurred within the ICAO Annex 13 criteria but was not a TL or SD event and has therefore not been included in this report.
- Of the 50 operational accidents, 9 [17] occurred in the Asia/Pacific region, 9 [19] in Europe, 10 [7] in North America, 7 [5] in the Caribbean/South America, and 10 [4] in Africa and 5 [1] in the Middle East. The sharp increase in accidents in Africa is of particular concern.
- There were 3 [1] Controlled-Flight-Into-Terrain (CFIT) accidents, one of which was a ferry flight but 2 of these accidents resulted in 274 [5] fatalities. These accounted for 35% of the year's total fatalities. Despite the increase in CFIT accidents when compared with last year, this figure is part of an encouraging downward trend over the past 10 years.
- The greatest number of accidents occur during approach and landing phases of flight, a conclusion confirmed by the year 2000 data which recorded 30 [33] operational accidents associated with these flight phases. Three [1] accidents occurred during approach, 2 [0] during go- around and 25 [32] during landing.
- Eight [4] accidents occurred during takeoff, 4 [4] during climb and 0 [1] in cruise.

- Other significant features of the 50 operational accidents are as follows: 1 Rejected Take off (1SD), 9 Hard Landings (1TL, 8SD), 2 Go-around accidents (1 TL, 1 SD), 6 events involving Undercarriage and Tyre problems (1 TL, 5SD), 11 Runway Excursions (6TL, 5SD), 1 Runway Incursion (1SD) and 4 cases of Loss of Control (4TL).
- The analysis of the 50 operational accidents identified 158 Human (HUM), Technical (TEC), Environmental (ENV) and Organisational (ORG) causal factors. Amongst these, HUM contributory factors were predominant (49) within which H3 (proficiency/skill failure and/or incorrect decision-making by the crew) scored highly (26). ORG factors were the next greatest influence in 39 accidents, predominantly selection or training of crewmembers (26). Predictably, ENV (38) was dominated by E1 (Weather and Night) contributing to 20 accidents.
- A lack of situational awareness was identified as a contributory factor in 7 of the 20 TL accidents reaffirming the need for particular action in this area of concern. Moreover, damage to aircraft by ground support vehicles is showing through into accidents and must be tracked and countered more comprehensively.
- Above all, this focus on the 50 accidents occurring in the year 2000 points to the need to apply a similar process to the analysis of the many more serious incidents (as defined by ICAO Annex 13). Events such as intrusions on to the flight deck by unruly passengers, runway excursions and tail strikes with minimal damage, and air proximity encounters, must be fully examined in an effort to communicate lessons learned to the aviation industry at large.
- The accidents of the year 2000 show that the IATA Safety Strategy 2000+ is appropriately formulated.

COSTS

The direct cost (excluding lost revenue, passenger liability, etc.) for operational TLs involving Western-built jets during 2000 i.e. hull losses is estimated at USD 550 million. For major accidents the direct costs are estimated to be USD 274 million. These costs are very similar to last year.

EASTERN BUILT JET TRANSPORTS

There were two [6] operational Total Hull Losses (see definitions) of Eastern-built jet transport aircraft, one [2] of which accounted for 9 [85] fatalities.

RECOMMENDATIONS

It is recommended that, IATA and Operators together:

- Promote the use of just, non-punitive air/ground safety reporting and investigation systems.
- Further promote the use of Flight Operations Quality Assurance (FOQA), the ICAO Line Operational Safety Audit (LOSA) programme, and the IATA Operational Safety Audit (IOSA) system.
- Increase awareness of the external and environmental pressures affecting pilots.
- Review training practices and quality of training devices in terms of the particular skills required by a pilot during the landing phase.
- Review training practices and SOPs to ensure that those basic flying skills which are first taught are not subsequently trained out of pilots by the implementation of specific procedures or the inappropriate use of automated systems.
- Review training policy and practices with the aim of ensuring that specific training is given to pilots regarding situational awareness i.e. during initial conversion training as well as during recurrent training exercises.
- Highlight the threat to situational awareness of using language other than English in the ATC environment and pursue wider use of English through ICAO, States, and Regions.
- Counter punitive intrusion into Safety Monitoring Systems by protection of accident/incident data to promote greater reporting freedom to contribute to improved safety performance.

- Co-ordinate with organisations such as ICAO, FSF, and other professional institutions the legislative defence against the criminal prosecution of flight crews.
- Investigate the capture of serious incident data for analysis in the IATA Safety Jet Report.
- Develop a template, which could form part of Service Level Agreements, for operational safety performance monitoring of airline Service Providers (Ground Handling and Maintenance).
- Review training emphasis and loading procedures to ensure that cargo shifts cannot occur in flight on dedicated freighter operations.
- Encourage greater use of the IATA Safety Information Exchange system.

1. INTRODUCTION

1.1 GENERAL

The International Air Transport Association (IATA) Safety Report (Jet) 2000 was prepared by the IATA Classification Working Group — Jet (CWGJ) under the chairmanship of Captain Thomas Baberg/LH and comprising (in airline order) Mr. Alan Rohl/BA, Captain Tom Croke/EI, Captain Deborah Lawrie/KL, Captain Doug Stott/QF, Captain Saad Al-Sheri/SV, Captain Jürg Schmid/SR, and Captain Carlos Nunes/TP. Data support was provided by Mr. Paul Hayes from Airclaims Ltd. Mr. David Mawdsley and Ms. Jill Sladen of IATA Safety acted as the CWGJ facilitators and developed the report. Captain Donald Van Dyke of IATA assisted with the databasing and other support aspects. The report is the responsibility of the IATA Safety Department approved by the IATA Safety Committee (SAC) and authorised for distribution by the Operations Committee (OPC).

1.2 OBJECTIVES

The objective of the IATA Safety Report (Jet) 2000 is to identify trends and matters of concern in aviation safety worldwide from the accident data available.

1.3 SCOPE

The analysis contained in the IATA Safety Report (Jet) 2000, except where specifically noted, is concerned solely with accidents involving Western-built jet aircraft having a Maximum Takeoff Weight (MTOW) of more than 15,000 kg, in commercial airline service. Accidents involving jet aeroplanes operated by non-airline concerns (e.g. private operators, brokers, governments/military, etc.) are excluded.

1.4 CONTENT

The IATA Safety Report (Jet) 2000 contains a factual record and statistics of the year's accidents, with summaries of available details. Since related formal accident investigations are seldom completed when this Safety Report is written, the information provided may not always correspond with the final accident report.

This Safety Report provides an overview of all accidents in a simple format, with graphs and illustrations that should prove helpful for general use by airline management, crewmembers, training organisations and safety staff.

The Safety Report also contains subjective commentary written by practising airline Safety Managers. This commentary is intended to identify areas where airline action, either internal or by the trade association, IATA, might reduce accidents.

1.5 DEFINITIONS

Definitions of terminology used in the IATA Safety Report (Jet) 2000 are provided in **Appendix A**.

1.6 CONVENTIONS

Unless otherwise indicated, figures shown in square brackets [ ] relate to 1999 data. Values and costs are presented in U.S. dollars (US$).

2. STATISTICS FOR WESTERN-BUILT JETS

2.1 DATA FOR 2000

Except where otherwise indicated, figures provided in square brackets [ ] relate to data for the previous calendar year.

2.1.1 Fleet-Hours-Sectors

World Fleet (end of year): 14,723 [13,761]

Hours Flown: 38.2 million [35.3 million]

Sectors (landings): 21.2 million [19.0 million]

2.1.2 Accidents

All Total Losses:	21 [23]	Operational Total Loss (TL):	20 [21]
All Substantial Damage:	38 [58]*	Operational Substantial Damage (SD):	30 [32]
Total accidents	**59 [81]**	**Total Operational Accidents:**	**50 [53]**

* Includes 20 aircraft damaged by hail in Sydney, Australia.

The following table lists the operational Total Losses (TL) and Substantial Damage (SD) accidents by aircraft Group/Type (see Appendix A for definitions).

GROUP 1				**GROUP 2**				**GROUP 3**				**GROUP 4**			
TYPE	TL	SD	TOT	TYPE	TL	SD	TOT	TYPE	TL	SD	TOT	TYPE	TL	SD	TOT
Passenger				**Passenger**				**Passenger**				**Passenger**			
B722	0	2	2	B732	2	0	2	A300	1	0	1	A310	2	0	2
B727	0	2	2	B74S	0	0	0	DC10	0	1	1	A320	2	1	3
				B742	0	1	1	MD82	0	0	0	A321	0	0	0
				B743	0	1	1	MD83	1	1	2	A330	0	1	1
				B747	0	2	2	SSC	1	0	1	BA146	0	1	1
				DC9	2	4	6					B733	1	0	1
				F28	0	1	1					B734	0	1	1
												B735	0	0	0
												B737	0	3	3
												B744	1	0	1
												B752	1	0	1
												B757	0	0	0
												B762	0	1	1
												B767	0	2	2
												CRJ	1	0	1
Total	**0**	**4**	**4**	**Total**	**4**	**9**	**13**	**Total**	**3**	**2**	**5**	**Total**	**8**	**10**	**18**
All-cargo				**All-cargo**				**All-cargo**				**All-cargo**			
B707	1	1	2	B742	0	2	2	DC10	1	0	1	A310	0	0	0
B727	1	0	1	B747	0	0	0					MD11	0	1	1
DC8	1	1	2									B737	1	0	1
Total	**3**	**2**	**5**	**Total**	**0**	**1**	**2**	**Total**	**1**	**0**	**1**	**Total**	**1**	**1**	**2**
TOTAL	**3**	**6**	**9**	**TOTAL**	**4**	**11**	**15**	**TOTAL**	**4**	**2**	**6**	**TOTAL**	**9**	**11**	**20**

2.1.3 Operational Loss Rates

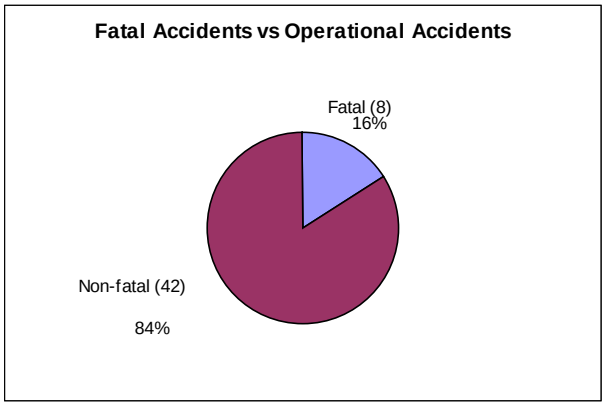
Total losses per million sectors: 0.94 [1.07]

Total losses per million hours: 0.52 [0.59]

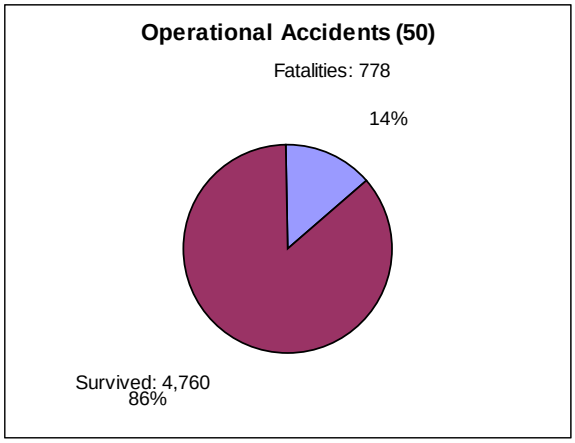
2.1.4 Passengers Carried-Fatal Accidents-Fatalities & Fatality Rate

Passengers carried (million):	2,017 [1,893]
Estimated increase over the previous year:	6.6 % [6.6 %]
Fatal accidents:	8 [11]
Fatalities:	
Passengers:	726 [299]
Crew:	52 [49]
Total:	**778 [348]**
Fatality rate:	0.36 [0.16] passenger-fatalities per million passengers or the equivalent of one passenger-fatality per 2.8 [6.3] million passengers carried.

Of the 50 operational accidents (20 TL and 30 SD), 7 (14%) resulted in passenger fatalities, and 1 resulted in crew fatalities.



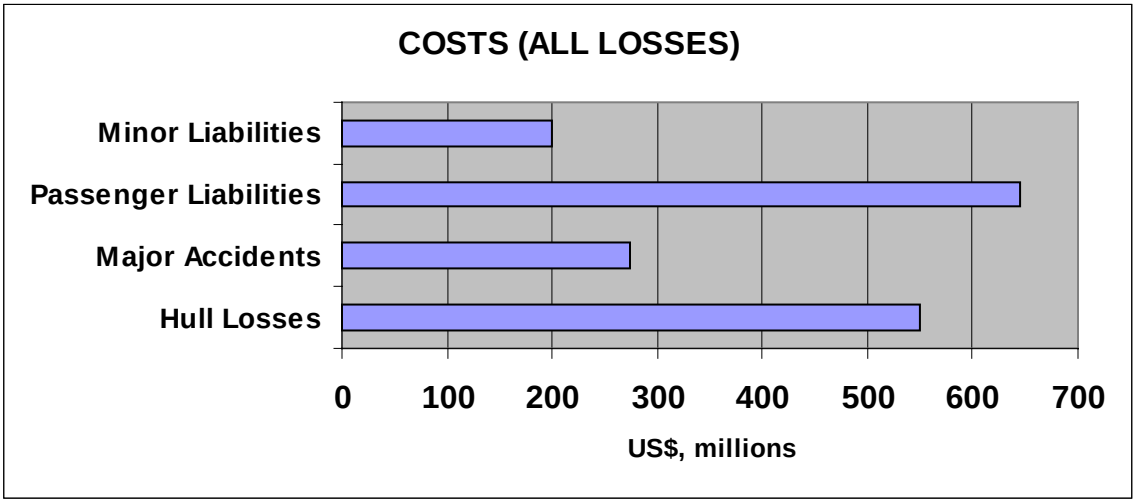
There were 5,538 [5442] individuals aboard the 50 [53] aircraft involved in operational accidents. Of these, 778 [348] suffered fatal injuries as a consequence while 4,760 [5,094] survived. The following diagram illustrates this relationship.



2.1.5 Estimated Cost

The direct cost (excluding lost revenue etc.) of the operational accidents is estimated at $1,550 [$1,647] million. When the losses for all causes, for passenger liability, and for the minor losses are added, the costs total $1,668[$1,669] million.

These costs are illustrated in the following diagram.



2.1.6 Registry-State of Operator-State of Occurrence

The following table lists the operational Total Loss accidents which occurred in 2000.

Total Losses: 20 [21]

Date 2000	Aircraft Registry	State of Operator	IATA Region	State of Occurrence	IATA Region
30.01	5Y-BEN	Kenya	AF	Ivory Coast	AF
31.01	N963AS	USA	NA	USA	NA
03.02	ST-APY	Sudan	AF	Tanzania	AF
11.02	TU-TAT	Ivory Coast	AF	Senegal	AF
12.02	S9-NAZ	Sao Tome	AF	Angola	AF
16.02	N8079U	USA	NA	USA	NA
05.03	N668SW	USA	NA	USA	NA
11.04	F-OHMD	Mexico	SA	Mexico	SA
19.04	RP-C3010	Philippines	FE	Philippines	FE
22.04	TC-THL	Turkey	EU	Turkey	EU
30.04	N800WR	Uganda	AF	Uganda	AF
26.06	70-ACQ	Yemen	NE	Sudan	AF
12.07	D-AHLB	Germany	EU	Austria	EU
17.07	VT-EGD	India	FE	India	FE
25.07	F-BTSC	France	EU	France	EU
23.08	A4O-EK	Bahrain	NE	Bahrain	NE
06.10	N936ML	Mexico	SA	Mexico	SA
31.10	9V-SPK	Singapore	FE	Taiwan	FE
05.11	TJ-CAB	Cameroon	AF	France	EU
31.11	9G-ADY	Ghana	AF	Guinea	AF

The following table lists the operational Substantial Damage accidents which occurred in 2000.

Substantial Damage: 30 [32]

Date 2000	Aircraft Registry	State of Operator	IATA Region	State of Occurrence	IATA Region
19.02	N811CK	USA	NA	USA	NA
22.02	SU-GAO	Egypt	NE	Zimbabwe	AF
26.02	EP-IAG	Iran	NE	Saudi Arabia	NE
27.02	PT-TEO	Brazil	SA	Brazil	SA
01.03	ZS-SHD	South Africa	AF	Zambia	AF
13.03	N516DA	USA	NA	USA	NA
17.03	C-GGWA	Canada	NA	Canada	NA
19.03	OB-1731	Peru	SA	Peru	SA
26.03	AP-BCO	Pakistan	FE	Saudi Arabia	NE
01.04	N79743	Micronesia	FE	Micronesia	FE
03.04	N534MC	USA	NA	Ecuador	SA
22.04	VH-EBW	Australia	FE	Italy	EU
06.05	G-JEBE	United Kingdom	EU	United Kingdom	EU
22.05	B-16111	Taiwan	FE	Taiwan	FE
25.05	F-GHED	France	EU	France	EU
07.06	PP-VNO	Brazil	SA	Brazil	SA
14.06	N649HA	USA	NA	USA	NA
14.06	XA-DEI	Mexico	SA	Mexico	SA
18.07	EP-PAU	Iran	NE	Iran	NE
27.07	EP-IRP	Iran	NE	Iran	NE
07.08	SU-PBB	Egypt	AF	Belgium	EU
08.08	N838AT	USA	NA	USA	NA
27.08	PH-BUP	Netherlands	EU	USA	NA
29.08	JA8161	Japan	FE	China	FE
19.09	S7-RGV	Vietnam	FE	Vietnam	FE
23.09	5Y-KQD	Kenya	AF	Sudan	AF
24.11	HS-TDF	Thailand	FE	Thailand	FE
29.11	N816AT	USA	NA	USA	NA
30.11	EC-HMK	Spain	EU	Ireland	EU
23.12	N132AA	USA	NA	Tahiti	FE

2.1.7 Accident Summaries

Descriptions of jet airliner operational Total Loss and Substantial Damage accidents and certain other losses are presented as **Appendix C**.

2.2 DATA FOR LAST 10-YEAR PERIOD (1991-2000)

2.2.1 Introduction

To obtain a more complete picture of current operations, a 10-year period is considered sufficiently long to indicate significant trends and short enough to eliminate the influence of superseded practices and procedures.

2.2.2 Hours-Sectors

In this period, some 1,150 airlines are recorded as having operated commercial jet aircraft and having performed:

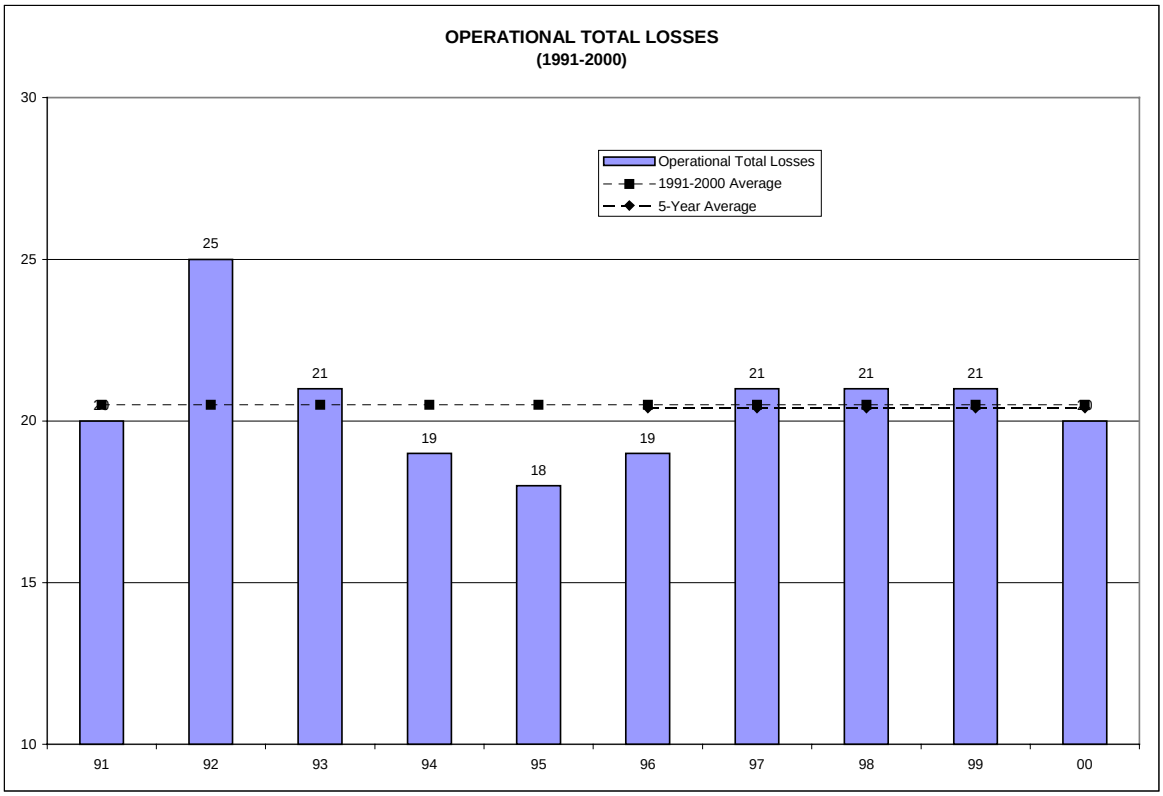
Hours Flown: 294.4 million

Sectors (landings): 164.2 million

2.2.3 Operational Total Losses

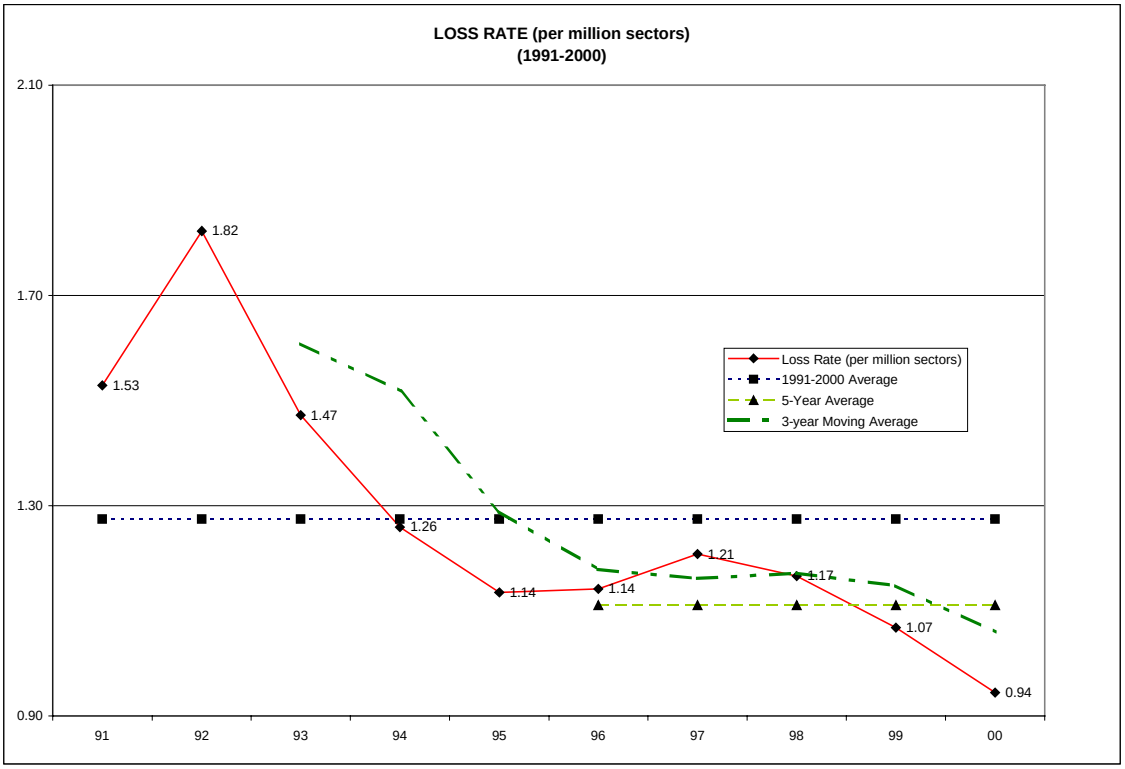
Operational Total Losses: 205 Average over the period: 20.5 Average over last 5-years: 20.4

The following graph depicts the operational Total Losses (TL) and the 5- and 10-year averages for the 1991-2000 period.

