CD-ROM Enclosed

Safety Report 2002

Issued March 2003

International Air Transport Association

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TABLE OF CONTENTS

FOREWORD

Safety is the Number One priority of IATA, and for five decades IATA has been working with the industry to prevent aviation accidents. In 1995, when the Hull Losses rate was 1.2 per million sectors, IATA committed to assist the industry to reduce the accident rate by 50% by 2004. Subsequently, as part of the IATA Safety Strategy 2000+, IATA committed to lead the global airline efforts to achieve a continuous improvement in Safety. In 2002 the accident rate was 0.72 per million sectors and so the industry appears on course to achieve its target, given that this is the Hull Loss rate for Western-built Jets.

This Safety Report has a wide remit, exploring regional performance and cargo operations, and it probes contributory factors of accidents to help understand what needs to be done to prevent accidents. While exploiting IATA's new accident and incident databases and auditing systems the report also looks back in history and across to other safety authorities to help benchmark safety. It then focuses on the accidents of 2002, all with the aim of being more pro-active in accident prevention. Most importantly it also identifies the areas on which the industry needs to focus in 2003 and beyond.

The Safety Report is a very serious and compelling read, packed with information for those embarked on accident prevention from the hangar floor and the cockpit to the boardrooms of IATA member airlines and the aviation industry at large. Prepared at a time when our industry is struggling with the effects of the worst crisis in its history, Safety Report 2002 faces the issues head on. During times like these Safety risks being neglected, or passed over for other business imperatives. History shows that this mix can lead to increases in accidents and loss of life as the economy recovers. It is therefore crucial that Safety vigilance is maintained and this Safety Report will play a key part in that process.