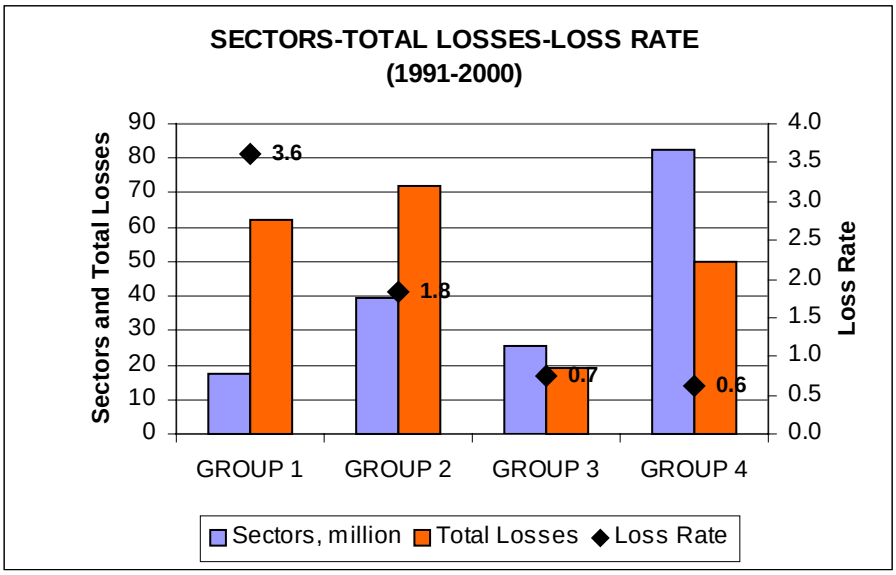


2.2.4 Loss Rates

The following graph shows the Loss Rate (Total Losses per million sectors), together with the 5- and 10-year annual averages, and a trendline (3-year moving average).



The following graph shows Sectors, Total Losses and Loss Rate by Aircraft Group for the 1991-2000 period. (See Appendix A for Aircraft Group definitions).

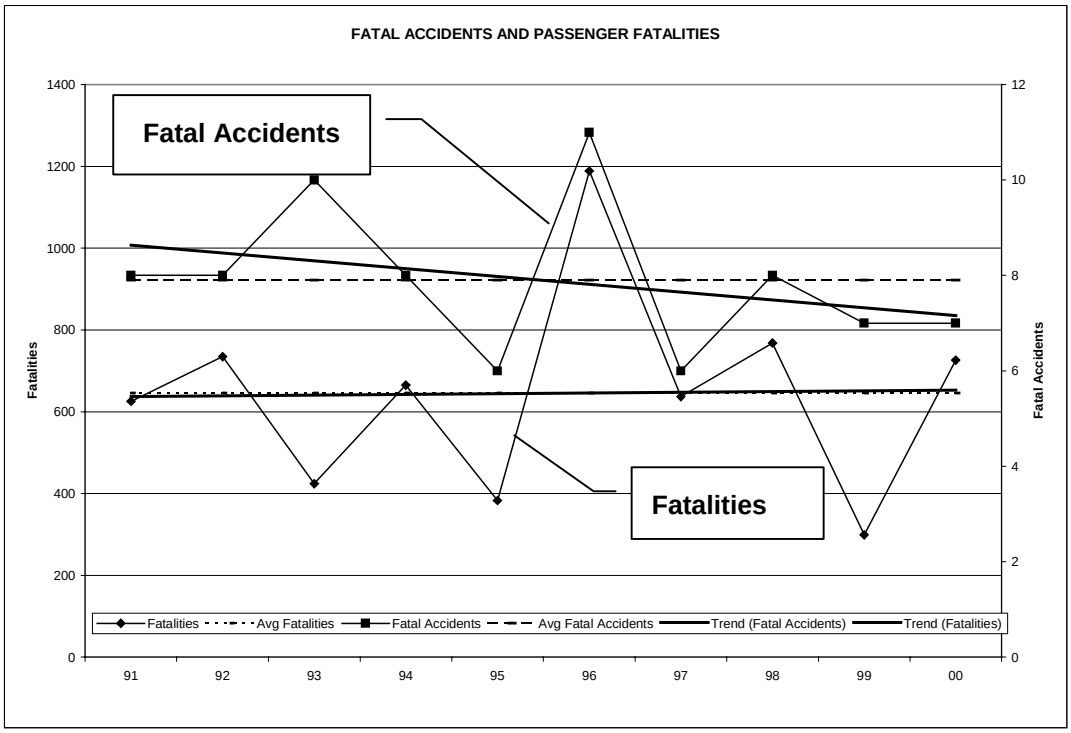


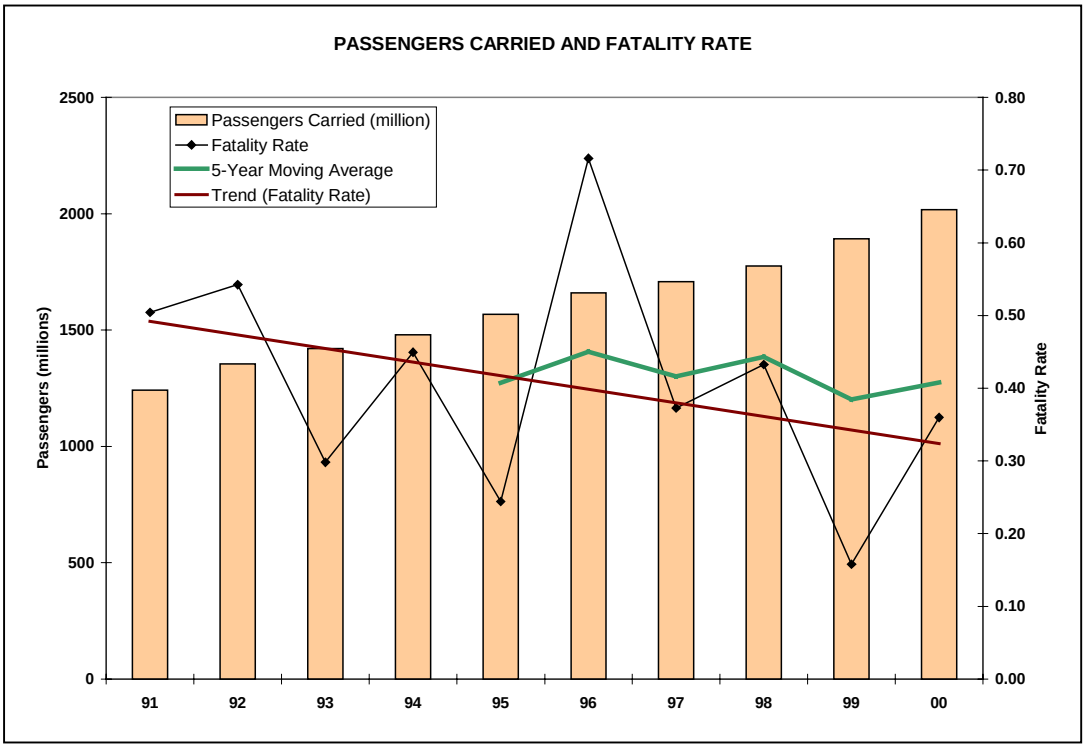
2.2.5 Passengers Carried-Fatal Accidents-Fatalities & Fatality Rate

Passengers carried: 16,119 million Fatal accidents: 79

Fatalities: Passenger: 6,452 Crew: 567 **Total fatalities: 7,019**

Fatality Rate: 0.4 passenger-fatalities per million passengers carried

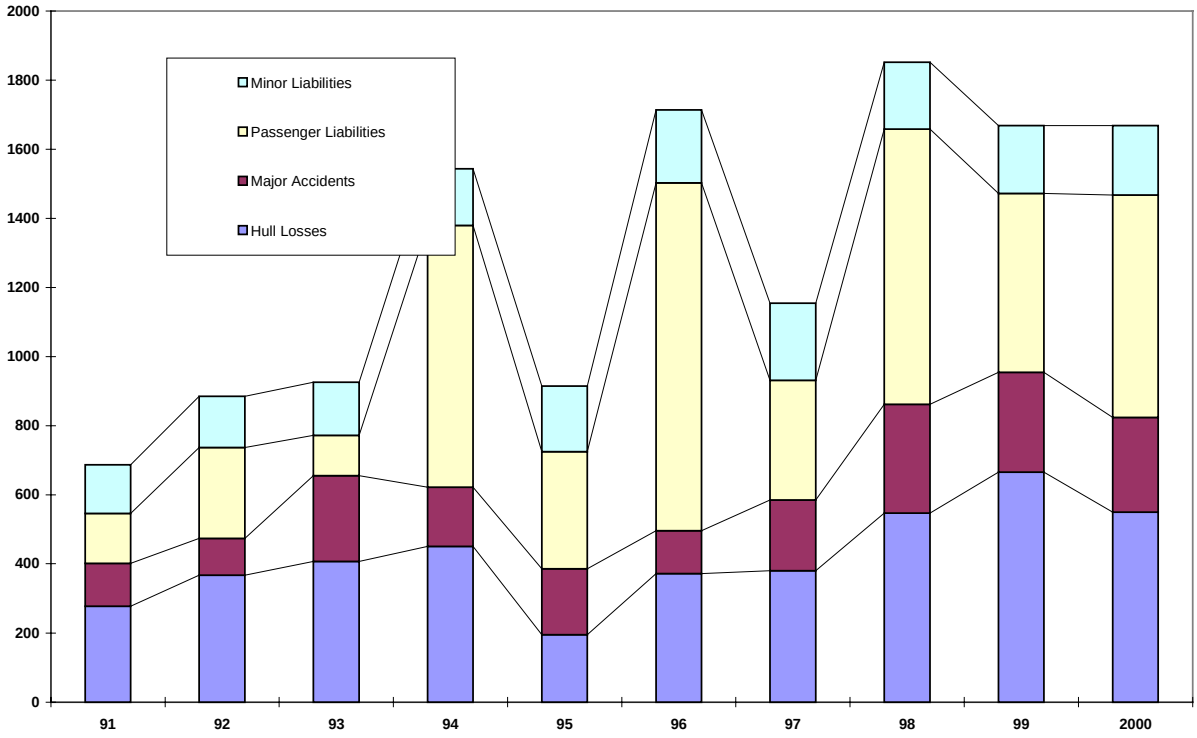




2.2.6 Estimated Cost

The figure shows the estimated cost for all losses involving Western-built jet airliners, including acts of violence, non-operational losses, and certain losses suffered by non-airline operators.

COSTS FOR ACCIDENTS INVOLVING WESTERN-BUILT JET AIRLINERS



2.3 HISTORICAL RECORD

2.3.1 Hours-Sectors-Fleet

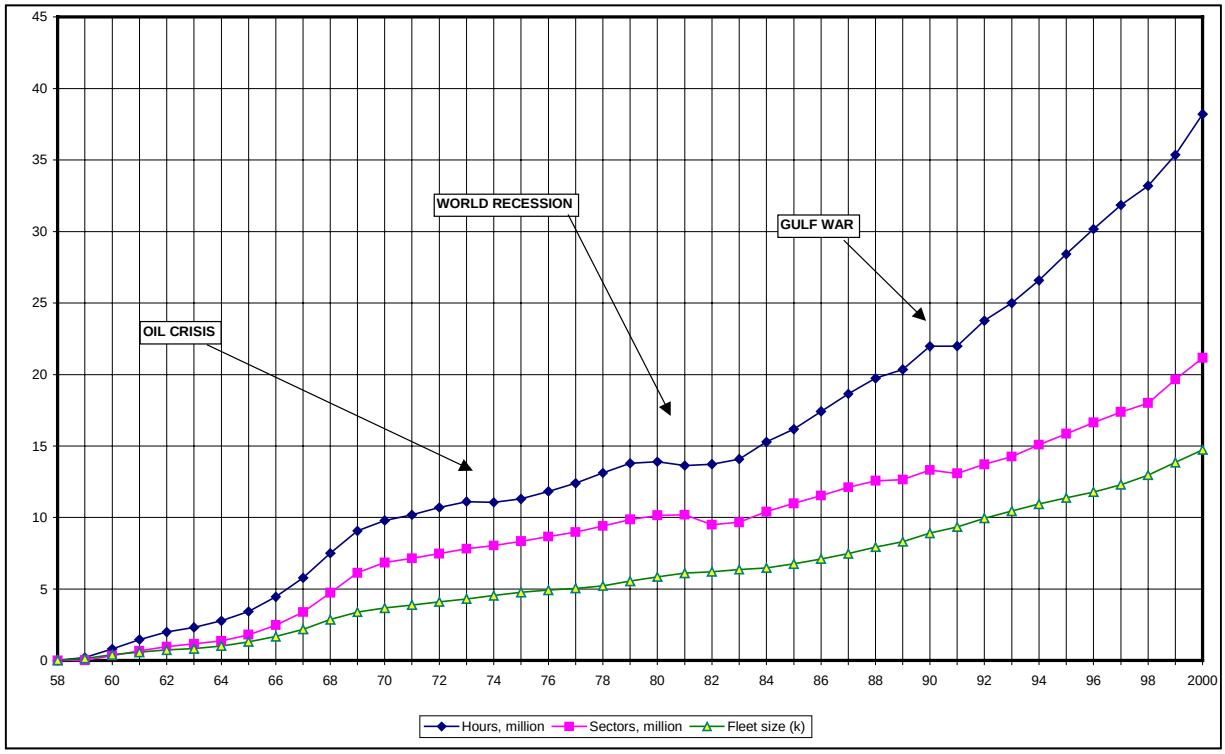
Since 1958, jet transport aircraft have flown some 634 million hours and 393 million sectors.

The figure shows the number of hours, sectors and fleet size since 1958. The number of hours per sector was fairly stable until 1984, but has been increasing at a much greater rate since. The most likely causes are:

- The transfer of a large amount of short-haul traffic from jet operators to commuter operations in turboprops albeit now reversing from turboprop to commuter jets;
- Introduction of ETOPS; and
- Introduction of long-range aircraft (A340, B747-400, etc.).

The plotted line for hours flown shows three points where the steady growth is discontinuous:

- 1974, first crude oil crisis;
- 1981, world economic recession; and
- 1991, Gulf War and over-capacity.



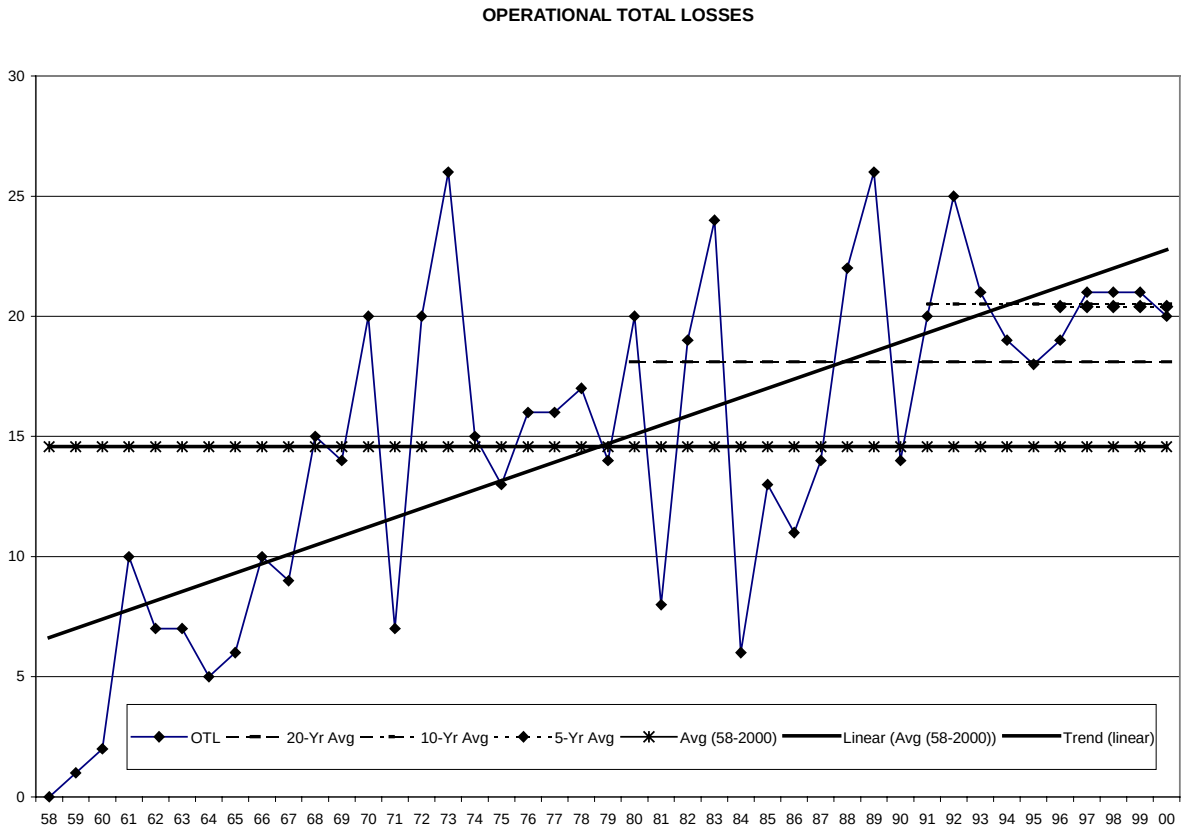
2.3.2 Total Losses since 1958

Airline

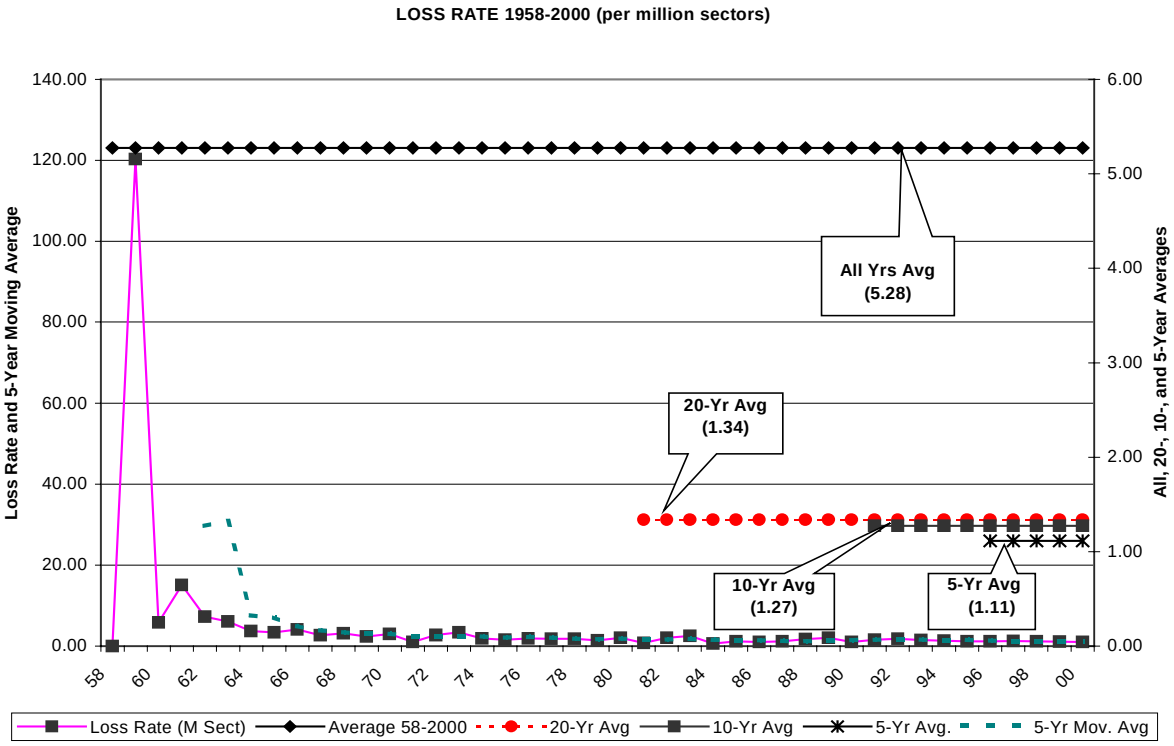
Operational	630
Test & Training	40
Violence (operational)	44
Non-operational (ground)	66
Non-airline/Unknown	20
Total Losses	**800**

The following figure shows the operational Total Losses since 1958, a trendline (linear), the average over the period 1958-2000 and the last 20-, 10- and 5-year annual averages. These values are:

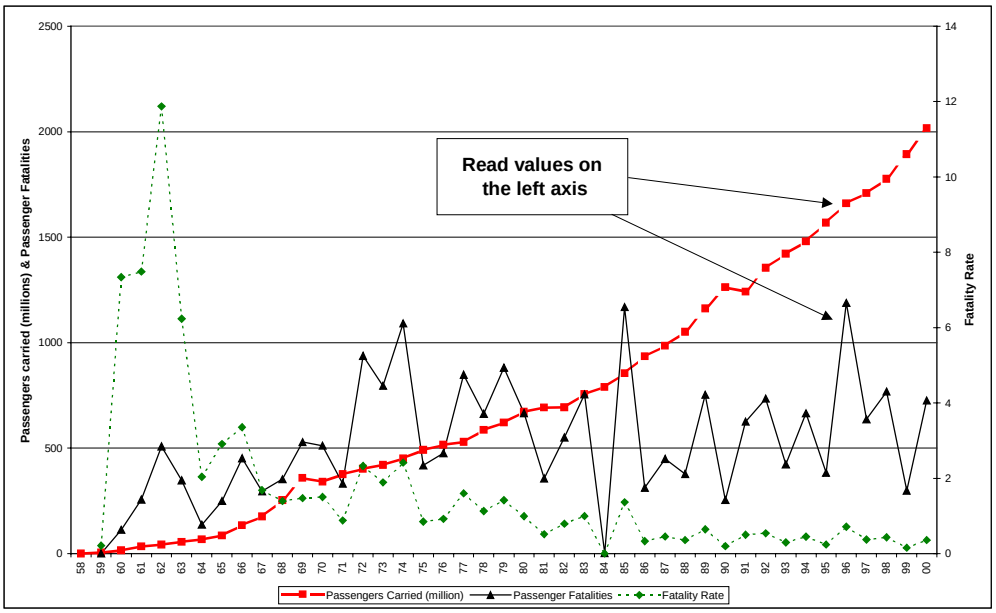
- For the period (1958-2000): 14.6
- Last 20 years (1981-2000): 18.1
- Last 10 years (1991-2000): 20.5
- Last 5 years (1996-2000): 20.4



2.3.3 Loss Rate



Passengers Carried-Fatal Accidents-Fatalities & Fatality Rate



3. ACCIDENT CLASSIFICATION – WESTERN-BUILT JETS

3.1 INTRODUCTION

This Safety Report includes a subjective assessment of the most apparent and contributory (causal) factors. The advantage of this practice is that it facilitates early identification of emerging problems. The disadvantages are that some accidents cannot be assessed at all because of insufficient data, and that no update of these initial assessments is made.

3.2 EVENTS

The more significant events identified in 2000 that resulted in an operational Total Loss (TL) or Substantial Damage (SD) accident were as follows:

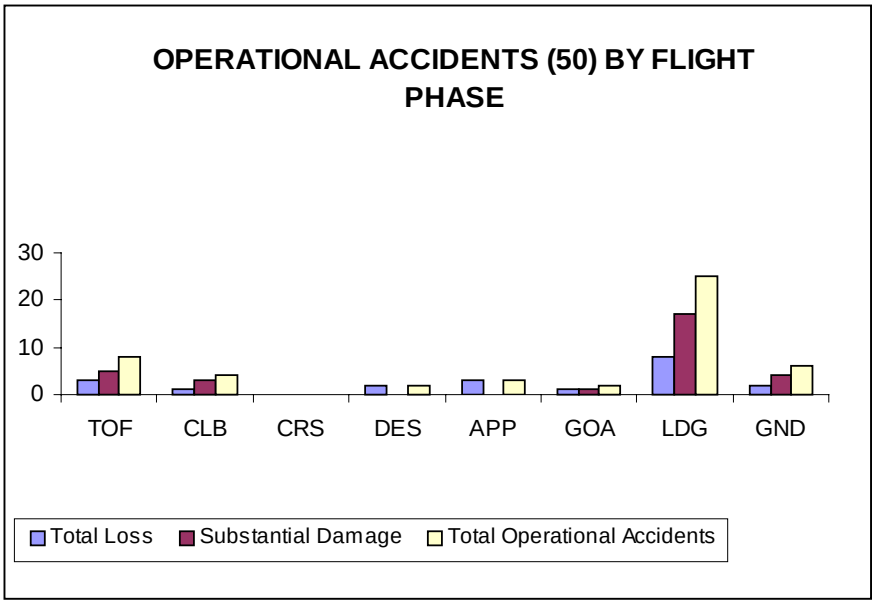
- In 20 accidents (11 TL and 9 SD), weather was a contributing factor;
- There were 11 runway excursions (events where the aircraft departed from the paved runway surface) (6 TL and 5 SD);
- In 6 cases (1 TL and 5 SD), landing gear design deficiency, related maintenance or structural failure was a contributing factor;
- There were 4 loss-of-control accidents (4 TL).
- 3 Controlled Flight Into Terrain (CFIT) accidents;
- 2 cases of “separation in flight” (2 SD); and
- 1 runway incursion

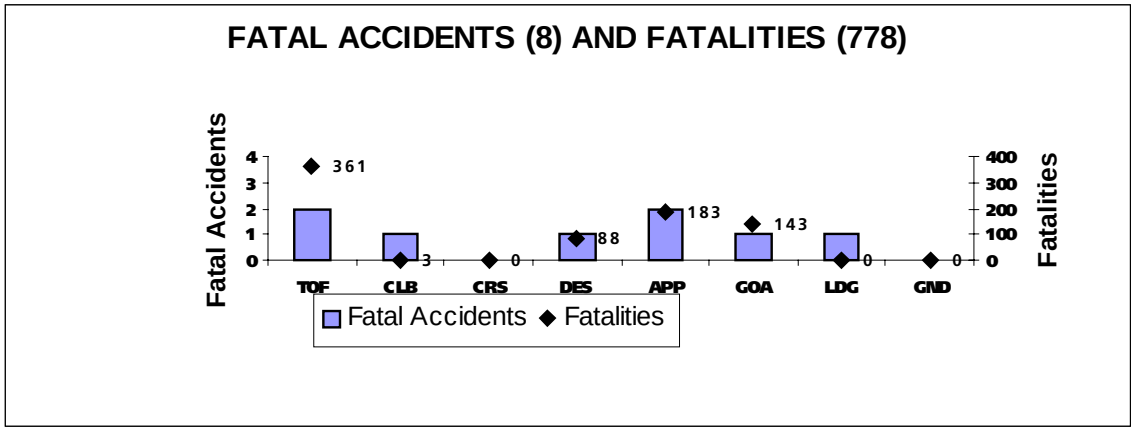
3.3 PHASE OF FLIGHT

The following table illustrates the distribution, in relation to the phase of flight, of operational:

- Total Loss (TL) accidents;
- Substantial Damage (SD) accidents;
- Fatal accidents; and
- Fatalities (crew and passenger).

Flight Phase	TL	SD	Tot	Fatal Accidents	Fatalities
TOF	3	5	8	2	361
CLB	1	3	4	1	3
CRS	0	0	0	0	0
DES	2	0	2	1	88
APP	3	0	3	2	183
GOA	1	1	2	1	143
LDG	8	17	25	1	0
GND	2	4	6	0	0
Total	**20**	**30**	**50**	**8**	**778**



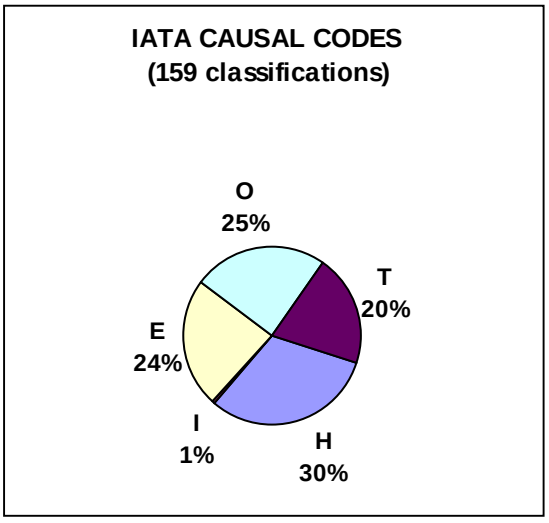


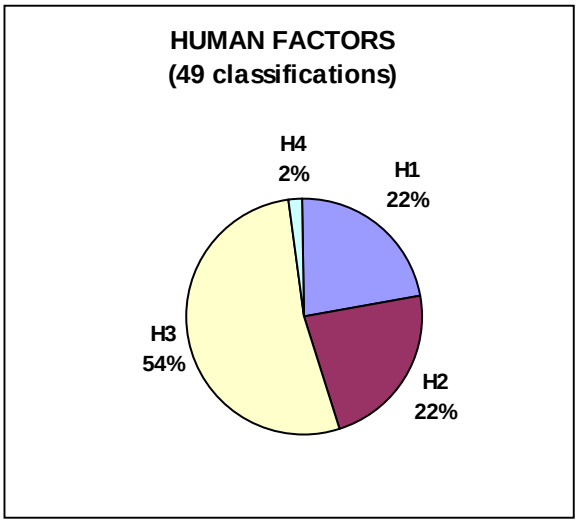
3.4 IATA CAUSAL FACTOR CODING

Of the 50 operational accidents (20 TL and 30 SD), there was sufficient information to classify *all but 1.* This resulted in 159 classifications, grouped as indicated below. (See Appendix A for definitions of causal codes.)

			HUM		TEC		ENV		ORG	
Human	**HUM**	49								
Technical	**TEC**	32	H1	11	T1	4	E1	20	O1	26
Environmental	**ENV**	38	H2	11	T2	2	E2	3	O2	0
Organisational	**ORG**	39	H3	26	T3	8	E3	0	O3	2
Incomplete	**I**	1	H4	1	T4	1	E4	2	O4	1
					T5	1	E5	6	O5	8
					T6	4	E6	4	O6	2
					T7	6	E8	0	O7	0
					T8	0	E10	1		
					T9	5	E11	2		
					T10	0				
					T11	1				
	Total	**159**		**49**		**32**		**38**		**39**

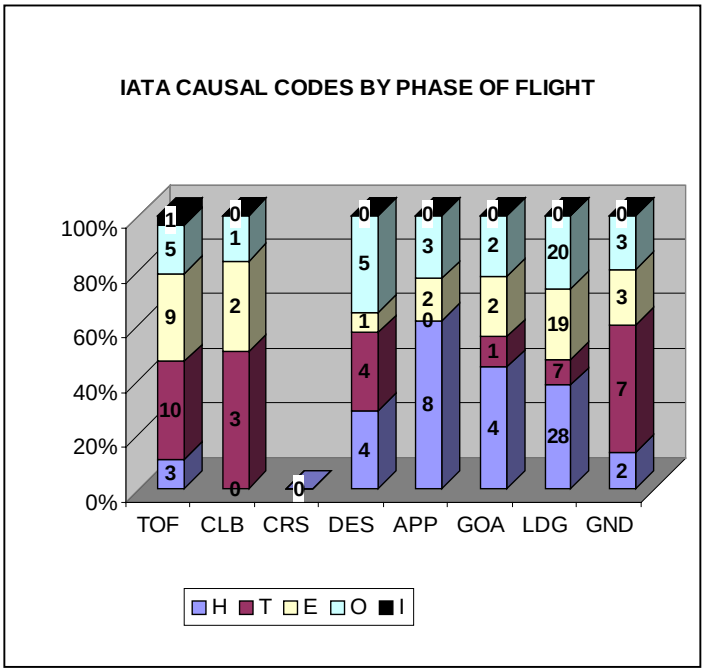
The relationship between causal factor codes is illustrated in the diagram below on the left.





It will be noted that Human Factors continue to be the dominant cause of operational accidents. Crew proficiency/skill failure and/or incorrect decision-making (H3) contributed to 54% of the 50 operational accidents suffered in 2000. The relationship between the various Human Factors classifications is illustrated in the diagram above and to the right.

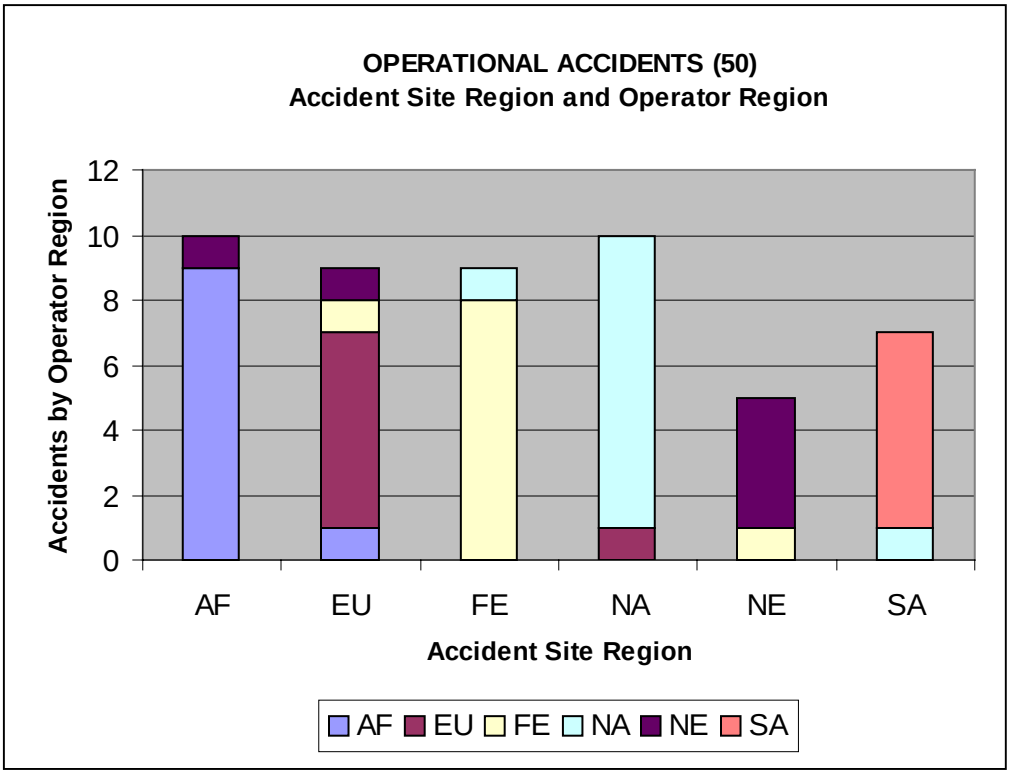
The next greatest contributing influences were Organisational Factors with selection or training (O1) accounting for 26 cases in this category, and Environmental Factors, with weather (E1), including night operations, accounting for 20 cases in this category. The combination of marginal weather and proficiency/skill failure and/or incorrect decision-making appears to be associated with 19 accidents. Lack of regulatory oversight (E11) appears to be associated with 2 accidents.



	H	T	E	O	I	Total
TOF	3	10	9	5	1	28
CLB	0	3	2	1	0	6
CRS	0	0	0	0	0	0
DES	4	4	1	5	0	14
APP	8	0	2	3	0	13
GOA	4	1	2	2	0	9
LDG	28	7	19	20	0	74
GND	2	7	3	3	0	15
Total	49	32	38	39	1	159

3.5 REGIONAL DATA

The following graph and accompanying table illustrate the relationship between accident site regions and operator regions for the 50 operational accidents recorded in 2000.



		Region of Accident Site						
		AF	EU	FE	NA	NE	SA	Total
Region of Operator	AF	9	1	0	0	0	0	**10**
	EU	0	6	0	1	0	0	**7**
	FE	0	1	8	0	1	0	**10**
	NA	0	0	1	9	0	1	**11**
	NE	1	1	0	0	4	0	**6**
	SA	0	0	0	0	0	6	**6**
	Total	**10**	**9**	**9**	**10**	**5**	**7**	**50**

3.6 CARGO SERVICES

All-cargo aircraft were involved in 8 [11] operational accidents (4 TL and 4 SD). The aircraft involved in the five Total Losses were one B707, one B727, one B737, one DC-8, and one DC-10. The four aircraft that suffered Substantial Damage accidents were one B707, two B747, one MD-11 and one DC-8.

4. STATISTICS FOR EASTERN-BUILT JETS

4.1 GENERAL

This part of the Safety Report deals with Eastern-built aircraft, generally those manufactured in the former Soviet Union.

4.2 DEFINITIONS

4.2.1 Other Operators

Airline operators of Eastern-built aircraft that are based outside the former Soviet Union.

4.2.2 Total Hull Loss

Accidents to the Eastern-built aircraft have been classified as "Total Hull Losses", a term used in the former Soviet Union to denote an accident where the aircraft was either destroyed or otherwise never repaired. This is not the same as the definition used for Western-built jets. (See Appendix A — Definitions)

4.2.3 Eastern-built Aircraft

The main types in current service and considered in this portion of the IATA Safety Report (Jet) 2000 are the Il-62, Il-76, Il-86, Tu-134, Tu-154, Yak-40 and Yak-42.

4.3 DATA FOR 2000

4.3.1 Hours and Sectors Flown

Hours and sectors flown are not available for the year 2000 but are projected to be in the region of 0.9 million hours and 0.36 million sectors (broad estimate): the same as in 1999. Traffic levels this year seem to be generally similar to 1999.

Utilisation of 'eastern built' jets has decreased very considerably during the 1990s and this significantly reduced exposure would explain, in part, the relatively few hull losses now compared to some earlier years.

4.3.2 Total Hull Losses

Former Soviet Union:	1 [2]
Others	1 [4]
Total	**2 [6]**

4.3.3 Fatal Accidents

Former Soviet Union: There was one [one] fatal accident involving aircraft operators of the former Soviet Union. Five crew and four passengers were killed in the accident.

Others: There were no [two] fatal accidents.

4.3.4 Total Hull Loss Rates

The operational Total Hull Loss rate is estimated to have been 5.6 [16.7] per million sectors and 2.2 [6.7] per million hours.

4.3.5 Phase of Flight

Flight Phase	Operational Total Hull Loss	Fatal Accidents	Passenger Fatalities	Crew Fatalities	Substantial Damage
GND					
TOF	1	1	4	5	
CLB					
CRS					
DES					
APP					
GOA					1
LDG	1				
Total	**2**	**1**	**4**	**5**	**1**

4.4 ACCIDENT LOCATIONS (TOTAL HULL LOSSES)

Date 2000	State of Operator	State of Occurrence
09.03	Russia	Russia
06.10	Central African Republic	Angola

4.4.1 Accident Summaries

Descriptions of accidents involving Eastern-built aircraft are presented in **Appendix C**.

4.5 DATA FOR LAST 10-YEAR PERIOD (1991-2000)

4.5.1 Hours and Sectors Flown

The estimated exposure of Eastern-built aircraft for the 10-year period is as follows:

State	Hours (M)	Sectors (M)
Former Soviet Union:	13.0*	7.0*
Others:	2.0*	1.0*
Total	15.0*	8.0 *

* Estimated.

4.5.2 Loss Rates

Data relating specifically to Former Soviet Union and non- Former Soviet Union utilisation was not available from traditional sources. During this period, there were 59 Total Hull Losses (36 Former Soviet Union and 23 non- Former Soviet Union) in an estimated 8.0 million sectors, giving a rate of 7.4 losses per million sectors for all operators (5.1 Former Soviet Union and 23 non- Former Soviet Union)*. The rate, over the same, period for Western-built jets was 1.2 per million sectors.

* Because of the difficulty in estimating the utilisation for this class of aircraft, these loss rates should be considered only as possible broad indications.

5. ANALYSIS AND CONCLUSIONS

5.1 GENERAL

In 2000, the figures for the hours and sectors flown, fleet size and passenger carried by Western-built jet airliners show a marked increase over the previous year. The following table provides the details:

	Variation	Δ%
HOURS (MILLION)	+2.9	+8.3
Sectors (million)	+2.2	+11.5
Fleet	+962	+7.0
Passengers carried (million)	-1	+0.0

5.2 TOTAL LOSS (TL) ACCIDENTS

Nine of the 59 accidents in the +15,000kg MTOW category occurred on a non-operational flight. Of the 50 accidents that occurred in operational service, 20 were TLs. The average over the last 20 years was 18.1, and for the last 10 years, 20.4. The long-term average (1958-2000) was 14.6. The worst years were 1973 and 1989 with 26 total losses.

The number of aircraft lost per million hours was 0.47, a decrease of 0.12 over 1999.

The number of operational TLs per million sectors was 0.94 (a decrease of 0.13 over the previous year), the lowest rate in the previous 10 years. This is less than the annual averages for the last 20-, 10- and 5-year periods (1.34, 1.27 and 1.11, respectively). The worst rate over the last 10-year period was 1.82 in 1992.

5.3 SUBSTANTIAL DAMAGE (SD) ACCIDENTS

There were 30 operational SD accidents, the same as 1999. Unlike in 1999 there were no fatalities amongst the SD events.

5.4 FATAL ACCIDENTS AND FATALITIES

In 2000 there were 8 fatal accidents, 2 less than in the previous year and equal to the lowest for the decade. One additional accident occurred in which there was one fatality. Although this accident was within the ICAO Annex 13 criteria, it was not a TL or SD event and has therefore not been included in the statistics of this report. Over the last 10 years, 1996 was the worst year with 14 fatal accidents. The years with the lowest number of fatal accidents (8) were 1995, 1997 and 2000.

The annual average over the last 10-year period was 10 fatal accidents resulting in 646 passenger fatalities (the maximum was 1,190 fatalities in 1996; the minimum was 299 fatalities in 1999).

The number of fatalities in 2000 was 778 (726 passengers and 52 crewmembers), an increase of 479 over the previous year. The fatality rate for 2000 was 0.36 per million passengers. This value is below the 10-year average of 0.40. The maximum fatality rate during the period was 0.72 in 1996 and the minimum was 0.16 in 1999.

5.5 PHASE OF FLIGHT

5.5.1 Approach and Landing Accidents

Along with Control Flight Into Terrain (CFIT), Human Factors, and Loss of Control, Approach and Landing Accidents (ALAs) have been identified as being one of the four aviation safety priorities. The Approach and Landing Accident Reduction (ALAR) task force defines ALAs as events that occurred in flight phases after initiation of the descent (includes approach and landing, circling manoeuvres and missed approach).

The need for improvement in the ALA record is reflected in the year 2000 statistics where the data indicate that, of the 50 operational accidents, 30 (12 TL and 18 SD) occurred during the approach (3 TL) and landing (8 TL and 17 SD) phases. These 25 landing accidents therefore accounted for 50% of all accidents and accounted for 11 runway excursions. Thus, as was the case last year, the large number of runway excursions in the landing phase is disturbing. The CWG remain concerned that thrust-reversers are not being used effectively by flight crew and that aircraft are being dispatched too often with thrust-reversers deactivated.

Adding the 2 (1 TL, 1 SD) Go-around and the 3 (3 SD)Approach Accidents, the ALA contribution to the total number of accidents occurring in the year 2000 is 60%. The reluctance of many crews to execute the Go-around is still apparent but so are the difficulties of doing so in poor weather. Go-around training should be enhanced.

Night operations result in more difficulties caused for example, by fewer visual cues or by spatial disorientation. Where night operations may have been a contributory factor, the CWG therefore included the event with E1 (Meteorology). Weather/night factors were evident in 20 accidents, mostly in the approach and landing phase.

There were 9 landing accidents associated with hard landings and 6 accidents were the result of landing gear problems.

Viewing these ALA factors collectively, it is apparent from the year 2000 statistics that the scrutiny of accident causation, particularly of the landing phase, must be continued. Moreover, it is apparent that those airlines seen as being in the first division of aviation safety are not immune from the landing accident. Nor are the best pilots.

5.5.2 Takeoff, Climb and Cruise Accidents

Eight accidents (3 TL and 5 SD) occurred during takeoff which is twice the number incurred last year. Of these, one cargo aircraft unsuccessfully attempted a Rejected Take Off and was substantially damaged. Four accidents (1TL and 3 SD) occurred in the Climb. There were no accidents in the cruise.