Günther Matschnigg
Senior Vice President
Safety, Operations & Infrastructure

LIST OF ACRONYMS

AACO	Arab Air Carriers Organization
ACAS	Airborne Collision Avoidance Systems
ACI	Airports Council International
ATDI	IATA Aviation Training and Development Institute
AENA	Spanish Aviation Authority
AES	Arrival/Engine Shutdown (ATA Phase of Flight)
AF	Africa (IATA Regions)
AGAS	European Action Group for ATM Safety
AIP	Aeronautical Information Publication
ALA	Approach and Landing Accidents
ALAR	Approach and Landing Accident Reduction
ANSP	Aviation Navigation and Satellite Programs
APP	Approach (ATA Phase of Flight)
AS/PAC	Asia/Pacific
ASC	Airports Services Committee
ASG	IATA Airside Safety Group
ASR	Air Safety Reports
ATA	Air Transport Association
ATC	Air Traffic Control
ATOS	Air Transportation Oversight System (FAA)
ATSP	Air Traffic Service Provider
BASIS	British Airways Safety Information System
CAP	UK Civil Aviation Publication
CASA	Civil Aviation Safety Authority
CAST	Commercial Aviation Safety Team
CBT	Computer Based Training
CFIT	Controlled Flight Into Terrain
COSCAP	Co-operative Development Of Operational Safety and Continuing Airworthiness Programmes
CRM	Crew Resource Management
CRZ	Cruise (ATA Phase of Flight)
CSWG	IATA Cabin Safety Working Group
CVR	Cockpit Voice Recorded
CWG	IATA Classification Working Group
DFDR	Digital Flight Data Recorder
DGAC	Dominican Republic CAA
DGB	IATA Dangerous Goods Board
DGR	Dangerous Goods Regulations
DST	Descent (ATA Phase of Flight)
EAGOSH	The European Ground Safety Council
ECL	En Route Climb (ATA Phase of Flight)
EGPWS	Enhanced Ground Proximity Warning System
ERPWG	IATA Emergency Response Planning Working Group
ESD	Engine Start/Depart (ATA Phase of Flight)
ETOPS	Extended-Range Twin-Engine Operations
FAA	Federal Aviation Authority
FDM	Flight Data Monitoring
FDR	Flight Data Recording
FE	Far East
FLC	Flight Close (ATA Phase of Flight)
FLP	Flight Planning (ATA Phase of Flight)
FO	First Officer
FOC	IATA Flight Operations Committee
FOQA	Flight Operations Quality Assurance
FPA	Flight Procedure Authorisations
FSF	Flight Safety Foundation
GAIN	Global Aviation Incident Network
GASAG	Global Aviation Security Action Group
GDS	Ground Servicing (ATA Phase of Flight)
GOA	Go-around (ATA Phase of Flight)
GPWS	Ground Proximity Warning System
HF HWG	Human Factors Harmonisation Working Group
HFWG	IATA Human Factors Working Group
HL	Hull Loss
IACA	International Air Carriers Association
ICAEA	International Civil Aviation English Association
ICAO	International Civil Aviation Organization
ICL	Initial Climb (ATA Phase of Flight)
IFALPA	International Federation of Airline Pilots Association
IFATCA	International Federation of Air Traffic Controllers Association
IFSP	In Flight Security Personnel
IGHC	IATA Ground Handling Council
INTERPOL	International Criminal Police Organization
IOSA	IATA Operational Safety Audit
IRM	Incident Review Meeting
ISASI	International Society of Air Safety Investigators
ITF	International Transport Workers Federation
JAA	Joint Aviation Authority
LAHSO	Land-and-Hold Short Operations
LND	Landing (ATA Phase of Flight)
LOC	Loss of Control
LOSA	Line Operations Safety Audit
MANPADS	Man Portable Air Defense Systems
METWG	IATA Meteorological Working Group
MIG	Mathematicians Implementation Group
MSTF	Multidivisional Safety Task Force
NAM	North American (IATA Region)
NASP	National Aviation Security Programme
NAT	North Atlantic (IATA Region)
NBIA	New Bangkok International Airport
NE	Near East (IATA Region)
NLR	National Aerospace Laboratory NLR, The Netherlands
NOTAM	Notices to Airmen
OPC	IATA Operations Committee
OQS	Operational Quality Standards
PA	Public Announcement
PAAST	Pan American Aviation Safety Team
PED	Personal Electronic Device
PRF	Pre-Flight (ATA Phase of Flight)
PRIOR	Programme for International Operator Readiness
PSF	Post-flight (ATA Phase of Flight)
QAR	Quick Access Recorder
RA	Resolution Advisory
RDPS	Radar Data Processing System
RIPP	Runway Incursion Prevention Programme
RTC/RCG	Regional Technical Conference
RTL	Regional Team Leaders
RTO	Rejected Take-off (ATA Phase of Flight)
SA	South America (IATA Region)
SAC	IATA Safety Committee
SAFA	Safety Assessment of Foreign Aircraft
SARAST	South Asia Regional Aviation Safety Teams
SBS	Safety Bulletin System
SCCM	Senior Cabin Crew Member
SD	Substantial Damage
SEARAST	Southeast Asia Regional Aviation Safety Teams
SISG	Safety Improvement Sub Group
SMS	Safety Management System
SMSS	Safety Management Support System
SOP	Standard Operating Procedures
SRC	Safety Regulation Commission
STEADES	Safety Trend Evaluation, Analysis and Data Exchange System
SWAP	Safety With Answers Provided
TAWS	Terrain Awareness Warning System
TCAS	Terrain Collision Avoidance System
TCAS RA	Terrain Collision Avoidance System Resolution Advisory
TEM	Threat and Error Management
TIPH	Taxy into Position and Hold
TOF	Taxi-off (ATA Phase of Flight)
TOPM	Technical Operations Policy Manual
TXI	Taxi-in (ATA Phase of Flight)
TXO	Taxi-out (ATA Phase of Flight)
UK CAA	UK Civil Aviation Authority
UKFSC	UK Flight Safety Committee
V/S	Vertical Speed
VNAV	Vertical Navigation
WMO — AMDAR	The World Meteorological Organisation — Aircraft Meteorological Data Reporting