5.6 IATA CAUSAL FACTORS

Analysis of the 50 operational accidents occurring in the year 2000 identified a total of 158 Human (HUM), Technical (TEC), Environmental (ENV) and Organisational (ORG) classifications. HUM factors were dominant (49) within which H3 (proficiency/skill failure and/or incorrect decision-making by the crew) scored highly (26). ORG factors were the next greatest influence in 39 accidents, mainly in terms of selection or training of crew members (26). Predictably, ENV (38) was dominated by poor weather and night operations. It is noteworthy that Air Traffic Services and Air Proximity factors barely featured amongst these IATA Causal Factors. Yet at airline level, the safety management systems of the world would show Air Traffic Control, TCAS, and Airprox events as featuring highly in their safety risk ratings. This points to the limitations of featuring only on accidents. Serious incidents must be addressed to gain a fuller understanding of the aviation safety threats.

Compared with 1999, across the spectrum of HUM, ENV, ORG contributory accident causes, there was an overall reduction in the total number of factors and a similar distribution in these three categories. TEC (32) however featured strongly with a 23% increase compared with last year. Also significant is the high number of SD accidents (10) in which TEC was the only factor identified i.e. one third of the SD accidents. While the presence of airworthiness related events (landing gear and engine malfunctions) is to be expected, particularly amongst the older aircraft, perhaps more concerning was the presence of T7 (Company Maintenance) as a causal factor in 5 of the 50 accidents.

5.7 REGIONAL VARIATIONS

Of the 50 operational accidents, 9 occurred in the Asia/Pacific region, 9 in Europe, 10 in North America, 7 in the Caribbean/South America, 5 in the Middle East and 10 in Africa. The sharp increase in accidents in Africa from 4 in 1999 to 10 in 2000 is of particular concern. One third of all fatal airliner accidents happened in Africa, while Africa accounts for only about 3% of all world aircraft departures. Safety oversight of flight operations, aircraft maintenance standards and Air Traffic Control infrastructure is partly the responsibility of Governments and their regulators. A lack of regulatory oversight of both Western and Eastern jet operations in Africa is seen as contributing to the disturbing accident rate in Africa. Essentially, States are responsible for giving effect to ICAO standards (as a minimum) and for monitoring compliance with those requirements. Operators are responsible for complying with State requirements, as well as their own specific standards, remembering that minimum compliance is not necessarily enough to achieve the safety performance expected of Society.

5.8 HUMAN FACTORS

Of the 49 flight-crew related HUM classifications identified, 26 were attributable to proficiency/skill failure and/or incorrect decision making by the crew (H3) or, alternatively, 54% of the operational accidents suffered in 2000. These factors are to do with misjudgement, a lack of proficiency and skill and, further back from the accident scene, could point to a latent inadequate condition in the flight-crew training. The high scoring under classification O1 (Selection and Training of Crew Members), which attracted 26 factors, further supports this possibility. However, the 11 factors identified under H1, which suggest non-adherence to SOPs and even pre-meditated negligent behaviour, is most concerning. This perhaps suggests a need for greater self- discipline amongst crews but the problem is undoubtedly more complex. A better understanding of this area of human factors is likely to come from the much heralded Flight Operations Quality Assurance (FOQA) programmes and perhaps even more so from the and Line Operations Safety Audits (LOSA) programme being advanced by Professor Heimreich of the University of Texas and Captain Maurino of the ICAO Human Factors department. Not least, the IATA Operational Safety Audit (IOSA) programme should also lead to a better understanding of this area of error management and the more concerning the high proportion of intentional non-compliance errors committed by pilots.

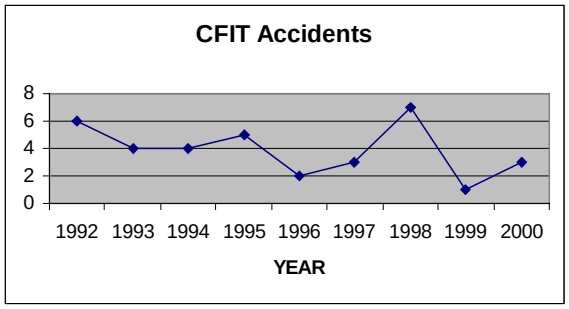
The CWG saw, in certain events, incorrect decision-making by the crew as being associated with pressures related to corporate schedule or financial problems this perhaps natural conclusion should be viewed also with an eye to “inadequate control or monitoring” (O5), and “incompatible goals” (O6) which collectively feature in 10 of these factors. It may not be appropriate in this section of the Safety Report to derive from the data that pilots are being forced to make unreasonable safety trade-offs. However, the airline safety managers of the CWG discussed this possibility and their views are represented further under Section 6 — Other Safety Issues.

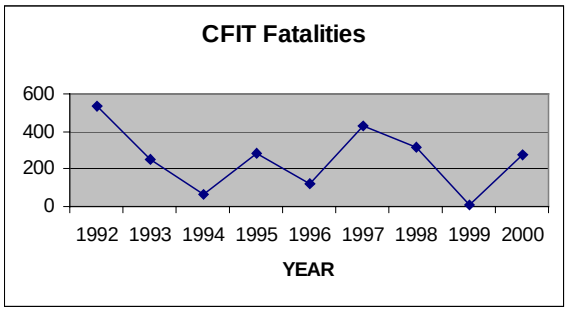
The most topical accidents in the human factors category were that of a B747 which met with disaster while trying to take off from the wrong runway and, elsewhere, an A310 which ran out of fuel during final approach.

5.9 CONTROLLED-FLIGHT-INTO-TERRAIN

The CWG’s definition of a Controlled-Flight-Into-Terrain (CFIT) accident is that of an accident in which an otherwise serviceable aircraft with fuel, under the control of the crew, lands (crashes) short of the runway, or is flown into terrain, obstacle(s) or water with no prior awareness on the part of the crew of the impending disaster. The industry CFIT Task force definition of this type of accident is broadly similar. It is one in which an airworthy aircraft has been inadvertently flown into terrain (ground), obstacle, or water, off the runway with no or little awareness by the pilot (s), but sufficient time existed to effect a safe recovery. Both definitions have been taken into consideration in this analysis of CFIT accidents.

For the period 1992-2000, the annual average of CFIT accidents was 4 and 253 associated fatalities per year. In 2000, there were 3 CFIT accidents (3 TL), one of which was a ferry flight but the other 2 fatal accidents claimed 35% of the year's total fatalities owing to the nature of this type of accident. Pilots are too often being caught out as they try to position the aircraft for landing in bad weather. Despite the increase in CFIT accidents in Y2000 this low figure forms part of an encouraging trend over the past 10 years. Undoubtedly aircraft equipment and CFIT training is improving but as can be seen from the trends in CFIT accidents and associated fatalities illustrated in the following graphs, the momentum of the industry wide campaign to minimise CFIT accidents must be maintained.





5.10 LOSS- OF- CONTROL

There were 3 TL accidents associated with Loss-of-Control arising in two instances from mismanagement in the cockpit of an airworthiness-related fault of the kind which should be well practised in the flight simulator. This issue was not included in last year's report but the focus on this important area of safety concern must be maintained. The most topical accident in this category was that resulting from aircraft which experienced a runaway horizontal stabiliser.

5.11 SITUATIONAL AWARENESS

Helmreich & Foushee (1993) identify situational awareness as an 'outcome rather than a specific set of mission management behaviours'. They nominate preparation, planning, vigilance, workload distribution and distraction avoidance as key factors when considering effective situational awareness. Orasana later describes situational awareness as the interpretation of 'situational cues'. Alternatively it has been described as, a state of mind — a dynamic mental model of relevant aspects of the "world". The CWG accepted these views, adding that situation awareness is not lost. Pilots are always forming some idea of what the system or process is doing. They always give a meaning to incoming cues and interpret data on the basis of what they already know, what they have just done, what they have set out to do, and what they expect to happen. When a mismatch occurs between how pilots understand their situation to be, and what the situation actually is, this can be termed loss of situational awareness.

Poor situational awareness was identified as a contributory factor in 7 of the 20 TL accidents reaffirming the need for particular attention to this area of concern. The pilot must be aware that the source of information, or cues, may differ from aircraft to aircraft, and from flight to flight. Like other CRM concepts, situational awareness may have become too vague a concept to many pilots and the early evidence of the accidents during 2000 suggests this would be a most unfortunate trend. Acknowledging the outstanding contribution to aviation safety made by the CFIT and the ALA task forces in recent years it is important to recognise that the ensuing training packages must be fully integrated into the overall training programme, which should include training in situational awareness. The essential tool for CFIT or terrain avoidance, along with other threats such as wind-shear and mid-air collision avoidance, is situational awareness. A CFIT accident is the result of a situational awareness failure. It is considered that safety would be enhanced by providing pilots with specific situational awareness training both during their initial conversion training as well as during recurrent training programmes such as Line Oriented Evaluation (LOE) exercises.

5.12 RUNWAY INCURSIONS

Although only one accident can be attributed in part to a runway incursion, the CWG were concerned about this risk which is evident in incident statistics. For example, the FAA has received reports of 429 runway incursions during the past year and is anxious to reverse this trend. Emerging technologies to reduce runway incursions must be identified. However, there must be no relaxation in current programmes to increase training and awareness for controllers, commercial and general aviation pilots and airport vehicle operators.

5.13 SAFETY OVERSIGHT

A lack of regulatory oversight was identified as a factor in 2 accidents involving Western Built jets compared with the 8 noted last year. In 8 accidents, however, the CWG identified inadequate safety or quality oversight — O5 — and this organisational issue at airline level is seen as being only one step away from scoring as a lack of regulatory oversight in the E11 category. Inadequate safety oversight was also apparent in terms of Ground Support (E6) related events (4).

5.14 GROUND SUPPORT

It is clear that ground damage and loading errors represent a serious threat to aviation safety. Ramp safety failures are now showing through in the accident statistics and 2000 saw 2 TLs in the Ground Support (E6) category. A particular area of concern is the ground damage caused by ground servicing vehicles. There is evidence that such damage has had serious consequences when not reported and assessed prior to flight. As mentioned in previous IATA Safety Reports, the need for operators to ensure that all ground damage is reported within a non-punitive reporting environment is essential. This requirement to establish and preserve an effective safety reporting culture is apparent elsewhere in the ground support areas such as cargo loading, catering, and maintenance.

5.15 ALL-CARGO OPERATIONS (DEDICATED FREIGHTER AIRCRAFT)

The CWG wish to refer to this category in future as Dedicated Freighter aircraft. The following table describes jet airliner fleet size, Total Loss (TL) and Substantial Damage (SD) accidents, and loss rates for all-cargo and passenger operations.

	FLEET (End of 2000)	TL	TL Per 1000 Aircraft	SD	TOTAL	Operational Accidents Per 1000 Aircraft
Dedicated Freighter	1,662	4	2.40	4	8	4.81
Passenger	13,061	15	1.15	24	39	2.99
Total	**14,723**	**19**	**1.29**	**28**	**47***	**3.19**

*Note this table does not include the three ferry flights (1TL, 2SD) shown in the table in the executive summary.

At year-end, Dedicated Freighter aircraft represented 11.3% of the world jet fleet. They were involved in 8 operational accidents (4 TL and 4 SD) as indicated in the following table:

AIRCRAFT	TL	SD
B707		1
B727	1	
B737	1	
B747		1
DC-8	1	1
DC-10	1	
MD-11		1
Totals	**4**	**4**

Therefore, in the Dedicated Freighter category, although there was one accident less than last year, the number of accidents in this category remains disproportionally high in comparison to the passenger aircraft category. All 3 of the TLs in Group 1 (Appendix A refers) involved dedicated freighters with dates of entry into service of the basic model ranging from 1958 to 1964. Three of these freighter losses were aged aircraft operated by airlines in Africa. The combination of 30-year-old aircraft operated in a less than comprehensive support infrastructure is presenting a higher risk scenario. Moreover, the threat of a cargo load shift in flight remains one of the most concerning risks in dedicated freighter operations.

6. OTHER FLIGHT SAFETY ISSUES

6.1 GENERAL

The mandate of the CWG is to identify threats to safety and, where viable, to offer recommendations. It is difficult, if not impossible, to evaluate flight safety solely in terms of factors arising from accidents. This section provides an opportunity for the safety managers participating in the CWG to express their concerns, perhaps those which are reflected in incidents of which they have knowledge, or other safety issues with which they are currently confronted.

6.2 EXTERNAL AND ENVIRONMENTAL PRESSURES

The analysis of this safety report shows that 60 % of the TL and SD accidents combined occurred in the approach and landing phase. Assuming a direct correlation between the results and risk levels, then ground operations and the take-off phase, with a combined total of 24% represents less than half the risk that is associated with the approach and landing phase. It is considered therefore that during the approach and landing phases that risk levels are more likely to increase because of the rising number of safety trade-offs that pilots are compelled to make.

Increasing traffic congestion, more politically influential environmental lobbyists, slot pressures, more demanding operational goals, company priorities and customer expectations, create a demanding environment in which the pilot must juggle these requirements in parallel with the demands for safety. In particular, late runway changes, ATC requests for high speeds to the outer marker, and landings on less favourable runways due to noise abatement procedures will require certain compromises to be made. The pilot must evaluate these compromises and judge the effect they will have upon the safety of the flight. In the extreme case these judgements may have to be made with inadequate knowledge or experience and may be influenced unduly by schedules and commercial pressures.

The pilot will always have to make decisions and choices but if accident reduction in the approach and landing phases is to be achieved, it is critical that external pressures and influences are kept under control. Pilots must be able to make ‘reasonable’ choices and should not be forced to compromise beyond personally acceptable minimum level of safety. It may well be that the industry should take a more positive stand against environmentalists and other groups who, perhaps unwittingly, are causing erosion of levels of safety.

6.3 PUNITIVE IMPEDIMENTS TO SAFETY SYSTEMS — CRIMINAL PROSECUTION OF CREWS

The need to establish and promote reporting cultures and systems, including confidential reporting and flight data monitoring, systems that do not lead to fault or punitive action is considered paramount to the success of any flight safety programme. The role of the Regulator in oversight of flight safety programmes must not impinge on voluntary company initiatives to enhance reporting and safety monitoring of their operation. Actions by the Operator, Regulator, Government or other external party that may result in prosecution and penalty must be seen as a disincentive to such reporting and thereby place at risk any improvement in the air safety and reporting culture.

Particular concern was expressed by the CWG about the manner in which several accident investigations had progressed. The Judicial Precedence and trend to criminal prosecution of crews involved are considered prejudicial to safety enhancement and contrary to the principles of ICAO Annex 13. There are great benefits to be gained by introducing legislation that would allow inadvertent mistakes made by air and ground crews to be reported without fear of retribution. This is not to protect egregious errors, deliberate breaking of the rules, or illegal acts that cannot be tolerated and must be dealt with accordingly. Rather this is to do with legislation that should protect from punitive action those who make inadvertent errors and give information in confidence to help the cause of accident prevention.

6.4 SITUATIONAL AWARENESS — LANGUAGE OTHER THAN ENGLISH IN ATC

A loss or lack of situational awareness, defied under section 5, has been identified as a significant factor in a number of accidents. A major factor in situational awareness is clear and unambiguous communications. The use of language other than English in ATC communications is identified as depriving crews of appropriate situational awareness.

6.5 SAFETY OVERSIGHT OF AIRLINE SERVICE PROVIDERS ON THE RAMP

As mentioned in the analysis section of this report, ground damage by servicing vehicles or equipment during turnarounds is now showing not only in the incident statistics but is being cited as a contributory factor in aircraft accidents. There is evidence that such damage has had serious consequences when not reported and assessed prior to flight. The need for operators to ensure that all ground damage is reported within a non-punitive reporting environment is essential. Open loops in the safety management system in this particular area of ground handling are dangerous. It is vital that safety feedback from the front line continues, firstly to understand why these hazards exist and next to establish what can be done to control them. It follows that senior airline managers have a responsibility to ensure that non-punitive safety reporting systems are put in place to assist in their understanding of the safety performance of their ground handling agents and service providers. Although the reporting culture on the ramp has improved in recent years there is much more to be done to ensure that there are no impediments to the reporting of ground damage.

The non-punitive reporting of incidents is but part of the Safety Management System that should be embraced by airside ground handling agents and service providers. As it is, airlines are reporting an alarming increase in both the number and severity of ground accidents that occur Airside involving people and property. Those senior airline managers responsible for overseeing the safety performance of their service providers and contractors must understand the nature of the ground handling business. Central to this understanding is an appreciation of the intense time and commercial pressure to which today's ground handlers are subjected. No longer is the work all under one organisation but more typically there is a complex web of separate contractors, each dealing with different aspects of the turnaround, all working alongside one another, and is susceptible to conflict. Too often there is no one in overall control of the turnaround of the aircraft or the ramp operation. With the ramp contractor situation being so competitive, there is a growing tendency for service providers to limit their responsibilities for safety related activities. Airport managers and regulators are increasingly faced with the problem of overseeing the safety performance of a disparate collection of contractors, most of whom are essential to improving customer service but whose business interests, agendas and requirements are not always conducive to effective safety management.

There are business benefits to be gained from good safety management on the ramp. The cost of damage and injury on the ramp has recently been estimated to be costing the airline industry USD2 Billion each year. For savings to be made it is necessary for the nature of the operation, particularly the pressures on the ramp, to be clearly understood. The ramp is not an area where competency and skill levels are consistently high. Whilst engineering and flight crew training and standards are mostly well developed, many airside ground handling staff do not have the same understanding, for example, of airworthiness and operational standards which must be adhered to in order to achieve a safe operation. Turnover of staff on the ramp is reportedly high, supervision often falls to the inexperienced, all amidst the certain and ever present pressure of on time performance. A better balance of the task and resources, consisting of properly trained staff, would pay dividends in cost saving and accident prevention.

The disparate nature of airside operations makes the training and oversight task all the more challenging and there is much more to be done. Whilst the standards required are well documented, Airport Authorities and regulators are less able to oversee safety in the march to "contractorisation". With this has come an increase in the power of the airline community as the direct customer of ground handling services. However, while many airlines are only too happy to use this power to reduce costs and improve service quality and efficiency, there is less evidence that it is being used to control safety on the ramp. In this situation there is a need for airlines to

require their ground handling agents and service providers to establish their own Safety Management Systems. The respective Ground Handling Agreements should stipulate safety performance targets and the essential components of the Safety Management System that must be incorporated. Such requirements could be developed from the IATA Standard Ground Handling agreements and Standard Catering Services Agreement. Above all, a Senior Corporate Manager of the airline must be held accountable by his/her CEO for reviewing the safety performance of the service providers/ground handling agents and monitoring the effectiveness of corrective action.

6.6 INCIDENTS

During this review of accidents occurring in the year 2000, the CWG was acutely aware of a number of other serious incidents as defined in ICAO Annex 13 which were not addressed as part of the safety review. Runway excursions and tail strikes, for example, may not have involved substantial damage but often avoided the accident statistics by good fortune alone. Similarly the underlying factors associated with serious incidents such as air proximity “near- misses” and intrusions on to the flight deck, have not been embraced by this report. The CWG felt that such incidents should be tracked, analysed and addressed by the Jet Safety Report.

Of particular concern during the year 2000 was a serious incident in which a mentally deranged passenger gained access to the flight deck and caused a severe upset to the flight path of the aircraft. This reflected the concerning increase in the number of passengers gaining access to unauthorised areas of the aircraft in recent years. Although the IATA database on such events is incomplete, it does nonetheless point to some extremely serious events arising from air rage and attacks on crew. This is a threat to aviation safety that needs to be understood more fully, beginning with a full exposition and analysis of all such serious incidents. IATA is aiming to capture more information on serious incidents to include in the next edition of the Safety Report. This work is in parallel with the Safety Trend Evaluation and Analysis Data Exchange System (STEADES) which will be used by IATA to mine incident- related information provided by a large number of airlines participating in the scheme.

6.7 IATA SAFETY STRATEGY 2000+

This analysis of the accidents which occurred in the year 2000 has confirmed that the industry safety priorities aimed at preventing Controlled-Flight-Into-Terrain accidents, Approach-and-Landing accidents, Loss of Control accidents and Human Factors, are the right ones. Conscious of these, and other emerging safety hazards, IATA has launched an enhanced and comprehensive safety strategy, to be known as Safety Strategy 2000+ which has been developed by the IATA Safety Committee.

IATA’s primary goal is to lead the global airline efforts to achieve a continuous improvement in safety.

Safety Strategy 2000+ calls for consolidation and integration of safety efforts at IATA with other industry organisations for greater effect, including regional airline organisations, aircraft manufacturers and the Flight Safety Foundation. The strategy will not only focus on the hazards evident from this report but it will also maintain awareness of other hazards through the integration and evaluation of safety data from various sources.

Under Safety Strategy 2000+ regional safety priorities will be established and best means for regional safety initiatives determined and implemented. Proper evaluation of the impact of safety initiatives in conjunction with constant monitoring of the industry safety performance will be key in ensuring the strategy is effective and delivers the desired continuous improvement in safety. This will include the development of an industry-wide standard that will ensure all Member airlines meet stringent operational criteria.

Safety must permeate the industry at all levels, from the shop floor all the way to the boardroom. With the full support of the IATA Board of Governors, Safety Strategy 2000+ therefore aims to reinforce the airline CEO role for safety accountability and actively promote safety initiatives and achievements through a sustained and effective industry-wide communications campaign.

7. RECOMMENDATIONS

Recommendations provided in previous IATA Safety Reports must often be reiterated, especially since much of the readership may be new to the airline industry. Additionally, experienced airline managers, flight and ground personnel will often benefit from revisiting the recommendations made in this and previous IATA Safety Reports. It is therefore recommended that reference is made to Appendix F.

For the year 2000 it is recommended that IATA and the Operators together:

7.1 Promote the use of just, non-punitive, air and ground safety reporting and investigation systems.

7.2 Further promote the use of Flight Operations Quality Assurance (FOQA), the ICAO LOSA programme and the IATA Operational Safety Audit (IOSA) system.

7.3 Increase awareness to the external and environmental pressures affecting pilots.

7.4 Review training practices and quality of training devices in terms of the particular skills required by a pilot during the landing phase.

7.5 Review training practices and SOPs to ensure that those basic flying skills which are first taught are not subsequently trained out of pilots by the implementation of specific procedures or the inappropriate use of automated systems.

7.6 Review training policy and practices with the aim of ensuring that specific training is given to pilots regarding situational awareness i.e. during initial conversion training as well as during recurrent training exercises.

7.7 Highlight the threat to situational awareness of using language other than English in the ATC environment and pursue wider use of English through ICAO, States, and Regions.

7.8 Counter punitive intrusion into Safety Monitoring Systems by protection of accident/incident data to promote greater reporting freedom to contribute to improved safety performance.

7.9 Co-ordinate with organisations such as ICAO, Flight Safety Foundation, and other professional institutions, the legislative defence against the criminal prosecution of flight crews.

7.10 Investigate the capture of serious incident data for analysis in the IATA Jet Safety report.

7.11 Develop a template, which could form part of Service Level Agreements, for operational safety performance monitoring of airline Service Providers (Ground Handling and Maintenance).

7.12 Review training emphasis and loading procedures to ensure that cargo shifts cannot occur in flight on dedicated freighter operations.

7.13 Encourage greater use of the IATA Safety Information Exchange system.

8. SIE REPORTS

Safety Information Exchange Reports were received on the following subjects:

4386 B757 Passenger Overhead Oxygen Mask Release Panels Deficiency
4387 A300 Flight Control Malfunction
4388 GPS Navigation Anomaly
4389 A320 Full-Face Oxygen Mask Goggles Anomaly
4390 B737-200 Uncommanded Left Rudder Movement
4391 BAE3200 Double Engine Power Failure
4392 B767 Bulkhead Airphone Electrical Short
4393 A319 Uncommanded Climb
4394 DC9-30 Depressurization Anomaly
4395 Avro RJ85 Runaway Electric Trim Incident
4396 B737-300 Rudder Pedal Jamming Incident
4397 B737-800 Antenna Location Anomaly
4398 CL65 Stabilizer and Mach Trim Failure
4399 ACAS High Vertical Speed Encounters
4400 Mobile Interference
4401 Taxiing Incident, Valencia, Venezuela
4402 MD80 Loss of Control Incident
4403 Jet Blast Incident at MIA
4404 EMB 145 Stabilizer Trim Failure
4405 CL65 Cabin Smoke Incident
4406 CL65 Anti-ice Duct Overheat Warning
4407 B737-200 Uncommanded Yaw Movements
4408 B767 Uncommanded Roll Incident
4409 Correction to SIE 4408
4410 B737-200 Hydraulic Systems Failure
4411 B767-300ER Engine Shut Down
4412 CL65 Elevator Split Problem
4413 Issue B of Report into TCAS Incident between BAW & KAL on 28 June 1999
4414 ILS Erroneous Glideslope Capture Apia
4415 B777 Passenger Seat Adjustment Wiring Incident
4416 B777 Hydraulic Brake Line Problem
4417 TCAS II Conflict Incident
4418 PA-44 Incorrect Heater Installation
4419 Mexico City Security Incident
4420 B777 Intercom System Anomaly
4421 B757-200 Air to Ground Communication System
4422 A320 Flight Control Incident
4423 Laptop Computer Navigation Interference

4424 Rolls Royce RB11 Engine Spinner Fairing Cracks
4425 A300 Uncommanded Rudder Movement
4426 CL65 In Flight Windshield Failure
4427 B757-200 Loss of Both Engine Bleeds

APPENDIX A — DEFINITIONS

Aircraft-years: means, for purposes of this report, the average fleet in-service during the year. The figure is calculated by counting the number of days each aircraft is in the airline fleet during the year and then dividing by 365. Periods during which the aircraft is out of service (for repair, storage, parked, etc) are then excluded.

Controlled Flight into Terrain (CFIT): An accident, in which an otherwise serviceable aircraft with fuel, under control of the crew, lands (crash) short of the runway, or is flown into terrain, obstacles or water with no prior awareness on the part of the crew of the impending disaster.

Crewmember: means anyone on-board a flight who has duties connected with the sector of the flight during which the accident happened. It excludes positioning or relief crew, security staff, etc. (see definition of "passenger" below).

Eastern-built aircraft: The main types in current service and considered in this Safety Report are the Il-62, Il-76, Il-86, Tu-134, Tu-154, Yak-40 and Yak-42.

Fatal accident: A fatal accident is one where at least one passenger or crew member is killed or later dies of their injuries as a result of an "operational" accident.

Events such as slips and falls, food poisoning, turbulence or accidents involving on-board equipment, which may involve fatalities but where the aircraft sustains minor or no damage, are excluded.

Most fatal accidents also result in the aircraft becoming a total loss but this is not necessarily always the case and there have been a number of substantial damage accidents where deaths have occurred.

Fatality: A fatality is a passenger or crewmember who is killed or later dies of their injuries resulting from an operational accident. Injured persons who die more than 30 days after the accident are generally excluded, however, one or two cases where death came later but could reasonably be shown to have been a direct result of injuries sustained in the original accident, are included. (This does not conform to the ICAO Annex 13 definition but, in this context, is thought to be more meaningful).

Flight phase: means a description of the situation or stage of flight in which the involved aeroplane suffered the accident or incident. The IATA flight phase codes are as follows:

CODE	DESCRIPTION	CONDITION(S)
TOF	Take-off	Start of take-off roll to 1500 ft AGL
CLB	Climb	1500 ft AGL to top of climb
CRS	Cruise	Top of climb to top of descent
DES	Descent	Top of descent to 3000 ft AGL
APP	Approach	3000 ft to crossing threshold
GOA	Go around	Discontinued approach and Landing
LDG	Landing	Crossing threshold to end of roll out (reaching proper taxi speed)
GND	Ground	Taxi or stationary with cockpit crew on board

IATA Accident Classifications: Classifications are groupings of factors attributable to accidents. They have been devised to help airlines develop training programmes for flight crew, cabin staff and other airline employees. These classifications can help identify the main areas of concern where remedial action should be taken.

IATA accident classifications are arranged in five categories: human, technical, environmental, organisational, and insufficient data.

It is generally difficult to classify accidents or incidents in only one category because they are often the result of a combination of different factors. Therefore, a single event may be classified under more than one category.

Human (HUM). The Human (HUM) category relates only to flight crew. However, the equivalent human factors implications are also present in the technical, environmental and operational areas. The H3 factor especially is often a consequence of an operational error or latent failure.

CODE	DESCRIPTION	EXAMPLE EVENT(S)
H1	Active Failure	Non-adherence to standards and procedures — this can include non adherence to SOP, law violations, failure to follow written instructions, failure to manage cockpit resources, gross lack of appropriate vigilance, laziness
H2	Passive Failure	Unawareness — Including possible breakdown of coordination, misunderstanding, communication failures, lack of expected support. It can be exacerbated by high workload, distraction, complacency, forgetfulness, boredom, and/or low arousal level, fatigue
H3	Proficiency/skill Failure	Inappropriate handling of aircraft or its systems — this can include misjudgement, making an incorrect decision. It can be exacerbated by lack of experience, lack of training or simple incompetence.
H4	Incapacitation	Flight crew member unable to perform his/her duty due to physical or psychological inability or impairment.

Technical (TEC).

CODE	DESCRIPTION
T1	Extensive engine failure, uncontained engine fire
T2	Engine failure, malfunction, fire warning
T3	Gear and tire
T4	Flight controls
T5	Structural failure
T6	Fire, smoke (cockpit, cabin, cargo)
T7	Company maintenance, servicing, (incl. Human error)
T8	Avionics
T9	Design, manufacturer
T10	Other
T11	System failure
T12	Autoflight

Environmental (ENV).

CODE	DESCRIPTION
E1	Meteorology (MET)
E2	Air Traffic Services (ATS)/Communications (COM)/conflicting traffic
E3	Ground-crew, cabin-crew, passengers
E4	Birds / Foreign Object Damage (FOD)
E5	Airport facilities
E6	Ground support (Procedures, Training)
E7	Navaids
E8	Dangerous goods
E9	Security
E10	Other
E11	Regulatory Oversight

Organisational (ORG).

CODE	DESCRIPTION
O1	Selection or training of crewmembers
O2	Inadequate SOPs, regulations
O3	Administrative deficiencies
O4	Latent failures
O5	Inadequate control and monitoring
O6	Incompatible goals
O7	Inadequate communications
O8	Other

Insufficient Data (I).

CODE	DESCRIPTION
I	Insufficient data to make any classification

Non-operational accident: This definition includes acts of deliberate violence such as sabotage, war etc. and (an IATA constraint) accidents which occur during crew training; demonstration and test flights. (Sabotage, etc. is believed to be a matter of security rather than flight safety, and crew training, demonstration and test flying are considered to involve special risks inherent to these types of operation).

Also included in this category are:

- Non-airline operated aircraft (e.g. military or government operated, survey, aerial work or parachuting flights)
- Accidents where there has been no intention of flight

Operational accident: means an accident is one which is believed to represent the risks of normal commercial operation, generally accidents which occur during normal revenue operations or positioning flights.

Passenger: means anyone on-board a flight who, as far as may be determined, is not a crew member. Apart from normal revenue passengers this includes off-duty staff members, positioning and relief flight crew members etc. who have no duties connected with the sector of the flight during which the accident happened. Security staff are included as passengers as their duties are not concerned with the operation of the flight.

Substantial Damage: means damage or structural failure which 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.

***Note**: Engine failure (damage limited to an engine), bent fairing or cowling, dented skin, small punctured holes in the skin or fabric, ground damage to rotor or propeller blades, minor damage to landing gear, wheels, tires, flaps, engine accessories, brakes, or wing tips are not considered "substantial damage" for purpose of this Safety Report.*

The ICAO Annex 13 definition is unrelated to cost and includes many incidents in which the financial consequences are minimal.

Total Loss: refers to accidents in which the aircraft has been destroyed or damaged according to the following definitions -

(a) **Western-built aircraft.** A total loss is defined as an aircraft which has been destroyed or otherwise damaged beyond economical repair (as generally determined by the insurance contract). It should be noted that on rare occasions an aircraft may actually be repaired after having been a total loss, however, they are still counted as having been total losses.

(b) **Eastern-built aircraft.** Accidents to the Eastern-built aircraft have been classified as "total hull losses", a term used in the former Soviet Union to denote an accident where the aircraft was either destroyed or otherwise never repaired. This is not the same as the definition used for Western-built aircraft.

A Total Loss event does not necessarily mean a "fatal" accident (e.g. a loss due to post-crash fire).

Western-built jet: Commercial jet transport aeroplane with a maximum takeoff weight (MTOW) of more than 15,000 Kg., designed and manufactured in the western world countries. They have been arranged into four groups, depending on the date of entry into service of the basic model.

BASIC MODEL	DATE OF ENTRY
GROUP 1	**1958-64**
Comet	30/09/58
B707/720	30/09/58
DC8	29/05/59
SE210	19/03/59
880/990	10/03/60
B727	29/10/63
Trident	19/12/63
VC10	22/04/64
GROUP 2	**1965-70**
BAC111	06/04/65
DC9	18/09/65
B737	28/12/67
F28	24/02/69
B747	12/12/69
GROUP 3	**1971-80**
DC10	20/07/71
L1011	05/04/72
A300	10/05/74
Mercure	16/05/74
VFW614	01/09/75
Concorde	19/12/75
MD80	13/09/80

BASIC MODEL	DATE OF ENTRY
GROUP 4	**1981-00**
B757	22/12/82
A310	25/03/83
BAe146/RJ	23/05/83
B767	19/08/83
A300-600	04/84
B737 (CFMI)	07/12/84
F100	29/02/88
A320	26/03/88
B747-400	09/02/89
MD11	29/11/90
CRJ	19/10/92
A340	29/01/93
A330	30/12/93
A321	27/01/94
B777	17/05/95
FK70	09/03/95
MD90	24/03/95
EMB145	27/12/96
A319	25/04/97
B737 NG	Early 1988
EMB135	09/09/99
F/D328	06/10/99
B717	12/10/99

APPENDIX B — IATA REGIONS

The geographic areas currently assigned to the respective IATA Regional Technical Conferences and respective Regional Offices are defined by countries as set out in the IATA Handbook as of January 1999. The designators assigned are shown in brackets.

AF — AFRICAN REGION (AFI)

Algeria, Angola
Benin, Botswana, Burkina Faso, Burundi
Cameroon, Cape Verde, Central African Republic, Chad, Comoros, Congo – Peoples Republic of, Cote d'Ivoire
Djibouti
Eritrea, Ethiopia, Eq. Guinea
Gabon, Gambia, Ghana, Guinea, Guinea Bissau
Kenya
Lesotho, Liberia, Libya
Madagascar, Malawi, Mali, Mauritania, Mauritius, Morocco, Mozambique
Namibia, Niger, Nigeria
Reunion, Rwanda
Sao Tome & Principe, Senegal, Seychelles, Sierra Leone, Somalia,
South Africa, Spain (Canary Is.), Western Sahara, Sudan, Swaziland
Tanzania, Togo, Tunisia
Uganda
Zaire, Zambia, Zimbabwe

SA — CARRIBEAN/SOUTH AMERICAN REGION (LATAM/CAR)

Argentina, Aruba
Bahamas, Barbados, Belize, Bolivia, Brazil
Cayman Is., Chile, Colombia, Costa Rica, Cuba
Dominican Republic
Ecuador, El Salvador
French Antilles, French Guiana
Grenada, Guatemala, Guyana
Haiti , Honduras
Jamaica
Mexico
Netherlands Antilles, Nicaragua
Panama, Paraguay, Peru, Puerto Rico
Surinam
Turks & Caicos Is., Trinidad & Tobago
Uruguay
Venezuela, Virgin Islands
West Indies Associated States

EU — EUROPEAN REGION (EUR)

Albania, Armenia, Austria, Azerbaijan
Belarus, Belgium, Bosnia/Herzegovina, Bulgaria
Croatia, Czech Republic
Denmark
Estonia
Finland, France
Georgia, Germany, Gibraltar, Greece
Hungary
Ireland, Italy
Latvia, Lithuania, Luxembourg
Malta, Moldova-Republic of
Netherlands, Norway
Poland, Portugal
Romania, Russian Federation (West of Moscow)
Slovenia, San Marino, Slovak Republic, Spain, Sweden, Switzerland
Turkey
United Kingdom, Ukraine
Yugoslavia, (Serbia/Montenegro)

NE — MIDDLE EAST REGION (MID)

Bahrain
Cyprus
Egypt, Arab Republic of
Iran, Iraq, Israel
Jordan, Hashemite Kingdom of
Kuwait
Lebanon
Oman, Sultanate of
Qatar
Saudi Arabia, Syrian Arab Republic
Turkey (Anatolia only) (Interface with MID)
United Arab Emirates

NA — NORTH ATLANTIC/ NORTH AMERICA REGION (NAT/NAM)

Bermuda
Canada
Iceland
United States of America

FE — ASIA/PACIFIC REGION (AS/PAC)

Afghanistan, Australia (including Cocos Is.),
American Samoa
Bangladesh, Brunei
China, Cook Islands
Easter Islands (Chile)
Fiji
Hong Kong
India, Indonesia
Japan
Korea, Kampuchea, Kiribati, Kazakstan, Kyrgystan
Laos
Malaysia, Maldives, Mariana Is., Marshall Is.,
Micronesia-Federated States of, Mongolia,
Myanmar
Nepal, New Zealand, New Caledonia, Nauru
Pakistan, Papua Niugini, Philippines
Russian Federation (East of Moscow)
Singapore, Solomon Islands, Sri Lanka
Tahiti, Taiwan, Thailand, Tonga, Tajikistan,
Turkmenistan
Guam, Hawaii, Line Islands
Uzbekistan
Vanuata, Vietnam
Western Samoa

APPENDIX C — ACCIDENT NARRATIVES

WESTERN-BUILT JET AIRLINERS
'OPERATIONAL' TOTAL LOSSES 2000

1. DATE OF LOSS: 2000-01-30

Aircraft Manufacturer: Airbus Industrie
Aircraft Type: A310
Year of Build: 1986
Operator: Kenya Airways
Registration: 5Y-BEN
Accident Location: in sea, off Abidjan,Ivory Coast
Service: Int'l. scheduled passenger
Phase of Flight: Take Off – Initial Climb
Classification: Total Loss
Loss %: 100
Crew on Board: 10
Crew Dead: 10
Crew Injured: 0
Pax on Board: 169
Pax Dead: 159
Pax Injured: 0

It is reported that on take-off from Runway 21 at Abidjan, the aircraft took more of the runway than normal and was 'still very low' as it passed over the sea wall some 500m beyond the end of the runway. The aircraft appears not to have gained height and it struck the surface of the water about one mile off shore. The accident happened in darkness (2108L) but apparently in clear weather, light winds and temp 77F. The aircraft was operating a service (KQ431) from Abidjan to Nairobi via Lagos.

2. DATE OF LOSS: 2000-01-31

Aircraft Manufacturer: Boeing (McDonnell-Douglas)
Aircraft Type: MD-80
Year of Build: 1992
Operator: Alaska Airlines
Registration: N963AS
Accident Location: in sea, off Point Mugu, California, USA
Service: Int'l. scheduled passenger
Phase of Flight: En Route/Landing – Initial Descent
Classification: Total Loss
Loss %: 100
Crew on Board: 5
Crew Dead: 5
Crew Injured: 0
Pax on Board: 83
Pax Dead: 83
Pax Injured: 0

The aircraft was destroyed when it apparently went out of control and fell into the waters of the Santa Barbara Channel some 20 miles south of Point Mugu whilst positioning for an approach to Los Angeles International Airport. While en-route from Puerto Vallarta, Mexico to San Francisco and in cruise flight at FL310 about 40 minutes after take-off, the pilot advised ATC that they were having control difficulties. The flight then seems to have rapidly descended to 23,700ft before the crew reported that they had the aircraft 'kind of stablised' and were going to attempt some 'troubleshooting'. The flight was subsequently cleared to fly between 20,000 and 25,000ft. About 4 or 5 min later the pilot advised ATC that they had a 'jammed stabiliser' and were having difficulty maintaining altitude. They also requested permission to divert to Los Angeles International Airport. At 1616L, 6 min after the first report of problems, the pilot advised ATC that they needed to descend to 10,000ft and configure the aircraft for landing 'while over water.' ATC subsequently cleared the flight to descend to 17,000ft. About 2min later, after having descended to 17,000ft., the crew extended the flaps and slats and apparently deemed the aircraft to be controllable in landing configuration. The flaps and slats were then stowed but about 1min later the crew apparently re-extended them. Very shortly after this the aircraft appears to have pitched over (-3g.) and rolled to the left into a steep dive which continued until impact with the sea.

3. DATE OF LOSS: 2000-02-03

Aircraft Manufacturer: Boeing
Aircraft Type: 707
Year of Build: 1967
Operator: Trans Arabian Air Transport
Registration: ST-APY
Accident Location: Lake Victoria, (near) Mwanza, Tanzania
Service: Int'l. ferry
Phase of Flight: Landing – Approach
Classification: Total Loss
Loss %: 100
Crew on Board: 5
Crew Dead: 0
Crew Injured: 0
Pax on Board: 0
Pax Dead: 0
Pax Injured: 0

The aircraft apparently undershot on approach to Runway 12 at Mwanza, coming down in Lake Victoria about 2nm. short of the runway threshold. The aircraft remained afloat and was later towed to shore and beached. The accident happened in darkness. It is understood that the accident happened during the aircraft's second approach. The first approach had been broken off and a left hand circuit flown to position for a second approach. However, while turning onto final approach, the aircraft reportedly flew through the extended centreline of the runway and a right turn was then made at low height to bring the aircraft back onto the correct approach path. During this turn the aircraft hit the water. It is reported that, when recovered, the captain's altimeter was reading 4,100ft while the co-pilot's was reading 3,720ft, which is correct for the airfield elevation. The aircraft was positioning from Juba, Sudan.

4. DATE OF LOSS: 2000-02-11

Aircraft Manufacturer: Airbus Industrie
Aircraft Type: A300
Year of Build: 1983
Operator: Air Afrique
Registration: TU-TAT
Accident Location: Yoff International Airport, Dakar, Senegal
Service: Int'l. scheduled passenger
Phase of Flight: Ground, Taxi
Classification: Total Loss
Loss %: 100
Crew on Board: 11
Crew Dead: 0
Crew Injured: 0
Pax on Board: 179
Pax Dead: 0
Pax Injured: 0

While taxiing for departure, as the aircraft entered the runway, a caution 'left undercarriage door in transit' came on. The pilot elected to return to the stand in order to have the apparent problem investigated. However, as the aircraft was taxiing back along a straight part of the taxiway, its left undercarriage suddenly collapsed allowing the No. 1 engine and left wing tip to strike the ground. On impact with the ground the No. 1 engine pylon was disturbed causing fuel and/or hydraulic lines to fail. Leaking fuel or hydraulic fluid was subsequently ignited and a fire broke out in the vicinity of the left engine. The fire caused damage to the left wing before it could be extinguished. It is understood that this was the aircraft's first commercial flight since the completion of a C-Check. It is alleged that some of the hydraulic lines in the left wheel well had, at some earlier time, been mislabled and, consequently, were not reconnected correctly. The aircraft was operating a flight to Paris.

5. DATE OF LOSS: 2000-02-12

Aircraft Manufacturer: Boeing
Aircraft Type: 727
Year of Build: 1967
Operator: TransAfrik
Registration: S9-NAZ
Accident Location: 4 de Fevereiro Airport, Luanda, Angola
Service: Domestic non-scheduled cargo
Phase of Flight: Landing – Landing Roll
Classification: Total Loss
Loss %: 100
Crew on Board: 7
Crew Dead: 0
Crew Injured: 0
Pax on Board: 0
Pax Dead: 0
Pax Injured: 0

Following an ILS approach to Runway 23 at Luanda, the aircraft reportedly touched down hard in a right wing low attitude and the right wing struck the ground. The impact also caused the aircraft's fuselage to fail and break away aft of the trailing edge of the wing. The accident happened in 'bad' weather with heavy rain and strong gusting winds. The accident happened during the second landing attempt, the first had been broken off when the aircraft became misaligned with the runway. The aircraft was operating a flight from Salima.

6. DATE OF LOSS: 2000-02-16

Aircraft Manufacturer: Boeing (McDonnell-Douglas)
Aircraft Type: DC-8
Year of Build: 1968
Operator: Emery Worldwide Airlines
Registration: N8079U
Accident Location: near) Sacremento, California, USA
Service: Domestic scheduled cargo
Phase of Flight: Take Off – Initial Climb
Classification: Total Loss
Loss %: 100
Crew on Board: 3
Crew Dead: 3
Crew Injured: 0
Pax on Board: 0

Pax Dead: 0
Pax Injured: 0

The aircraft was destroyed by impact and post impact fire when it apparently went out of control and crashed into an auto salvage yard while attempting to return to Mather Airport. The point of impact was about 1.5sm East of the threshold of Runway 22. It is reported that the aircraft had earlier taken off from Runway 22 but, about 45 seconds after getting airborne, the pilot advised ATC that he had a 'severe centre of gravity problem.' The pilot declared an emergency and commenced an immediate left turn to return to the airport. The aircraft appears to have flown a tight circuit but crashed while turning onto the base leg of the approach to Runway 22. The accident happened in darkness (1950L). The aircraft was operating a flight (No. 17) to Dayton, Ohio.