EXECUTIVE SUMMARY

INTRODUCTION

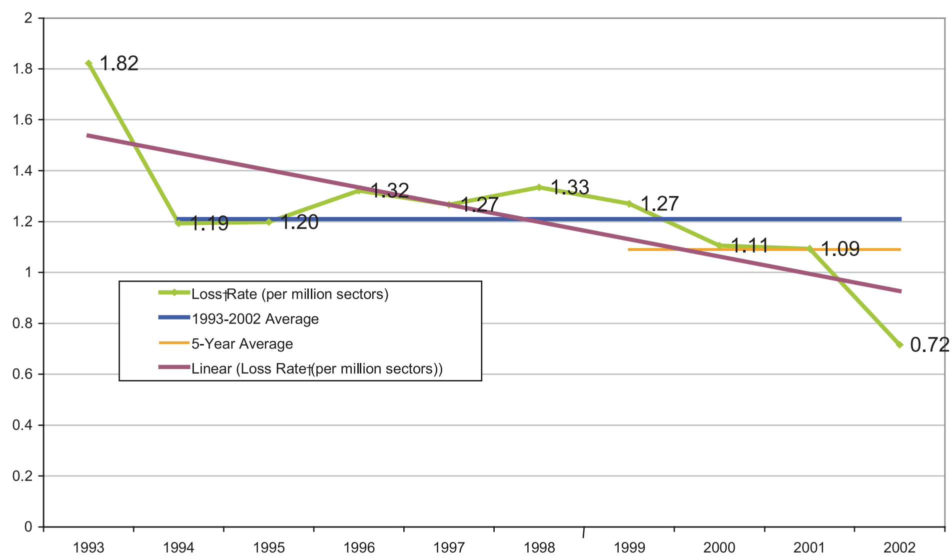
The aim of the IATA Safety Report is to produce a timely analysis of accidents to achieve a rapid response to emerging or persistent safety problems. The Report is published annually in April following the IATA Classification Working Group's analysis of all Jet and Turboprop accidents that have occurred during the previous calendar year. Safety concerns are identified in the report and recommendations are made in an endeavour to prevent accidents. The principal Safety Report 2002 accident statistics and issues are set out below.

SUMMARY OF ACCIDENTS FOR 2002

Total Accidents: 85, compared with 104 accidents in 2001

- 31 Western-built Jet;
- 31 Western-built Turboprop;
- 6 Eastern-built Jet;
- 17 Eastern-built Turboprop.

Western-built Jet Hull Loss Rate 1993-2002



Western-built Aircraft

- As shown in the above figure, the Jet Hull Loss Rate has reduced from 1 Hull Loss per million sectors in 2001 to 0.72 Hull Losses per million sectors in 2002;
- Jet Hull Loss rate has more than halved since ten years ago;
- 11 (4 Jet and 7 Turboprop) CFIT accidents, more than double the 5 CFIT accidents in 2001, but close to the five and ten year averages;
- 8 fatal accidents involving Jets, equals the lowest number of the decade;
- Increase in fatal accidents and Hull Loss rate for turboprops;
- 42% of the Jet and Turboprop accidents involved proficiency/skill failures — Training issues.

Western and Eastern-built Aircraft Combined

- Total 15 CFIT accidents, which is nearly double the 8 CFIT accidents in 2001;
- Total fatal accidents 32, total fatalities 974;
- Approach and Landing Accidents (ALA) continue to dominate;
- 40% of accidents occurred in Africa and South America;
- 27% of all accidents involved cargo operations;
- 8% of all accidents involved ferry/positioning flights.

MAIN ISSUES

IATA and the industry need to focus on these main issues, as agreed and supported by the Operations Committee and the Safety Committee.

CFIT/ALAR

Enhanced Ground Proximity Warning Systems, otherwise known as Terrain Awareness Warning Systems, could have prevented all 15 accidents involving Controlled Flight Into Terrain. All passenger and freighter aircraft should be upgraded with Enhanced Ground Proximity Warning Systems.

Weak or non-existent Regulatory Oversight

IATA needs to challenge regulators to fix weak or non-existent Regulatory Oversight in Africa and South America. To complement this activity, IATA will expand the role of Regional Directors in the capture of safety data and safety improvements.

Wide range of training issues

IATA should promote management safety training through its training institute and introduce Threat and Error Management (TEM) training.

Cargo accidents

IATA must increase focus and support of cargo operational safety by expanding from existing dangerous goods and airside safety platforms.