7. DATE OF LOSS: 2000-03-05

Aircraft Manufacturer: Boeing
Aircraft Type: 737 (CFMI)
Year of Build: 1984
Operator: Southwest Airlines
Registration: N668SW
Accident Location: Burbank International Airport, Burbank, California, USA
Service: Domestic scheduled passenger
Phase of Flight: Landing – Landing Roll
Classification: Total Loss
Loss %: 100
Crew on Board: 5
Crew Dead: 0
Crew Injured: 0
Pax on Board: 137
Pax Dead: 0
Pax Injured: 0

Following a visual approach to Runway 08 at Burbank, the aircraft reportedly landed (long?) and fast and then overran the end of the runway. The aircraft subsequently ran through the airport perimeter fence and across a road before coming to rest close to a gas station. The accident happened in darkness (1811L) but in VMC. Wind 210deg./6kt. Runway 08 is 6,032ft. long and has a grooved asphalt surface. The aircraft was operating a flight (SWA1455) from Las Vegas. On arrival at Burbank, on first contact with approach control, the flight was asked to maintain 230kt. or faster until advised and, later, to remain at or above 3,000ft. until crossing the Van Nuys VOR located about 6 miles from the airport. However, it would seem that the descent from 3,000ft. was not commenced until only about 4 miles from the runway threshold. The aircraft reportedly touched down at 181kt. and was still travelling at 32kt. as it went through the perimeter fence.

8. DATE OF LOSS: 2000-04-11

Aircraft Manufacturer: Airbus Industrie
Aircraft Type: A320-231
Year of Build: 1993
Operator: Mexicana (not Aeromexico)
Registration: F-OHMD
Accident Location: Minatitlan, Mexico
Service: domestic scheduled passenger
Phase of Flight: Ground
Total Loss
100%
Crew on Board: 6
Crew Dead: 0
Crew Injured: 0
Pax on Board: 0
Pax Dead: 0
Pax Injured: 0

During refuelling on the ramp at Minatitlan, the refuelling hose appears to have failed allowing fuel to spray out onto the right engine. The spilt fuel caught fire and caused substantial damage to the aircraft's right wing and engine before it could be put out. The accident occurred in darkness (1935L). It is understood that, at some time in the past, the fuel hose had been shortened by cutting and then remating the coupling and that the failure apparently occurred in this general area.

9. DATE OF LOSS: 2000-04-19

Aircraft Manufacturer: Boeing
Aircraft Type: 737 (JT8D)
Year of Build: 1978
Operator: Air Philippines
Registration: RP-C3010
Accident Location: Samal Island, (near) Davao, Philippines
Service: Domestic scheduled passenger
Phase of Flight: Landing – Approach
Classification: Total Loss
Loss %: 100
Crew on Board: 7
Crew Dead: 7
Crew Injured: 0
Pax on Board: 124
Pax Dead: 124
Pax Injured: 0

On arrival at Davao the pilot carried out an ILS approach to Runway 05 but was forced to make a

go around as the runway was occupied by another aircraft. The crew then requested a VOR/DME approach to Runway 23 and subsequently commenced an approach to that runway. Last contact with the flight was when the pilot reported at seven miles and advised that he would call again when he had the runway in sight. Two minutes later ATC attempted to contact the aircraft but received no reply. The aircraft was subsequently found to have crashed close to the summit of a low hill on Samal Island. The point of impact was on the extended centre line of the runway at about the 570ft. amsl. level some four miles from the runway threshold. The accident happened in daylight (about 0700L).

10. DATE OF LOSS: 2000-04-22

Aircraft Manufacturer: Avro
Aircraft Type: RJ Avroliner
Year of Build: 1996
Operator: THY – Turkish Airlines
Registration: TC-THL
Accident Location: Siirt Airport, Siirt, Turkey
Service: Domestic scheduled passenger
Phase of Flight: Landing – Landing Roll
Classification: Total Loss
Loss %: 100
Crew on Board: 4
Crew Dead: 0
Crew Injured: 0
Pax on Board: 42
Pax Dead: 0
Pax Injured: 0

Following a visual approach to Runway 06 at Siirt, on landing, the aircraft was not stopped before the end of the runway and it overran. After leaving the runway the aircraft continued down a slight slope and through the airport perimeter fence (chain link with heavy concrete uprights and sill) sustaining substantial damage. Inbound to Siirt, the forecast wind was 240deg/15kt. Therefore the crew briefed for a landing on Runway 24 and, in due course, commenced a circling approach to that runway. Sometime after the start of the approach to Runway 24, the Tower reported the actual wind as 240deg./8kt. The pilot subsequently elected to accept a tail wind component and land on Runway 06. The accident happened in daylight. Runway 06 at Siirt is 1801m. long and has an ungrooved concrete surface. There had been recent heavy rain and the runway was wet with, it is reported, areas of standing water. However, it is understood that no evidence of aquaplaning has been reported. The aircraft was operating a service from Ankara.

11. DATE OF LOSS: 2000-04-30

Aircraft Manufacturer: Boeing (McDonnell-Douglas)
Aircraft Type: DC-10
Year of Build: 1976
Operator: DAS Air
Registration: N800WR
Accident Location: Entebbe International Airport, Entebbe, Uganda
Service: Int'l. non-scheduled cargo
Phase of Flight: Landing – Landing Roll
Classification: Total Loss
Loss %: 100
Crew on Board: 7
Crew Dead: 0
Crew Injured: 0
Pax on Board: 0
Pax Dead: 0
Pax Injured: 0

Following a reportedly normal ILS approach and touchdown on Runway 17 at Entebbe, during the landing roll, as the aircraft slowed through about 80kt., it seemed to stop decelerating. It apparently became obvious that the aircraft would not stop before the end of the runway and the pilot therefore steered it off to the left in order to avoid overrunning through the ILS antenna and the approach lights. The aircraft continued across the grass for some 100m. before falling down a steep bank into the waters of Lake Victoria. The accident happened in darkness (0530L). Wind, reported 320deg./4kt. During the approach the aircraft had apparently encountered light to moderate rain, however, it is understood that, there had been recent 'very heavy' rain on the airfield. Runway 17 at Entebbe is 3658m. long and has an asphalt surface. The aircraft was operating a flight from London (Gatwick).

12. DATE OF LOSS: 2000-06-26

Aircraft Manufacturer: Boeing
Aircraft Type: 737 (JT8D)
Year of Build: 1984
Operator: Yemenia
Registration: 7O-ACQ
Accident Location: Khartoum Airport, Khartoum, Sudan
Service: Int'l. scheduled cargo
Phase of Flight: Landing – Landing Roll
Classification: Total Loss
Loss %: 100

Crew on Board: 5
Crew Dead: 0
Crew Injured: 0
Pax on Board: 0
Pax Dead: 0
Pax Injured: 0

It is reported that, on arrival at Khartoum, the crew had initially planned for a landing on Runway 18 but then elected to carry out a 'straight in' approach to Runway 36. However, it would seem that, on or shortly after touchdown, directional control was lost and the aircraft ran off the side of the runway. It subsequently continued across rough ground parallel to the runway. The aircraft's nose undercarriage struck a number of raised brick and concrete drain covers and was torn off. The aircraft came to rest beside the runway. The accident happened in daylight but in poor visibility in blowing sand. Wind 230deg./15kt.

13. DATE OF LOSS: 2000-07-12

Aircraft Manufacturer: Airbus Industrie
Aircraft Type: A310
Year of Build: 1989
Operator: Hapag-Lloyd
Registration: D-AHLB
Accident Location: Schwechat Airport, Vienna, Austria
Service: Int'l. non-scheduled pass.
Phase of Flight: Landing – Approach
Classification: Total Loss
Loss %: 100
Crew on Board: 8
Crew Dead: 0
Crew Injured: 0
Pax on Board: 142
Pax Dead: 0
Pax Injured: 0

The aircraft was planned to operate a charter flight (HF3378) from Chania, Crete to Hanover, however, on take-off, there were apparently indications that its left main undercarriage had failed to retract properly. It is reported that the decision was then made to continue with the flight to Munich, operating at a lower height and speed than normal. About 2hr. after take-off, while in contact with Budapest ATC, the crew apparently advised that they were diverting to Vienna. 11min. later, the crew reportedly declared an emergency and requested priority handling. The flight continued towards Vienna and an approach was commenced to Runway 34, however, while still some 20km. from the runway, both of the aircraft's engines lost power. The aircraft failed to gain the runway but instead touched down hard in fields a few hundred metres short of the threshold. It veered to the left and eventually came to rest on the grass to one side of the runway. During the accident sequence the aircraft's left undercarriage failed and broke away. The aircraft touched down 2hr 33min. after take-off, about 5min. after losing power on both engines.

14. DATE OF LOSS: 2000-07-17

Aircraft Manufacturer: Boeing
Aircraft Type: 737 (JT8D)
Year of Build: 1980
Operator: Alliance Air
Registration: VT-EGD
Accident Location: Gardanibagh District, Patna, India
Service: Domestic scheduled passenger
Phase of Flight: Landing – Approach
Classification: Total Loss
Loss %: 100
Crew on Board: 6
Crew Dead: 6
Crew Injured: 0
Pax on Board: 52
Pax Dead: 46
Pax Injured: 6

The aircraft was destroyed by impact and post impact fire when it crashed on approach to Patna. The point of impact was in a residential district 2,854ft. SE of the runway threshold. The accident happened in daylight (0734L) and in fine weather. Visibility 4,000m. in haze and wind, calm. The aircraft was operating a flight (CD412/IC7412) from Calcutta to Delhi via Patna and Lucknow.

On arrival at Patna, when about 25miles SE of the airfield, following the 313deg. radial towards the PPT (Patna) VOR (located on the airfield), the flight was cleared to descend and to report at 13DME for an ILS-DME ARC approach to Runway 25. This approach calls for a right turn at 13DME and then follow the 11DME ARC round to the left to intercept the localizer for Runway 25. The flight subsequently reported commencing the arc and then 'crossing lead radial and coming up on localizer.' The flight was requested to report established on the localizer. The pilot acknowledged this instruction but apparently never reported established. At 0732:30, about 1min. after reporting 'crossing (the) lead radial,' the pilot asked to do a 360deg. turn as they were too high on the approach. The pilot then confirmed that he had the

airfield in sight and was cleared to make the turn and to report on final approach. This clearance was acknowledged but there was then no further contact with the flight. ATC subsequently saw the aircraft commencing a left turn before 'loosing height all of a sudden.' A review of the CVR showed that, 6sec. after being cleared to commence the 360 the sound of the aircraft's 'stick shaker' can be heard.

According to a diagram published by the Court of Inquiry, the flight had not followed the published ILS-DME ARC approach and had flown through the localizer ('crossing lead radial') at a point inside 5DME.

15. DATE OF LOSS: 2000-07-25

Aircraft Manufacturer: Aerospatiale
Aircraft Type: Concorde
Year of Build: 1975
Operator: Air France
Registration: F-BTSC
Accident Location: Gonesse, (near) Paris, France
Service: Int'l. non-scheduled pass.
Phase of Flight: Take Off Run/Take Off – Initial Climb
Classification: Total Loss
Loss %: 100
Crew on Board: 9
Crew Dead: 9
Crew Injured: 0
Pax on Board: 100
Pax Dead: 100
Pax Injured: 0

The aircraft was totally destroyed when it apparently went out of control and crashed into the annex of the Hotel Hotelissimo, located on the outskirts of Gonesse, shortly after take-off from Charles de Gaulle Airport, Paris. The point of impact was some three miles beyond the departure end of the runway.

During the take-off roll on Runway 26R, after passing V1, ATC advised the flight that there were 'flames at the rear of the aircraft.' The take-off was continued but, at rotation, the crew can be heard on the CVR to announce the failure of the No. 2 engine. Shortly after this they also noted that the undercarriage 'could not be retracted.' The FDR apparently shows that the aircraft's No. 1 engine also suffered a temporary loss of power at rotation. After becoming airborne, the aircraft apparently did not climb beyond about 150–200ft. and failed to accelerate. Less than a minute after take-off, the No. 1 engine began to lose power again. The aircraft banked sharply to the left and crashed. The aircraft wreckage was contained within a relatively small area. Other debris from the aircraft has been found along its flight path and tyre debris was found on the runway. Apart from debris from the aircraft, a 'metal strip' said to be some 16in. long was also apparently found on the runway. This 'strip' reportedly matches the shape of a cut found in one of the aircraft's tyres and it is apparently currently believed that this caused the failure of one of the tyres during the take-off roll. Debris from the tyre is then thought to have punctured one of the fuel tanks leading to a major fuel leak and fire. Film of the aircraft's take-off and short flight shows a massive fire trailing behind it from the underside of its left wing. The metal strip is apparently believed to have come from a Continental DC-10 which had taken off shortly before the Concorde.

The accident happened in daylight (1644L) and in fine, clear weather. The aircraft was operating a charter flight (AF4590) to New York on behalf of a german tour company, Peter Deilmann River and Ocean Cruises. The passengers were to join the cruise ship MS Deutschland in New York.

16. DATE OF LOSS: 2000-08-23

Aircraft Manufacturer: Airbus Industrie
Aircraft Type: A320
Year of Build: 1994
Operator: Gulf Air
Registration: A4O-EK
Accident Location:(near) Manama, Bahrain
Service: Int'l. scheduled passenger
Phase of Flight: Landing – Go Around
Classification: Total Loss
Loss %: 100
Crew on Board: 8
Crew Dead: 8
Crew Injured: 0
Pax on Board: 135
Pax Dead: 135
Pax Injured: 0

It is reported that, following a VOR/DME approach to Runway 12 at Muharraq International Airport, Bahrain, the aircraft's speed was high and the pilot carried out a 360deg. turn about one mile from the runway threshold. During this turn the aircraft's height increased from about 600ft. to 700ft. before decreasing to about 350ft. and the aircraft's airspeed decreased from 200kt. to about 160kt. Following the orbit, the aircraft was poorly positioned to complete the landing and a go around was commenced. ATC subsequently

instructed the flight to turn left onto a heading of 300deg. and climb to 2,500ft. The aircraft's undercarriage was retracted and engine thrust increased to maximum. The aircraft began a left turn and climbed to about 1,000ft. in a 5deg nose up attitude. Meanwhile its airspeed had increased beyond 185kt. and the Master Warning sounded. The co-pilot announced 'over-speed limit' and this was reportedly apparently quickly followed by a forward movement of the captain's side stick. The aircraft's pitch gradually decreased to 15deg. nose down. It rapidly lost height and crashed into shallow water about one mile north of the runway. There was no distress call nor, apparently, did the pilot report any problems. The accident happened in darkness (1930L) but in good weather; CAVOK, wind 090deg./7kt. and Temp. +35C. The aircraft was operating a flight (GF072) from Cairo.

17. DATE OF LOSS: 2000-10-06

Aircraft Manufacturer: Boeing (McDonnell-Douglas)
Aircraft Type: DC-9
Year of Build: 1970
Operator: Aeromexico
Registration: N936ML
Accident Location: General Lucio Blanco Airport, Reynosa, Mexico
Service: Domestic scheduled passenger
Phase of Flight: Landing – Landing Roll
Classification: Total Loss
Loss %: 100
Crew on Board: 5
Crew Dead: 0
Crew Injured: 0
Pax on Board: 83
Pax Dead: 0
Pax Injured: 0

Following a non-precision approach to Runway 31 at Reynosa, the aircraft reportedly touched down about halfway along the runway. It was subsequently not stopped before the end of the runway and overran. The aircraft continued for some 400m. along an old runway and then for a further 100m. across soft, scrub covered ground before impacting a number of small, wooden houses. It eventually struck an 8ft. high earth embankment and came to rest partway in a canal on the far side. Four people in one of the houses were killed in the crash. The accident happened in daylight (1655L) but in poor weather with light, variable winds, visibility 3 miles in heavy rain and overcast ceiling at 800ft. Runway 31 at Reynosa is 1,900m. long and has an asphalt surface. The aircraft was operating a flight from Mexico City.

18. DATE OF LOSS: 2000-10-31

Aircraft Manufacturer: Boeing
Aircraft Type: 747
Year of Build: 1996
Operator: Singapore Airlines
Registration: 9V-SPK
Accident Location: Chiang Kai Shek International Airport, Taipei, Taiwan
Service: Int'l. scheduled passenger
Phase of Flight: Take Off Run
Classification: Total Loss
Loss %: 100
Crew on Board: 20
Crew Dead: 4
Crew Injured: 3
Pax on Board: 159
Pax Dead: 79
Pax Injured: 45

The aircraft was destroyed by impact and post impact fire after hitting a number of obstructions while attempting to take-off from a closed runway. According to early reports, on departure from Taipei, the flight had apparently been cleared to taxy to Runway 05L and had proceeded along taxiway NP, which runs slightly to the East and parallel to the two runways (Runway 05L and 05R). At the end of the taxiway the aircraft would have turned right and crossed the end of Runway 05R before entering Runway 05L, about 200m. beyond. However, it would seem that the aircraft lined up on Runway 05R and, when, in due course, it was cleared for take-off, commenced its take-off run on the closed runway. The initial part of the take-off run appears to have been uneventful but, about four seconds after the co-pilot called 'V1' (142kt.), the captain is heard on the CVR to exclaim 'something there.' A 'banging' sound is heard almost immediately after this.

Runway 05R was closed due to work in progress, however, the first 1,400m. of the runway was apparently unobstructed and available for use as a taxiway. The work area commenced after the intersection of Taxiway N4 and was protected by a concrete barrier. The 747 apparently struck this barrier and continued on to impact two heavy mechanical excavators and other equipment.

The accident happened in darkness (2317L) and in bad weather with strong winds (reported as 020deg./28kt., gusting to 50kt.) and heavy rain. It is reported that, at the time of the accident,

Runway 05L was 'fully lit' with yellow edge and white centreline lights. Taxiway NP and Runway 05R were apparently lit with green taxiway centreline lights. The aircraft was operating a service (SQ006) to Los Angeles.

19. DATE OF LOSS: 2000-11-05

Aircraft Manufacturer: Boeing
Aircraft Type: 747
Year of Build: 1981
Operator: Cameroon Airlines
Registration: TJ-CAB
Accident Location: Charles de Gaulle Airport, Paris, France
Service: Int'l. scheduled passenger
Phase of Flight: Landing – Landing Roll
Classification: Substantial Damage
Loss %: 0
Crew on Board: 16
Crew Dead: 0
Crew Injured: 0
Pax on Board: 183
Pax Dead: 0
Pax Injured: 0

The aircraft reportedly overran (or went off the side?) of Runway 09R while landing at Charles de Gaulle Airport, Paris and was substantially damaged when its nose undercarriage dug into soft ground and broke away. The accident happened in darkness (2230L) and in bad weather with strong, gusting winds and rain. The runway was wet. The aircraft was operating a flight (UY070) from Douala via Yaounde.

20. DATE OF LOSS: 2000-11-13

Aircraft Manufacturer: Boeing (McDonnell-Douglas)
Aircraft Type: DC-9
Year of Build: 1975
Operator: Ghana Airways
Registration: 9G-ADY
Accident Location: Conakry Airport, Conakry, Guinea
Service: Int'l. scheduled passenger
Phase of Flight: Landing – Landing Roll
Classification: Total Loss
Loss %: 100
Crew on Board: 6
Crew Dead: 0
Crew Injured: 0
Pax on Board: 61
Pax Dead: 0
Pax Injured: 0

On arrival at Conakry, the aircraft landed with its undercarriage retracted. It is understood that the crew had not advised ATC of any problems prior to touchdown and that one of the cabin crew, who had been seated outside the flight deck door during the approach, reported hearing the GPWS oral warning 'pull up.' During the aircraft's recovery, when the undercarriage was selected down, it apparently extended and locked into position 'without difficulty.' The accident happened in daylight (1600L) and in clear, fine weather. The aircraft was operating a flight (GH530) from Accra via Abidjan. Apart from the damage caused by the belly landing, further substantial damage was caused during the recovery operation.

WESTERN-BUILT JETS
OPERATIONAL SUBSTANTIAL DAMAGE 2000

1. DATE OF LOSS: 2000-02-19

Aircraft Manufacturer: Boeing (McDonnell-Douglas)
Aircraft Type: DC-8
Year of Build: 1971
Operator: Kitty Hawk International
Registration: N811CK
Accident Location: Tacoma International Airport, Seattle, Washington, USA
Service: Domestic non-scheduled cargo
Phase of Flight: Take Off Run
Classification: Substantial Damage
Loss %: 13
Crew on Board: 5
Crew Dead: 0
Crew Injured: 0
Pax on Board: 0
Pax Dead: 0
Pax Injured: 0

On take-off from Seattle, at rotation, the crew received anomalous indications for the No. 2 engine and the aircraft rolled slightly to the left. The take-off was completed and the crew began to trouble shoot the problem. However, at this point ATC advised them that they had left 'debris' on the runway. The pilot subsequently elected to return to Seattle where a safe landing was made sometime later. The accident happened in darkness (2147L) but in VMC. The aircraft was operating a flight to Anchorage.

It was subsequently determined that the cowlings from both the No. 1 and 2 engines had come away during the take-off roll and climb out. An initial review of the cowl sections found no evidence of damage to any of the latches, latching pins or associated areas. It is also understood that the cowl latches were in the un-latched position when initially found.

After the aircraft had arrived at Seattle that morning, work had been carried out to trouble shoot and rectify reported problems on the thrust reversers on both the No. 1 and 2 engines. The engineer working on the No. 2 engine, who was due to go off shift at 1300 but worked on until 1645, signed off the work when he had finished but left the engine cowling 'wide-open'. He apparently then asked the engineer working on the No. 1 engine to close the cowlings for him. A third engineer, who came on duty at 1500, received a 'tie-in' from the engineer, who had previously been working on the No. 1 engine, that all the cowlings on the aircraft needed to be closed, however, he did not review the 'tie-in' log. The third engineer initially attended a Boeing 747 and did not arrive at the DC-8 until sometime between 1630 and 1645. At that time he noted that the cowlings on the No. 1 and 2 engines were already closed although those for the No. 3 and 4 engines were open. He did not check that the cowlings on the No. 1 and 2 engines were properly latched. The engineer's previous shift had ended at 0130 but he had worked on until 0800. He had then gone home but had been unable to sleep before reporting for duty again at 1500.

2. DATE OF LOSS: 2000-02-22

Aircraft Manufacturer: Boeing
Aircraft Type: 767
Year of Build: 1989
Operator: Egyptair
Registration: SU-GAO
Accident Location: Harare International Airport, Harare, Zimbabwe
Service: Int'l. scheduled passenger
Phase of Flight: Landing – Landing Roll
Classification: Substantial Damage
Loss %: 57
Crew on Board: 17
Crew Dead: 0
Crew Injured: 0
Pax on Board: 76
Pax Dead: 0
Pax Injured: 0

Following a VOR/DME approach to Runway 23 at Harare, shortly after touchdown, the aircraft apparently ran off the right side of the runway. The pilot brought the aircraft back to the left but it continued across the runway and onto the grass on the other side. The aircraft was eventually brought back onto the runway and brought to a safe stop. At some point during the accident sequence the left engine struck the ground and the engine and pylon were torn away.

The accident happened in darkness (about 2200L) and in 'bad' weather with strong, gusting winds. The aircraft was operating a flight (MS880) from Johannesburg to Cairo via Harare.

3. DATE OF LOSS: 2000-02-26

Aircraft Manufacturer: Boeing
Aircraft Type: 747
Year of Build: 1976
Operator: Iran Air
Registration: EP-IAG

Accident Location: King Abdulaziz International Airport, Jeddah, Saudi Arabia
Service: Int'l. ferry
Phase of Flight: Ground, Taxi
Classification: Substantial Damage
Loss %: 24
Crew on Board: 8
Crew Dead: 0
Crew Injured: 0
Pax on Board: 0
Pax Dead: 0
Pax Injured: 0

Following pushback and engine start, the tow tug was disconnected and moved slightly to one side. However, at this point, the crew, apparently believing that they had been given the 'all clear', increased power and began to taxi forward. The aircraft's right main undercarriage subsequently struck the tug sustaining substantial damage. The accident happened in darkness (0530L). It is understood that, when the misunderstanding happened, the ground engineer had already disconnected his head set and was communicating with the crew by hand signals.

4. DATE OF LOSS: 2000-02-27

Aircraft Manufacturer: Boeing
Aircraft Type: 737 (CFMI)
Year of Build: 1990
Operator: Transbrasil
Registration: PT-TEO
Accident Location: Salgado Filho Airport, Port Alegre, Brazil
Service: Domestic scheduled passenger
Phase of Flight: Landing – Landing Roll
Classification: Substantial Damage
Loss %: 57
Crew on Board: 7
Crew Dead: 0
Crew Injured: 0
Pax on Board: 111
Pax Dead: 0
Pax Injured: 0

The aircraft (overran?) on landing on Runway 29 at Porto Alegre and fell into a ditch some 45m from the runway centreline. The accident happened in darkness (2019L) and in poor weather with strong winds and heavy rain. The aircraft is said to have aquaplaned. Runway 29 is 2,280m long. The aircraft was operating a flight (TBA202) from Sao Paulo

5. DATE OF LOSS: 2000-03-01

Aircraft Manufacturer: Airbus Industrie
Aircraft Type: A320
Year of Build: 1991
Operator: South African Airways
Registration: ZS-SHD
Accident Location: Lusaka Airport, Lusaka, Zambia
Service: Int'l. scheduled passenger
Phase of Flight: Landing – Landing Roll
Classification: Substantial Damage
Loss %: 37
Crew on Board: 7
Crew Dead: 0
Crew Injured: 0
Pax on Board: 142
Pax Dead: 0
Pax Injured: 0

During the final stage of an ILS approach to Runway 10 at Lusaka, visual contact with the runway was established just before reaching the decision height (200ft). The approach was continued but, just before touchdown, the aircraft entered an area of heavy rain and sight of the runway was lost. The aircraft subsequently touched down to the right of the runway centreline and then veered further to the right. It ran off the side of the runway onto soft ground and then continued, roughly parallel to the runway, until it struck the edge of a taxiway where its right main undercarriage apparently failed. The accident happened in daylight (1310L) but in poor weather with heavy rain associated with local thunderstorm activity. The aircraft was operating a flight (SA064) from Johannesburg.

6. DATE OF LOSS: 2000-03-13

Aircraft Manufacturer: Boeing
Aircraft Type: 727
Year of Build: 1978
Operator: Delta Air Lines
Registration: N516DA
Accident Location: San Francisco International Airport, San Francisco, California, USA
Service: Domestic scheduled passenger
Phase of Flight: Landing – Landing Roll
Classification: Substantial Damage
Loss %: 24
Crew on Board: 7
Crew Dead: 0
Crew Injured: 0
Pax on Board: 70
Pax Dead: 0
Pax Injured: 0

On take-off from San Francisco, when the undercarriage was selected up, the red 'doors' light came on. The aircraft subsequently climbed to 5,000ft and was put into a hold while the crew attempted to rectify the problem. Meanwhile a visual inspection of the undercarriage showed that the right main undercarriage was partially extended and the clamshell door was open. The crew completed the emergency procedures but did not recycle the undercarriage as apparently Delta procedures do not allow this in case it causes more problems. Attempts were made to manually extend the undercarriage but to no avail and the crew, therefore, decided to return to San Francisco. The aircraft touched down safely on Runway 28R and the crew attempted to hold the right wing up for as long as possible. As the aircraft's speed slowed, the right wing dropped and struck the runway. The aircraft came to rest on the runway. There was no fire. The accident happened in darkness (2006L) but in VMC. The aircraft was operating a flight (DAL1972) to Salt Lake City.

7. DATE OF LOSS: 2000-03-17

Aircraft Manufacturer: Airbus Industrie
Aircraft Type: A330
Year of Build: 1998
Operator: Canada 3000 Airlines
Registration: C-GGWA
Accident Location: Vancouver International Airport, Vancouver, British Columbia, Canada
Service: Domestic scheduled passenger
Phase of Flight: Take Off – Initial Climb?
Classification: Substantial Damage
Loss %: 3
Crew on Board: 13
Crew Dead: 0
Crew Injured: 0
Pax on Board: 240
Pax Dead: 0
Pax Injured: 0

On take-off from Vancouver, the left outboard engine fan cowl broke away and struck the leading edge of the left wing. The cowling then travelled inboard and struck the fuselage-to-wing fairing. The crew declared an emergency before returning to Vancouver for a safe landing. The accident happened in darkness (2046L). The aircraft was operating a flight to Calgary.

8. DATE OF LOSS: 2000-03-19

Aircraft Manufacturer: Boeing
Aircraft Type: 727
Year of Build: 1964
Operator: Aviandina
Registration: OB-1731
Accident Location: Tacna Airport, Tacna, Peru
Service: Domestic scheduled passenger
Phase of Flight: Landing – Landing Roll
Classification: Substantial Damage
Loss %: 50
Crew on Board: 6
Crew Dead: 0
Crew Injured: 0
Pax on Board: 58
Pax Dead: 0
Pax Injured: 0

During the approach to Juliaca, when the undercarriage was selected down the right main undercarriage apparently would not extend. The pilot subsequently elected to divert to Tacna where the aircraft landed with its right main undercarriage up. The aircraft was operating a flight from Lima via Arequipa.

9. DATE OF LOSS: 2000-03-26

Aircraft Manufacturer: Boeing
Aircraft Type: 747
Year of Build: 1974
Operator: Pakistan International Airlines
Registration: AP-BCO
Accident Location: King Abdulaziz International Airport, Jeddah, Saudi Arabia
Service: Int'l. ferry
Phase of Flight: Landing – Landing Roll
Classification: Substantial Damage
Loss %: 6
Crew on Board: 16
Crew Dead: 0
Crew Injured: 0
Pax on Board: 0
Pax Dead: 0
Pax Injured: 0

On landing at Jeddah, the aircraft's No. 4 engine reportedly caught fire. It is understood that both fire bottles were used and that, initially, the fire 'died down.' However, sometime later, it apparently flared up again and had caused damage to the engine cowls, pylon and adjacent wing area before it could be extinguished by the AFS.

10. DATE OF LOSS: 2000-04-01

Aircraft Manufacturer: Boeing
Aircraft Type: 727
Year of Build: 1980
Operator: Continental Micronesia
Registration: N79743

Accident Location: Yap Airport, Yap, Pacific Islands (Trust Territories)
Service: Domestic scheduled passenger?
Phase of Flight: Landing – Landing Roll
Classification: Substantial Damage
Loss %: 29
Crew on Board: 7
Crew Dead: 0
Crew Injured: 0
Pax on Board: 96
Pax Dead: 0
Pax Injured: 0

The aircraft's right main undercarriage reportedly collapsed on landing

11. DATE OF LOSS: 2000-04-03

Aircraft Manufacturer: Boeing
Aircraft Type: 747
Year of Build: 1979
Operator: Atlas Air
Registration: N534MC
Accident Location: in flight, (near) Guayaguil, Ecuador
Service: Int'l. scheduled cargo
Phase of Flight: Take Off – Initial Climb
Classification: Substantial Damage
Loss %: 13
Crew on Board: 3
Crew Dead: 0
Crew Injured: 0
Pax on Board: 0
Pax Dead: 0
Pax Injured: 0

Shortly after take-off from Guayaguil, as the aircraft was climbing through about 400ft, its No. 1 engine reportedly suffered an uncontained failure. The pilot subsequently elected to return to Guayaguil and made a safe landing. Debris from the engine fell on a built-up area causing some damage on the ground. The accident happened in daylight (1400L). The aircraft was operating a flight for Lan Chile between Santiago and Miami with a technical stop at Guayaguil.

12. DATE OF LOSS: 2000-04-22

Aircraft Manufacturer: Boeing
Aircraft Type: 747
Year of Build: 1986
Operator: QANTAS
Registration: VH-EBW
Accident Location: Fumicino International Airport, Rome, Italy
Service: Int'l. scheduled passenger
Phase of Flight: Ground, Taxi
Classification: Substantial Damage
Loss %: 23
Crew on Board: 19
Crew Dead: 0
Crew Injured: 0
Pax on Board: 301
Pax Dead: 0
Pax Injured: 0

On departure from Rome, due to work in progress on the taxiway, the aircraft had to backtrack Runway 16L/34R and make a 180deg turn prior to take-off from Runway 16L. During this turn at the end the runway there was a 'loud bang' and the aircraft settled on its right side. An initial inspection found that the right main undercarriage outer cylinder had apparently fractured and broken away. The aircraft was operating a flight (QF16) to Bangkok and Melbourne.

13. DATE OF LOSS: 2000-05-06

Aircraft Manufacturer: BAE SYSTEMS (HS)
Aircraft Type: 146
Year of Build: 1991
Operator: British European
Registration: G-JEBE
Accident Location: Birmingham International Airport, Birmingham, United Kingdom
Service: Domestic scheduled passenger
Phase of Flight: Ground, Taxi
Classification: Substantial Damage
Loss %: 3
Crew on Board: 6
Crew Dead: 0
Crew Injured: 0
Pax on Board: 104
Pax Dead: 0
Pax Injured: 0

After pushback from Stand 57, just as the aircraft started to taxi, its right main undercarriage fell into an excavation, which had been covered by steel plates. The aircraft sustained substantial damage, however, the passengers and crew escaped without serious injury and disembarked safely. The accident happened in daylight. The aircraft was operating a service to Jersey. The cause of the accident was the failure of one or more of the plates to support the aircraft's right main undercarriage. The plates had not been secured to the surface of the taxiway nor had any temporary infilling of the trench been carried out to provide support for the plates.

14. DATE OF LOSS: 2000-05-22

Aircraft Manufacturer: Boeing (McDonnell-Douglas)
Aircraft Type: MD-11
Year of Build: 1998
Operator: EVA Air
Registration: B-16111
Accident Location: Chiang Kai Shek Inernational Airport, Taipei, Taiwan
Service: Int'l. scheduled cargo
Phase of Flight: Landing – Landing Roll/Landing – Go Around
Classification: Substantial Damage
Loss %: 5
Crew on Board: 2
Crew Dead: 0
Crew Injured: 0
Pax on Board: 0
Pax Dead: 0
Pax Injured: 0

It is reported that, following an ILS approach to Runway 05L at Taipei, during the landing flare, a high sink rate developed and the aircraft subsequently touched down hard and bounced. During the bounce it would appear that the pilot pushed the nose down and, as a result, the aircraft touched down hard on its nose undercarriage. At this point the crew elected to carry out a go-around but, on take-off, the aircraft was apparently over rotated and its tail struck the ground.

The aircraft climbed away before returning for a safe landing. The landing was being performed by the co-pilot. The accident happened at night (0320L) but in clear weather. There had been recent rain and there had apparently been some reports of windshear. The aircraft was operating a flight (682) from Penang.

15. DATE OF LOSS: 2000-05-25

Aircraft Manufacturer: Boeing (McDonnell-Douglas)
Aircraft Type: MD-80
Year of Build: 1987
Operator: Air Liberte
Registration: F-GHED
Accident Location: Charles de Gaulle Airport, Paris, France
Service: Int'l. non-scheduled pass.
Phase of Flight: Take Off Run
Classification: Substantial Damage
Loss %: 25
Crew on Board: 6
Crew Dead: 0
Crew Injured: 0
Pax on Board: 150
Pax Dead: 0
Pax Injured: 0

During the take-off roll on Runway 27, while accelerating close to V1, the aircraft's left wing struck the cockpit and forward fuselage area of a Streamline Shorts 330 (G-SSWN) which had apparently begun to enter the active runway at a taxiway intersection. The accident happened in darkness (0252L). The aircraft was operating a flight to Madrid. The Shorts 330 was departing on a flight to Luton.

16. DATE OF LOSS: 2000-06-07

Aircraft Manufacturer: Boeing
Aircraft Type: 767
Year of Build: 1986
Operator: VARIG
Registration: PP-VNO
Accident Location: Guarulhos International Airport, Sao Paulo, Brazil
Service: Int'l. scheduled passenger
Phase of Flight: Take Off Run
Classification: Substantial Damage
Loss %: 30
Crew on Board: 10
Crew Dead: 0
Crew Injured: 0
Pax on Board: 178
Pax Dead: 0
Pax Injured: 0

Shortly after the start of the take-off roll on Runway 09L at Sao Paulo, the aircraft's No. 2 engine apparently suffered an uncontained failure and caught fire. The take-off was aborted and the crew took action to extinguish the fire. However, it had caused damage to the engine cowls, pylon and adjacent wing area before it was put out. The aircraft was operating a service (RG886) to Lima.

17. DATE OF LOSS: 2000-06-14

Aircraft Manufacturer: Boeing (McDonnell-Douglas)
Aircraft Type: DC-9
Year of Build: 1975
Operator: Aeromexico
Registration: XA-DEI
Accident Location: Miguel Hidalgo Airport, Guadalajara, Mexico
Service: Domestic scheduled passenger
Phase of Flight: Landing – Landing Roll
Classification: Substantial Damage

Loss %: 14
Crew on Board: 6
Crew Dead: 0
Crew Injured: 0
Pax on Board: 94
Pax Dead: 0
Pax Injured: 0

The aircraft overran the end of the runway on landing and became bogged down in soft ground. The aircraft's undercarriage did not collapse but both engines appear to have suffered FOD. The accident happened in 'very poor weather'.

18. DATE OF LOSS: 2000-06-14

Aircraft Manufacturer: Boeing (McDonnell-Douglas)
Aircraft Type: DC-9
Year of Build: 1976
Operator: Hawaiian Air
Registration: N649HA
Accident Location: Lihue Airport, Lihue, Hawaii, USA
Service: Domestic scheduled passenger
Phase of Flight: Landing – Landing Roll
Classification: Substantial Damage
Loss %: 15
Crew on Board: 5
Crew Dead: 0
Crew Injured: 0
Pax on Board: 134
Pax Dead: 0
Pax Injured: 0

The aircraft sustained substantial damage as the result of a hard landing on Runway 35 at Lihue. The landing was made by the co-pilot. The accident happened in daylight (1649L) and in VMC. Wind 080deg/9kt. The aircraft was operating a flight (193) from Honolulu.

19. DATE OF LOSS: 2000-07-18

Aircraft Manufacturer: Fokker
Aircraft Type: F.28
Year of Build: 1981
Operator: Iran Asseman Airlines
Registration: EP-PAU
Accident Location: Ahwaz Airport, Ahwaz, Iran
Service: Domestic scheduled passenger
Phase of Flight: Landing – Landing Roll
Classification: Substantial Damage
Loss %: 0
Crew on Board: 6
Crew Dead: 0
Crew Injured: 0
Pax on Board: 83
Pax Dead: 0
Pax Injured: 0

During the final stage of a visual approach to Runway 30 at Ahwaz, just before touchdown, the pilot lost visual contact with the runway. The aircraft subsequently touched down hard towards the right side of the runway and on a heading diverging further to the right. It then bounced, touching down again on hard ground off the right side of the runway. The pilot elected to carryout a go around and, after a ground run of about 100m., successfully got airborne again. The crew put the aircraft into a holding pattern while they assessed the situation before returning to Ahwaz about 24min. later for a safe landing. The accident happened in darkness with reduced visibility in blowing sand. The aircraft was operating a service (EP775) from Tehran.

20. DATE OF LOSS: 2000-07-27

Aircraft Manufacturer: Boeing
Aircraft Type: 727
Year of Build: 1974
Operator: Iran Air
Registration: EP-IRP
Accident Location: Shiraz Airport, Shiraz, Iran
Service: Domestic scheduled passenger
Phase of Flight: Landing – Landing Roll
Classification: Substantial Damage
Loss %: 15
Crew on Board: 8
Crew Dead: 0
Crew Injured: 0
Pax on Board: 110
Pax Dead: 0
Pax Injured: 0

On approach to Shiraz, when the undercarriage was selected down, the nose undercarriage would not extend. The pilot made a number of attempts to rectify the problem but to no avail and, after carrying out a fly by of the control tower so that the position of the nose undercarriage could be confirmed, returned to Shiraz for an emergency landing. During the subsequent landing roll the pilot managed to hold the aircraft's nose up until the last moment and it suffered relatively minor damage. The failure of the undercarriage has reportedly been attributed to the loss of a locating bolt from the nose undercarriage uplock release actuating rod. The aircraft was operating a flight from Tehran.

21. DATE OF LOSS: 2000-08-07

Aircraft Manufacturer: Boeing
Aircraft Type: 707
Year of Build: 1968
Operator: Air Memphis
Registration: SU-PBB
Accident Location: Ostend Airport, Ostend, Belgium
Service: Int'l. non-scheduled cargo
Phase of Flight: Landing – Approach/Landing – Landing Roll
Classification: Substantial Damage
Loss %: 0
Crew on Board: 3
Crew Dead: 0
Crew Injured: 0
Pax on Board: 0
Pax Dead: 0
Pax Injured: 0

During the final stage of the approach to Ostend, as the aircraft descended through about 40ft., its No. 2 engine reportedly surged and lost power. The aircraft subsequently touched down hard. The landing was completed and the aircraft taxied to the ramp. An inspection of the aircraft's No. 2 engine found damage to the first and second stage fan blades and to the engine inlet casing. The engine was changed, however, during refuelling prior to departure, a number of fuel leaks were discovered and further investigation apparently found damage to the left wing rear spar at its inbound terminal.

22. DATE OF LOSS: 2000-08-08

Aircraft Manufacturer: Boeing (McDonnell-Douglas)
Aircraft Type: DC-9
Year of Build: 1969
Operator: AirTran Airways
Registration: N838AT
Accident Location: in flight, (near) Greensboro, North Carolina, USA
Service: Domestic scheduled passenger
Phase of Flight: Take Off – Climb to Cruise
Classification: Substantial Damage
Loss %: 67
Crew on Board: 5
Crew Dead: 0
Crew Injured: 0
Pax on Board: 57
Pax Dead: 0
Pax Injured: 0

Shortly after take-off from Greensboro, as the aircraft climbed through about 7,000ft., the pilot reported smoke in the cockpit, apparently coming from the Power Distribution Panel located behind his seat. The crew, who had donned their oxygen masks and goggles, reported that the smoke became very dense and restricted their ability to see the cockpit instruments, visual references outside the aircraft or even each other. The flight returned safely to Greensboro and an emergency evacuation was carried out on the runway. A subsequent inspection discovered that the fire had apparently originated in the vicinity of the avionics cooling fan relay and had caused extensive damage within the panel and to the fuselage frames and crown skin directly above it. The accident happened in daylight (1545L). The aircraft was operating a flight to Atlanta.

23. DATE OF LOSS: 2000-08-27

Aircraft Manufacturer: Boeing
Aircraft Type: 747
Year of Build: 1980
Operator: KLM Royal Dutch Airlines
Registration: PH-BUP
Accident Location: in flight, (near) Los Angeles, California, USA
Service: Int'l. scheduled passenger
Phase of Flight: Take Off – Initial Climb
Classification: Substantial Damage
Loss %: 11
Crew on Board: 18
Crew Dead: 0
Crew Injured: 0
Pax on Board: 435
Pax Dead: 0
Pax Injured: 0

On take-off from Runway 25R at Los Angeles, as the aircraft climbed through about 375ft. agl., there was a rumbling noise and the aircraft began to shake. Subsequently the flight engineer reported that there was an engine vibration annunciation on his panel and that the No. 3 engine N1 was fluctuating in the high end of the normal range. The crew believed that they had suffered a bird strike and elected to return to Los Angeles where a safe landing was made sometime later. Meanwhile, parts of the No. 3 engine cowling and tail cone had broken away and fallen on Dockweiler State Beach just beyond the end of the runway. The accident happened in daylight (1641L) and in VMC. The aircraft was operating a flight to Amsterdam.

24. DATE OF LOSS: 2000-08-29

Aircraft Manufacturer: Boeing
Aircraft Type: 747
Year of Build: 1983
Operator: Japan Airlines
Registration: JA8161
Accident Location: Hongqiao Airport, Shanghai, China
Service: Int'l. scheduled passenger
Phase of Flight: Ground, Taxi
Classification: Substantial Damage
Loss %: 15
Crew on Board: 18
Crew Dead: 0
Crew Injured: 0
Pax on Board: 175
Pax Dead: 0
Pax Injured: 0

While taxiing towards the gate after landing, the aircraft reportedly 'took a wrong turn' and its right wing was substantially damaged when it struck a lamp standard. The aircraft had just arrived on a flight from Tokyo.

25. DATE OF LOSS: 2000-09-19

Aircraft Manufacturer: Boeing
Aircraft Type: 767
Year of Build: 1995
Operator: Vietnam Airlines
Registration: S7-RGV
Accident Location: Tan Son Nhat Airport, Ho Chi Minh City, Vietnam
Service: Int'l. scheduled passenger
Phase of Flight: Landing – Landing Roll
Classification: Substantial Damage
Loss %: 11
Crew on Board: 12
Crew Dead: 0
Crew Injured: 0
Pax on Board: 190
Pax Dead: 0
Pax Injured: 0

At some point during the landing sequence, the aircraft appears to have touched down hard on its nose undercarriage causing substantial damage. The landing was completed safely and the aircraft taxied to the stand. The accident happened in daylight (1448L). Weather; visibility 1,500m. in light rain. The aircraft was operating a service (VN941) from Osaka, Japan.

26. DATE OF LOSS: 2000-09-23

Aircraft Manufacturer: Boeing
Aircraft Type: 737 (CFMI)
Year of Build: 1999
Operator: Kenya Airways
Registration: 5Y-KQD
Accident Location: Khartoum Airport, Khartoum, Sudan
Service: Int'l. scheduled passenger
Phase of Flight: Landing – Landing Roll
Classification: Substantial Damage
Loss %: 4
Crew on Board: 7
Crew Dead: 0
Crew Injured: 0
Pax on Board: 104
Pax Dead: 0
Pax Injured: 0

The aircraft was damaged in a hard landing at Khartoum. The accident happened in daylight but in deteriorating weather conditions with strong crosswinds. The aircraft was being handled by the co-pilot (a captain undergoing route validation) at the time. The aircraft was operating a flight from Nairobi.