RECOMMENDATIONS

These issues are further developed in the 37 specific recommendations that arise from the analysis of the 2002 accidents. These recommendations covering the operational, training, engineering and organisational aspects of safety are made in the relevant sections of the report and for convenience are summarised in Chapter 5.

CHAPTER 1 — INTRODUCTION

1.1 GENERAL

"Experience is a jewel, and it had needed be so, for it is often purchased at an infinite price" William Shakespeare.

Aviation's normal experience is one of marvellous, well-documented achievement. Most accidents however are the sort of bitter occurrence that society would prefer to forget. Thus it falls to the aviation safety community to remember and seek the gems of experience from all accidents and incidents in order to prevent future tragedy. And that is what this Safety Report is really about — accident prevention.

1.2 IATA'S ANNUAL SAFETY REPORT

IATA is the core of the world's international airline industry. Originally founded in 1919, it now groups together over 270 airlines, including the world's largest. These airlines fly over 98% of all international scheduled air traffic. It is upon this vast and highly representative experience that IATA draws when determining the lessons learned from accidents, most of which involve aircraft which are not in the IATA fold.

The focus of this report will be the failures in safety — the accidents. This is a harsh but appropriate corner stone for any safety communication. The devil of an accident is most certainly in the detail and this report will not shirk from addressing that detail because, as every accident investigator knows, it is in the web of detail that the lessons of accident prevention are to be found.

The approach to this analysis, for what follows is truly a global safety analysis, will be to look back at the accident trends over recent decades and then review 2002 in some detail. The report will show how the CWG has driven down into the contributory factors, in most cases identified for the first time well ahead of formal accident investigation. Finally, the report will offer recommendations for accident prevention, which will shape IATA's safety strategies and those of the industry for years to come.

Produced immediately following the year under review, the report examines not only the accident statistics and trends, but it also attributes contributory factors to those accidents and leads to recommendations to the industry. The Safety Report also reflects the work of IATA, communicating the important Safety issues identified by IATA's Operations and Safety Committees and Working Groups, including those in the Security arena. Therefore, the Safety Report helps the airlines to understand the global safety situation and thus react quickly to the threats to aviation safety.

The IATA Safety Report is also the main vehicle for communicating IATA's Safety Strategy 2000+. In 2001 the Safety Report was completely updated and launched as a new product with an emphasis on providing practical advice and risk management tools for those serving operational safety at the front line. It is a unique report in that no other organisation produces yearly statistics and analysis combined with the added benefit of recommendations to the industry.

"Aviation's normal experience is one of marvellous, well documented achievement."

1.2.1 SAFETY REPORT FORMAT

The ambitious technique used by IATA to analyse, early in the New Year, the accidents (and increasingly the incidents) of the previous year has been retained. This process is seen as a key component of the IATA Safety Management Support System (SMSS).

The most noticeable change with this new Safety Report is the move towards presenting not only areas of concern and high risk, combined with recommendations to the industry, but it also provides direction to safety management information and tools.

There is a CD-ROM included in the report which is divided into the following sections:

- **Safety Report,** containing the Report, Appendices and PowerPoint slide support package;
- **Supporting Documents,** containing additional material supporting discussions in the report;
- **Safety Toolkit,** containing useful and practical material for use at airlines;
- **CEO Brief,** containing executive summary and PowerPoint presentation;
- **Web links;** containing links to websites and documents available on the Web that IATA Safety recognises as helpful to airlines.

Although the additional information that is found on the CD-ROM is not exhaustive, it does serve as an indication of some of the valuable tools for accident prevention which have come to IATA Safety's attention during 2002. All of these components form the new Safety Report.

1.3 CLASSIFICATION WORKING GROUP (CWG)

This report reflects the vast experience coming from the CWG participants. It is the voice of highly committed airline safety people from IATA member airlines who join forces each year in search of the jewels of experience that come from paying the infinite price of an airline accident.

The membership of the CWG is ever changing in response to the threats to aviation safety. In 2002 a representative from IFALPA joined the group for the first time together with a new representative from the Far East (JAL) and from Africa (Kenya airways). Next year a representative from ATC and an Eastern bloc operator will be asked to join the CWG.

Appendix A on the CD-ROM describes the role of the CWG in detail. Participants in the 2002 sessions were as follows:

Captain Tom Croke	Aer Lingus	Chairman
Captain Doug Stott	Qantas	Vice-Chairman
Captain Louis Theriault	Air Canada	
Captain Bertrand de Courville	Air France	
Mr. Alan Rohl	British Airways	
Captain Shuishi Okada	Japan Airlines	
Captain Ngeny Biwott	Kenya Airways	
Captain Deborah Lawrie	KLM Cityhopper	
Dr. Deiter Resigner	Lauda Air	
Captain Klaus Froese	Lufthansa	
Captain Saad Al-Shehri	Saudi Arabian Airlines	
Captain Jürg Schmid	Swiss	
Captain Carlos Nunes	TAP / Air Portugal	
Mr. Jean Daney	Airbus	
Mr. Paul Hayes	Airclaims Ltd.	
Captain David Carbaugh	Boeing	
Mr. Jim Donnelly	Bombardier	
Mr. Nuno Aghdassi	Embraer	
Wing Commander David Mawdsley	IATA Facilitator/Co-Editor	
Mrs. Jill Sladen-Pilon	IATA Facilitator/Co-Editor	
Captain Lou Van Munster	IFALPA	
Dr. Robert Helmreich	University of Texas	

1.4 REPORT AUTHORITY

The Safety Report is sponsored by the IATA Safety Department, approved by the IATA Safety Committee (SAC) and authorised for distribution by the Operations Committee (OPC).

1.5 PURPOSE OF THE SAFETY REPORT

The purpose of the Safety Report is fully described in **Appendix B** on the CD-ROM. Its primary purpose is to assist with maintaining safety vigilance by identifying the areas of greatest risk apparent from the experience of aircraft accidents. It aims to offer practical advice to airlines in accident prevention against the backdrop of accidents that have occurred in 2002. The report is taking an increasing interest in air safety incidents, seeing them as useful pointers for accident prevention. It presents data and trends, analyses and recommends preventative measures.

1.6 IATA GOVERNANCE

1.6.1 OPERATIONS COMMITTEE AND THE SAFETY COMMITTEE

The IATA Safety Management Support System (SMSS) is governed by the Operations Committee (OPC) and the Safety Committee (SAC). The OPC was created to advise the IATA Board of Governors, and the Director General, on all matters that relate to the improvement of safety, security, and efficiency of civil air transport. The SAC reports to the OPC to assist in all matters that relate to the optimisation of airline safety. In this way the OPC and SAC airline representatives help to formulate IATA's safety strategies and trigger the initiatives based on their experiences and their perception of the threats to safety.

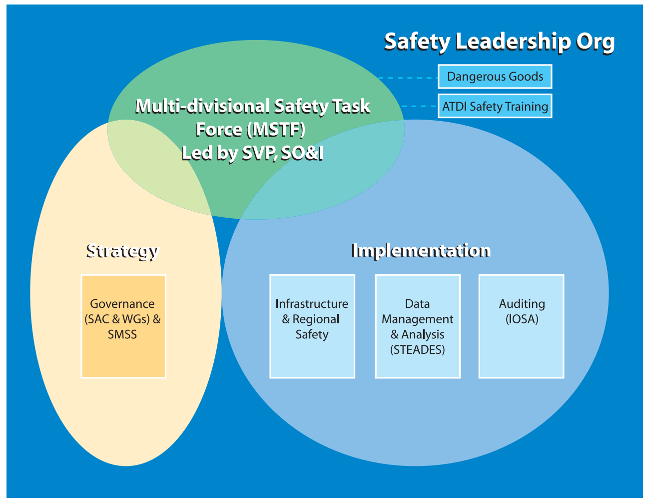
1.6.2 INCIDENT REVIEW MEETING (IRM)

Part of the SAC is the Incident Review Meeting (IRM), which is particularly valuable in providing a unique opportunity for Safety Executives to share in confidential session the experience of accidents and incidents which their airlines may have suffered. Apart from being a safety information exchange, the IRM is also an important part of IATA's information collecting process. It assists IATA Safety to remain sensitive to the safety concerns of its member airlines and complements the work of the CWG. Additionally, the SAC deploys the CWG in the role described at **Appendix A** on the CD-ROM These forums have been the traditional "input" to the IATA safety system for many years. However, IATA's new safety initiatives are already beginning to contribute to the information gathering process of IATA's SMSS. It is therefore pertinent to report on the implementation of these initiatives arising from Safety Strategy 2000+.