27. DATE OF LOSS: 2000-11-24

Aircraft Manufacturer: Boeing
Aircraft Type: 737 (CFMI)
Year of Build: 1992
Operator: Thai Airways International
Registration: HS-TDF
Accident Location: Bangkok International Airport, Bangkok, Thailand
Service: Int'l. scheduled passenger
Phase of Flight: Landing – Landing Roll
Classification: Substantial Damage
Loss %: 15
Crew on Board: 9
Crew Dead: 0
Crew Injured: 0
Pax on Board: 146
Pax Dead: 0
Pax Injured: 0

On landing at Bangkok, the aircraft apparently touched down hard and bounced. It subsequently came down on its nose undercarriage, which failed and collapsed. The accident happened in darkness (2230L). The aircraft was operating a flight from Ho Chi Minh City.

28. DATE OF LOSS: 29-11-2000

Aircraft Manufacturer: Boeing (McDonnell-Douglas)
Aircraft Type: DC-9
Year of Build: 1970
Operator: AirTran Airways
Registration: N816AT
Accident Location: in flight, (near) Atlanta, USA
Service: scheduled domestic passenger
Phase of Flight: Take-off – Climb to Cruise
Classification: Substantial Damage
Loss %: 57
Crew on Board: 5
Crew Dead: 0
Crew Injured: 0
Pax on Board: 92
Pax Dead: 0
Pax Injured: 0

Shortly after take-off from Atlanta, the pilot reported that he had an 'electrical problem' with indications of smoke in the forward cargo hold and that he was returning. The aircraft landed safely and was brought to a halt on the runway where an emergency evacuation was carried out. A preliminary inspection found fire damage in the vicinity of the left side of the hold, extending to the cabin floor and the base of the cabin sidewalls. The aircraft was operating a flight to Akron, Ohio.

29. DATE OF LOSS: 30-11-2000

Aircraft Manufacturer: Boeing
Aircraft Type: 737 (NG)
Year of Build: 2000
Operator: Futura International Airways
Registration: EC-HMK
Accident Location: Shannon Airport, Shannon, Ireland
Service: International non-scheduled passenger
Phase of Flight: Landing – Landing Roll
Classification: Substantial Damage
Loss %: 22
Crew on Board: 6
Crew Dead: 0
Crew Injured: 0
Pax on Board: 189
Pax Dead: 0
Pax Injured: 0

Following an ILS approach to Runway 24 at Shannon, on touchdown, the aircraft appears to have come down hard on its nose undercarriage, which subsequently failed and collapsed. The accident happened in daylight (1240L) but in poor weather with strong, gusting, cross winds. The aircraft was operating a flight from Lanzarote.

30. DATE OF LOSS: 23-12-2000

Aircraft Manufacturer: Boeing (McDonnell-Douglas)
Aircraft Type: DC-10
Year of Build: 1979
Operator: Hawaiian Air
Registration: N132AA
Accident Location: Faaa Airport, Papeete, Tahiti
Service: International scheduled passenger
Phase of Flight: Landing – Landing Roll
Classification: Substantial Damage
Loss %: ?
Crew on Board: 15
Crew Dead: 0
Crew Injured: 0
Pax on Board: 139
Pax Dead: 0
Pax Injured: 0

The aircraft overran on landing at Papeete and came to rest with its nose undercarriage and the lower forward fuselage partially submerged in the lagoon off the end of the runway. The accident happened in darkness (2359L) and in poor weather with heavy rain. The aircraft was operating a flight (HAL481) from Honolulu.

EASTERN-BUILT JETS
OPERATIONAL TOTAL LOSSES 2000

1. DATE OF LOSS: 2000-03-09

Aircraft Manufacturer: Yakovlev
Aircraft Type: Yak-40
Year of Build: 1976
Operator: Vologda Air Enterprise
Registration: RA-88170
Accident Location: Sheremetyevo Airport, Moscow, Russia
Service: Int'l. non-scheduled pass.
Phase of Flight: Take Off – Initial Climb
Classification: Total Loss
Loss %: 100
Crew on Board: 5
Crew Dead: 5
Crew Injured: 0
Pax on Board: 4
Pax Dead: 4
Pax Injured: 0

On take-off from Sheremetyevo Airport, Moscow, the aircraft apparently climbed to a height of about 30 to 50m before losing height and crashing at the side of the runway. The accident happened in daylight (0840L) and in clear weather. The aircraft was operating a flight to Kiev. Initial reports suggest that the aircraft had either not been de-iced or had been improperly de-iced prior to departure and that it was not correctly configured for take-off.

2. DATE OF LOSS: 2000-10-06

Aircraft Manufacturer: Antonov
Aircraft Type: An-72
Year of Build: 1982
Operator: Centrafrican Airlines
Registration: TL-ACW
Accident Location: Luzamba Airport, Luzamba, Angola
Service: Domestic non-scheduled cargo
Phase of Flight: Landing – Landing Roll
Classification: Total Loss
Loss %: 100
Crew on Board: 6
Crew Dead: 0
Crew Injured: 0
Pax on Board: 4
Pax Dead: 0
Pax Injured: 0

On arrival at Luzamba, during the first approach, the aircraft reportedly encountered turbulence and the crew elected to increase speed. The aircraft subsequently landed long, reportedly touching down about halfway along the runway. The crew decided to carry out a go around and the aircraft got airborne again. However, because of the perceived risk of hostile action, a tight right hand circuit was flown to bring the aircraft back for a second approach. During this manoeuvre, it would appear that the crew forgot to extend the undercarriage and the aircraft subsequently touched down with it retracted. The aircraft remained on the runway and came to rest after a ground slide of some 350m. It is reported that the undercarriage warning horn sounded but, in the circumstances, the crew mistook it for something else.

EASTERN-BUILT JETS
OPERATIONAL SUBSTANTIAL DAMAGE

1. DATE OF LOSS: 2000-07-04

Aircraft Manufacturer: Tupolev
Aircraft Type: Tu-154
Year of Build: 1982
Operator: MALEV
Registration: HA-LCR
Accident Location: Makedonia Airport, Thessaloniki, Greece
Service: Int'l. scheduled passenger
Phase of Flight: Landing – Go Around
Classification: Substantial Damage
Loss %: ?
Crew on Board: 7
Crew Dead: 0
Crew Injured: 0
Pax on Board: 80
Pax Dead: 0
Pax Injured: 0

According to unconfirmed reports, during the final stage of the approach to Thessaloniki, just before touchdown, ATC instructed the flight to go-around as there was an aircraft on the runway. The pilot subsequently commenced a go-around and retracted the undercarriage, however, the aircraft, initially, continued to descend and it struck the runway before a positive rate of climb was established. The aircraft then climbed away before returning to Thessaloniki for a safe landing. The accident happened in daylight and in conditions of high temperature (reportedly +40C). The aircraft was operating a flight (MA262) from Budapest.

APPENDIX D — TABLES

	Sectors				Losses				Fleet
Type	**1958-80**	**1981-91**	**1991-2000**	**Total**	**1958-80**	**1981-90**	**1991-2000**	**Total**	**end 2000**
GROUP 1									
Comet	823,700	0	0	823,700	10	0	0	10	0
B707/720	14,886,400	2,045,400	555,400	17,487,200	59	28	21	108	96
DC8	8,774,400	2,011,200	1,474,800	12,260,400	40	9	17	66	234
SE210	5,585,300	611,200	63,800	6,260,300	31	9	3	43	10
880/990	1,573,100	16,900	0	1,590,000	9	2	0	11	0
B727	30,890,400	28,354,700	15,096,400	74,341,500	34	19	21	74	1,165
Trident	1,290,600	401,700	10,400	1,702,700	3	5	0	8	0
VC 10	526,400	0	0	526,400	2	0	0	2	0
Tot Grp 1	**64,350,300**	**33,441,100**	**17,200,800**	**114,992,200**	**188**	**72**	**62**	**322**	**1,505**
GROUP 2									
BAC111	5,047,500	2,512,600	912,100	8,472,200	12	4	7	23	94
DC9	26,062,100	19,352,500	13,207,200	58,621,800	32	18	22	72	675
B737 (JT8D)	12,317,500	22,191,900	17,850,000	52,359,400	8	30	27	65	809
F28	1,693,400	3,676,500	3,113,200	8,483,100	12	11	8	31	165
B747	2,436,300	4,948,400	4,209,600	11,594,300	6	5	8	19	499
Tot Grp 2	**47,556,800**	**52,681,900**	**39,292,100**	**139,530,800**	**70**	**68**	**72**	**210**	**2,242**
GROUP 3									
DC10	2,023,800	3,498,600	2,544,000	8,066,400	8	6	6	20	315
L1011	1,311,200	2,497,500	1,467,400	5,276,100	2	1	1	4	135
A300	419,100	3,053,200	2,205,700	5,678,000	0	3	4	7	168
Mercure	121,300	239,800	60,800	421,900	0	0	0	0	0
VFW614	52,200	0	900	53,100	0	0	0	0	2
Concorde	20,200	34,900	28,900	84,000	0	0	1	1	12
MD80	2,100	6,438,600	19,164,600	25,605,300	0	3	7	10	1,154
Tot Grp 3	**3,949,900**	**15,762,600**	**25,472,300**	**45,184,800**	**10**	**13**	**19**	**42**	**1,786**
GROUP 4									
B757	0	1,633,200	8,752,000	10,385,200	0	1	4	5	920
A300-600	0	319,300	2,310,500	2,629,800	0	0	3	3	243
A310	0	940,400	2,172,000	3,112,400	0	0	6	6	217
Bae 146/RJ	0	1,180,000	4,501,800	5,681,800	0	0	5	5	347
B717	0	0	43,500	43,500	0	0	0	0	41
B737CFMI	0	4,622,500	31,243,500	35,866,000	0	3	11	14	1,929
B737NG	0	0	1,398,800	1,398,800	0	0	0	0	689
B744	0	71,000	2,474,600	2,545,600	0	0	3	3	533
B767	0	1,911,300	6,630,700	8,542,000	0	0	2	2	786
Do 328J	0	0	42,400	42,400	0	0	0	0	46

	Sectors				Losses				Fleet
Type	**1958-80**	**1981-91**	**1991-2000**	**Total**	**1958-80**	**1981-90**	**1991-2000**	**Total**	**end 2000**
F100	0	140,100	4,650,200	4,790,300	0	0	3	3	273
A320	0	204,300	8,212,300	8,416,600	0	2	5	7	883
MD11	0	100	954,700	954,800	0	0	5	5	188
CRJ	0	0	2,936,400	2,936,400	0	0	1	1	448
A340	0	0	502,300	502,300	0	0	0	0	178
A330	0	0	699,200	699,200	0	0	0	0	173
A321	0	0	1,019,600	1,019,600	0	0	0	0	175
A319	0	0	939,900	939,900	0	0	0	0	312
B777	0	0	764,200	764,200	0	0	0	0	309
FK70	0	0	397,300	397,300	0	0	0	0	43
MD90	0	0	649,700	649,700	0	0	1	1	113
EMB135	0	0	73,900	73,900	0	0	0	0	58
EMB145	0	0	863,600	863,600	0	0	1	1	286
Total Gp 4	**0**	**11,022,200**	**82,233,100**	**93,255,300**	**0**	**6**	**50**	**56**	**9,190**
Grand total	**115,857,000**	**112,907,800**	**164,198,300**	**392,963,100**	**268**	**159**	**203**	**630**	**14,723**

AIRCLAIMS DATA

Year	Hours, million	Sectors, million	Fleet size (k)
58	0.008	0.003	12
59	0.204	0.008	143
60	0.817	0.343	392
61	1.465	0.664	588
62	1.998	0.964	741
63	2.318	1.166	831
64	2.770	1.370	1,025
65	3.436	1.803	1,303
66	4.460	2.478	1,682
67	5.784	3.387	2,182
68	7.495	4.739	2,858
69	9.066	6.131	3,388
70	9.797	6.848	3,678
71	10.192	7.145	3,891
72	10.709	7.468	4,092
73	11.120	7.811	4,315
74	11.056	8.040	4,540
75	11.306	8.346	4,771
76	11.829	8.663	4,925
77	12.396	8.985	5,047
78	13.125	9.408	5,223
79	13.794	9.866	5,549
80	13.902	10.148	5,852
81	13.637	10.189	6,107
82	13.729	9.496	6,201
83	14.085	9.657	6,357
84	15.281	10.409	6,470
85	16.183	10.990	6,754
86	17.419	11.531	7,108
87	18.643	12.106	7,470
88	19.737	12.562	7,926
89	20.351	12.658	8,317
90	21.970	13.324	8,911
91	21.990	13.078	9,337
92	23.773	13.716	9,952
93	24.990	14.264	10,450
94	26.578	15.083	10,951
95	28.423	15.857	11,367
96	30.174	16.642	11,780
97	31.846	17.381	12,301
98	33.203	18.005	12,965
99	35.357	19.654	13,850
2000	38.211	21.168	14,723

AIRCLAIMS DATA

ACCIDENT COSTS ($M) ADJUSTED TO 2000 VALUES				
YEAR	Hull Losses	Major Accidents	Passenger Liabilities	Minor Liabilities
91	278	124	144	141
92	367	107	263	149
93	407	248	117	154
94	451	171	757	164
95	195	191	339	190
96	372	125	1007	211
97	380	205	347	223
98	548	315	796	194
99	666	289	518	196
2000	550	274	644	200
Totals:	3663	1774	4287	1623
Western built Jet Airliners (All Losses incl. Acts of Violence, non-operational losses and some losses suffered by non-airline operators). Passenger liability figures may include contribution from 'products'				

AIRCLAIMS DATA

APPENDIX E — POWERPOINT PRESENTATION

A PowerPoint presentation is available on request to the Director, Flight Operations and Safety Services, IATA.

APPENDIX F — RECOMMENDATIONS FROM PREVIOUS JET SAFETY REPORTS

Given the flow of labour in air commerce, recommendations provided in previous Safety Reports should often be reiterated, especially since much of its readership may be new to the industry. There will always be a new cadre of managers who will benefit from the recommendations made herein.

A. CONFIDENTIAL AND NON-PUNITIVE REPORTING SYSTEMS

The Safety Report should include a recommendation to encourage development and use of confidential reporting systems.[1] Confidential reporting schemes — when run by clearly independent non-state authority agencies, provide a valuable "last resort" safety net. They can often reveal problems that would otherwise remain hidden, particulary in cultures (airline or regional) where admission of errors to management provokes punitive measures or humiliation.

Unfortunately, these schemes do suffer from certain limitations. Reporters and investigators are often unaware of significant aspects known only to airline safety managers. Their ability to resolve problems on their own is sometimes limited by their dependence on State agencies.

Such airline schemes do not duplicate existing mandatory national schemes but extend them.

Practical experience has shown that significant advances in proactive accident avoidance can result from the implementation of certain types of airline operated confidential reporting schemes. One airline (some 300 aircraft fleet) reports that within the first year of such a confidential scheme, 700 reports were received, of which 550 provided useful human factors information.

However, they depend critically upon clearly a clearly-stated, non-punitive Company Policy which encourages participation and protects the reporter. Unfortunately, the culture, aviation legislation and legal systems in many States mitigate against this freedom. Given certain state-mandated and operated confidential reporting schemes in some regions, it appears IATA and operators might pursue suitable changes to facilitate such airline operated schemes.

B. APPLICATION OF QUALITY ASSURANCE TO AIRLINE SAFETY

B.1. Flight Operations Quality Assurance

FAA Issues Policy On FOQA Programs

FAA Administrator Jane Garvey said yesterday (September 22, 1998) the agency will not use "deidentified" digital flight data recorder information to undertake enforcement actions "except in egregious (eg: those involving fraud or criminal intent) cases." A rulemaking will follow, Garvey said. The new policy is similar to FAA's position during a three-year test of the Flight Operations Quality Assurance (FOQA) program in cooperation with major airlines and pilots unions. Garvey said the safety benefits derived from using the data "are in the public interest."[2]

The policy statement says the demonstration study has "provided substantial documentation of the benefits of FOQA," and the findings are "very similar to the results obtained by foreign air carriers, many of whom have long experience in the use of this technology." Use of the data is made possible by a new generation of digital flight data recorders that can routinely provide information concerning unusual auto-pilot disconnects, ground proximity warning system activation, excessive rotation rates on takeoff, unstabilized approaches, hard landings and compliance with standard operating procedures. Garvey said the data also have been used for monitoring fuel efficiency, enhancing engine condition monitoring, noise abatement compliance, rough runway surfaces and aircraft structural fatigue.

This information can be used to identify needed improvements in flight crew performance, in air carrier training programs, operating procedures, air traffic control, airport maintenance and design, and aircraft operations and design," Garvey said. This, she said, "clearly enhances safety. The FAA therefore finds that encouraging the voluntary implementation of FOQA programs by U.S. operators is in the public interest." Garvey earlier told The DAILY that FAA was working with the Justice

Department concerning immunity issues. “I am suggesting a policy at the same time as a rulemaking,” she said (DAILY, Sept. 22). She said there was no need for legislation.

The test program, recommended by the Aviation Safety Commission, included the participation of United, US Airways, Continental and Alaska at numerous airports. Air Transport Association President Carol Hallett welcomed the policy statement, saying the “FOQA concept holds great promise for improving aviation safety, provided that the process receives broad support from the aviation community both within and outside of government.

Your policy statement will generate strong support for FOQA throughout commercial aviation.” Hallett said the program permits industry to play an “active role in objectively identifying potential safety threats” and encourages companies to “fully and honestly participate in FOQA without fear of retaliation or punishment.”

There is clear evidence that where information from a DFDR incident analysis programme is fed back to flight crew there is a reduction in the number of exceedances leading to a safer operation. The benefits can only be quantified by the improvement in safety resulting from the reduction of operating trends that would otherwise go unnoticed until an accident. Because these are proactive programmes, the results are not easy to quantify in dollar terms, but can only be related to the current costs of a major accident (see 2.3.3).

IATA intends to take the lead in promotion of the use of the DFDR analysis programmes in the upcoming Safety Seminars and continue to share the findings of these programmes in the annual IATA Safety Reports.[3]

It is accepted that individual airlines may set differing trigger points. These should be perhaps surveyed to identify those areas of commonality.

B.2. Encourage the Development of Corporation-wide Quality Systems

While useful, FOQA remains too technically focussed. Airline executives should be encouraged to develop policies of greater management accountability.

There is evidence that certain operations are conducted in violation of Standard Operating Procedures (SOPs). The Safety Report should recommend that companies establish corporation-wide quality assurance systems which demand compliance.

This will also serve to ensure that airline growth is not unaccommodated in terms of management oversight.

C. IATA Safety Information Exchange

The Safety Report should encourage participation in and use of the IATA Safety Information Exchange (SIE) to exchange operational information and experience.

D. Controlled Flight Into Terrain

IATA regards prevention of CFIT accidents as a major priority and encourages the use of any effective means to enhance aviation safety.

D.1. **GPWS and TAWS.** The effectiveness of Ground Proximity Warning Systems (GPWS) in further reducing the level of CFIT accidents could be improved by encouraging more widespread implementation to the latest revision status or replacement with advanced Terrain Avoidance Warning Systems (TAWS).

D.2. **CFIT Education and Training Aid**. Both the IATA Director General and the Senior Director, Operations & Infrastructure have identified the ICAO Controlled Flight Into Terrain (CFIT) Education and Training Aid as a useful tool in the industry’s combined efforts to enhance aviation safety.

D.3. **MSAW.** IATA recognises and endorses the recommendation of the ICAO and Industry CFIT Task Force regarding the Minimum Safe Altitude Warning (MSAW) system, and supports the proposal to

introduce MSAW as a standard. Members are requested to encourage implementation of this system through their national aviation authority.

Implementation of these systems, as aids in preventing CFIT accidents, should be promoted in the Safety Report.

E. Approach and Landing Accidents

The approach and landing phase have been identified as being responsible for approximately 25% of all Operational Total Losses.

It is noted that non-precision approaches appear to have greater associated risk. The Safety Report should endorse replacement of non-precision approach aids with precision approach aids as well as encourage the design and approval of GPS-based approaches.

F. Go-around Accidents

Projected traffic increases will result in an increased number of go-around accidents. Go-around training is provided along defined structures and criteria.

Our analysis indicates that a significant number of go-arounds occur outside these trained parameters.

The Safety Report should recommend that training departments be aware of these and provide greater variety in go-around training scenarios.

G. Major Partial Losses

Substantial damage accidents (as defined in ICAO Annex 13) cannot be used as a basis for the IATA Safety Report since most of the less serious events go unreported, especially if they fall below the deductible amount on hull insurance policies.

In terms of new, high-value jets (eg wide-body), a loss of US$1 million represents only 2% to 3% damage and may therefore seem trivial. Where such accidents involve, for example, the loss of a flap section, they would be defined as substantial under Annex 13. Others may not.

Damage costs, expressed as a percentage of theoretical new aircraft prices at the time of loss, might provide a better indication of the actual extent of the damage suffered. Whether or not historical data could be restated to the new definition would have to be addressed by the data warehouse.

H. Qualifying Weight Limit for Turboprop Aircraft

The minimum qualifying weight (mass) considered by the CWG is presently 3900 kg. It is proposed that this be increased to 5700 kg which, in many countries, is the weight above which an Airline Transport Pilot License (ATPL) is required for command.

I. Solicit Readership Feedback Using the Safety Report Survey

A survey questionnaire, similar to the example provided on page 19, should accompany each IATA Safety Report (Jet and Turboprop).

J. Evaluate Inheritance Effects and Management Influences

In circumstances where financial pressures are especially severe, the IATA Safety Report should recommend that regulatory oversight be increased to ensure adequate resourcing of safety matters.

The way we do things here (JAR – JAR transfers); corporate culture.

K. Promote Implementation of TCAS/ACAS

IATA policy. AIRPROX data. The Safety Report should recommend that its remit be revisited to include a review of AIRPROX data worldwide.

L. Focus on Human Factors

M. Assess the Safety and Other Benefits of Aiming to Achieve Cockpit Commonality

N. Benchmark Statistics

Forecast against corporate goals.

O. Aircraft Design

It is recommended that line cockpit crew be more heavily involved in the design of new aeroplanes.

P. Flight Safety Buddy System

Offer technical assistance.

Q. Promotion of Safety Information Feedback

R. Reduction of Controlled Flight Into Terrain Accidents

S. Human Factors

Certain aspects of flight operations should be referred to the Flight Simulator Working Group and the Flight Crew Training Working Group for further analysis and comment, including:

- Inappropriate crew response to confusing audio cues (e.g. compressor stall vs burst tyres);
- Training for parallel approach breakout procedures;
- Training for the go-around procedure.

T. Analyse Vulnerability of Highly Automated Aircraft to Human Factor Type Accidents

Unannounced mode changes (e.g. green and yellow hydraulic systems on A310).

U. Distribution

The Safety Report should be given wider distribution, including to non-IATA airlines and the internet.

V. On-going Reporting

Certain high-profile accidents (e.g. TWA 800, SR 111, etc) should receive on-going treatment in subsequent issues of the Safety Report.

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[1] Press release by Mr. Pierre Jeanniot.

[2] The Daily, Sept. 22, 1998.

[3] Overflying the Final Frontier, address by Mr. Pierre Jeanniot, Director-General — IATA to the 1998 IFALPA Annual Conference. INTERpilot 1998 No. 2, pg. 12.

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