1.7 IATA NEW SAFETY ORGANISATION

It is now a well established precept in aviation safety management that commitment to Safety must come from the CEO. Safety Strategy 2000+ promotes this precept to our member airlines. For that reason, the Safety Team is pleased to see that our new Director General, **Giovanni Bisignani,** is increasing the profile of Safety and moving towards integrating Safety across all of IATA. No longer is operational safety the preserve of IATA's Safety Department. The O&I Division is now retitled to become the **Safety,** Operations & Infrastructure Division, and **Guenther Matschnigg,** Senior Vice President Safety, Operations and Infrastructure, is leading a Multi Divisional Safety Task Force and spearheading the new focus towards an integrated corporate wide approach to Safety. The new corporate goals of Safety are based exclusively on airline and industry safety needs, embracing Operations, Infrastructure, Airports, Cabin Safety, Ramp Safety, Dangerous Goods and not least Corporate Communications. IATA is aiming to lead the industry in the area of safety auditing, safety data management, infrastructure safety, safety training, regional safety initiatives and dangerous goods regulations.

Figure 1.A
IATA Safety Leadership Organisation



IATA has crafted this leadership role to ensure that it blends with the other global safety initiatives of ICAO, the Flight Safety Foundation, the aircraft manufacturers, the ATA, IFALPA and the regulatory authorities. Most importantly, IATA's leadership role has to do with the airlines — to lead the global airline efforts to achieve a continuous improvement in safety. It is this market to which the IATA safety products are targeted. And so 2003 will not be far advanced before IATA is known in the safety community as the auditing people, the data minders and analysers, the safety trainers, the infrastructure safety watchdogs and the safety standard in the world of Dangerous Goods and aircraft loading. As a backdrop, the 2002 Safety Report will show how this leadership role is being assumed and implemented.

1.8 SAFETY STRATEGY 2000+

Safety Strategy 2000+ was conceived in consultation with the IATA Safety Committee (SAC) and IATA's Senior Executives, including the Regional Directors. At a time when a number of organisations around the world claimed to lead the Industry in Safety, IATA Safety Strategy 2000+ pointed to the particular areas where IATA should lead the global airline efforts to achieve a continuous improvement in Safety. Most importantly this strategy recognised that IATA could not cover the whole safety spectrum and that co-operation with other safety campaigners such as ICAO, the Flight Safety Foundation, Airbus, Boeing and the ATA was vital, especially if regional differences in safety performance were to be tackled. Safety Strategy 2000+ is now well established within the aviation industry and its eight strategies continue to drive IATA's Safety programme and management system. **Refer to the Supporting Documents Section of the CD-ROM enclosed for a Power Point Presentation of Safety Strategy 2000+.** The principal safety programmes are described below followed by a description of IATA's SMSS.

IATA Operational Safety Audit (IOSA)

Most significantly, Safety Strategy 2000+ has led to the creation of IATA's biggest safety initiative ever, which is the IATA Operational Safety Audit (IOSA). IATA is fast gaining international recognition among airlines and regulatory authorities for IOSA as a substitute for existing safety audit programmes. The IOSA Programme is an internationally recognised and accepted evaluation system designed to assess the effectiveness of the operational management and control systems of an airline. IOSA will use internationally recognised quality and audit principles and will be designed so that each audit is conducted in a standardised and consistent manner.

IOSA complements the ICAO Safety Oversight Audit programme as shown at Figure 1.B, which shows how IOSA closes the loop between the regulatory oversight (ICAO) top down approach and the operational oversight (IATA) bottom up approach. With this closed loop system, IOSA will complement ICAO's Standards and Recommended Practices.

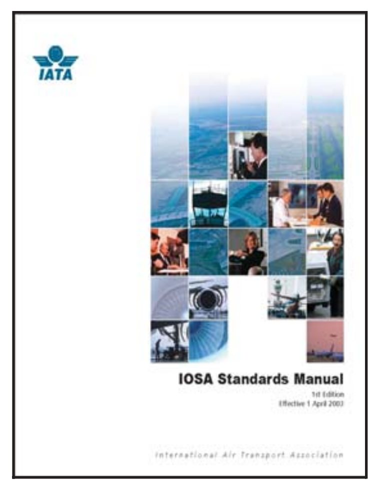
Figure 1.B

ICAO Oversight/IOSA Relationship

The IOSA Programme will possess the degree of quality and integrity necessary such that mutually interested airlines and regulators can all comfortably accept IOSA audit reports. To this end, the critical and monumental task of developing the standards was completed in 2002. This is the culmination of 12 task forces comprising 100 safety and quality professionals from IATA's member airlines. The IOSA programme, to be launched in July 2003, will result in quality standards recognised internationally, reduction of audits, considerable cost savings for airlines and increased code share opportunities. The following project milestones are significant:

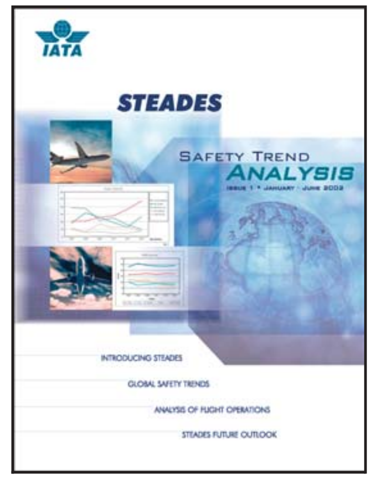
- Accreditation of Endorsed Training Organisation to perform training of IOSA auditors, and Audit Organisations to perform IOSA audits in 2003;
- Acceleration of support from IATA member airlines and from regulatory authorities including FAA, CASA of Australia, Transport Canada, and the US Department of Defense.

Refer to the Supporting Documents Section of the CD-ROM enclosed for a Power Point presentation on IOSA.



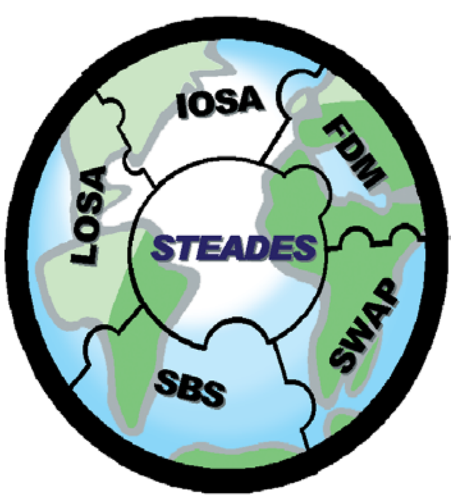
Safety Trend, Evaluation and Data Exchange System (STEADES)

Launched in 2001, the purpose of STEADES is to collect, collate and analyse Air Safety Reports (ASR) from participating airlines and disseminate the trends observed, findings and recommendations to the participants. It identifies potential accident precursors and contributes to a reduction in commercial aircraft accident rates. With the recent publication of its first Trend Analysis Report, STEADES is fast establishing IATA Safety as the leader in global safety data management and analysis. While STEADES was initially aimed at airlines it is also attracting interest from industry safety and airworthiness research organisations. IATA, as a trusted keeper of airline safety data, is the only organisation to hold safety data of this magnitude. However, IATA places great emphasis on unlocking the value of the data by performing analysis. As a clear demonstration of the product, the first STEADES report arising from the analysis of some 200,000 records was circulated to programme members in October 2002. Most former British Airways BASIS Safety Information Exchange members have switched to IATA and there are now about 50 organisations contributing data. Safety Research organisations are very interested in STEADES as a vital tool in accident prevention. Indeed, STEADES is already achieving many of the objectives and requirements of the FAA Global Aviation Incident Network (GAIN). **Refer to the Supporting Documents Section of the CD-ROM enclosed for a Power Point presentation on STEADES.**



Data for STEADES will come from a variety of distinct sources, as illustrated in Fig. 1.C. STEADES will sit at the centre of this information framework, drawing on all sources to get a holistic picture of aviation safety.

Figure 1.C



The STEADES programme plans to include Flight Data Monitoring (FDM), so that ASRs collected can be compared to flight events. IATA will not offer a full FDM service, rather STEADES will use the MAXVAL/Snapshot methodology, extracting packets of data only when they either exceed a threshold, or are being actively monitored. IATA's Safety With Answers Provided (SWAP) will provide STEADES with more informal information than it gets from ASRs. This bulletin board styled information exchange provides valuable insight into members' concerns in aviation safety. It also provides a useful forum for the exchange of lessons learned, a key aspect of STEADES. In this same light, STEADES is planning a Safety Bulletin System (SBS) web site to post bulletins received from operators, manufacturers, avionics companies, as well as trends detected by STEADES that require urgent notification, that directly affect flight safety. The operational oversight that IOSA embodies through its audits should allow for direct correlation between what is being done within the organisation and how it is affecting the day-to-day operations of the airline. STEADES also hopes to draw on LOSA data so that it can be compared to the Air Safety Reports that are received through STEADES, adding a third dimension to this valuable information.

Line Operations Safety Audit (LOSA)

Human error remains a major factor in aviation accidents and incidents. Understanding the management of operational safety threats and the management of errors lies at the centre of the industry's ability to reduce such errors. The HFWG and SAC, through its monitoring of safety developments within the airline industry, have identified Line Operations Safety Audit (LOSA) as a tool with great potential for better understanding of operational errors and their management in flight operations.

Following development of LOSA during the last two years (12 LOSA's total, 5 in the last 2 years), ICAO plans to make normal operations monitoring a recommended practice by 2004 and an international standard by 2006; and with the publication of guidance materials, including the June edition of the ICAO Journal dedicated to LOSA and the ICAO LOSA Manual (Doc 9803) in July 2002, it is expected that airline interest about LOSA will increase. This may in turn lead to a situation where airlines learn of LOSA from parties claiming they are equipped to perform a LOSA for an airline. Since this may or may not be the case, it is critical, during this early stage, that IATA communicates a position regarding LOSA in order to help guide our members.

In October 2002 OPC endorsed LOSA as a tool for normal operations monitoring and toward understanding and reducing operational errors, when it incorporates the following 10 operating characteristics:

1. Jumpseat observations during normal flight operations;
2. Voluntary crew participation;
3. De-identified, confidential and safety-minded data collection;
4. Joint management/pilot association sponsorship;
5. Targeted observation instrument;
6. Trusted, trained and calibrated observers;
7. Trusted data collection site;
8. Data cleaning roundtables;
9. Data-derived targets for enhancements;
10. Feedback of results to line pilots.

Refer to the CD-ROM for more information on LOSA.

Regional Safety Initiatives

Targeting programmes on a regional basis is an integral part of Safety Strategy 2000+. Asia is the fastest growing market and in view of this, 2002 saw the establishment of two **new IATA regional safety initiatives** in Asia. These are the South and Southeast Asia Regional Aviation Safety Teams (SARAST/SEARAST) and are modelled on the Pan American Aviation Safety Team (PAAST), established in 2000. Africa is also high on IATA's list of regional safety initiatives.

1.9 SAFETY MANAGEMENT SYSTEMS

This report will inevitably refer to safety management systems because they are evolving as the basic tool being used by airlines and other safety organisations to manage safety programmes.

A Safety Management System (SMS) applies a business-like approach to safety. It is a systematic, explicit and comprehensive process for managing safety risks. As with all management systems, an SMS provides for goal setting, planning and measuring performance. A SMS is woven into the fabric of an organisation. It becomes part of the corporate culture, the way people do their jobs. The following are the principal components of an SMS.

- a safety policy;
- a process for planning, and measuring safety performance;
- a process for identifying safety hazards and evaluating and managing safety risks;
- a process for ensuring that personnel are trained and competent to perform their duties;

- a proactive process for the internal reporting and analysis of safety hazards, incidents and accidents, and for taking corrective measures to prevent their recurrence, including a safety awareness and communications programme;
- a documentation of all the SMS processes, and a process for ensuring that personnel are aware of their responsibilities in regards to them;
- a process for conducting reviews or audits of the SMS, on a periodic basis.

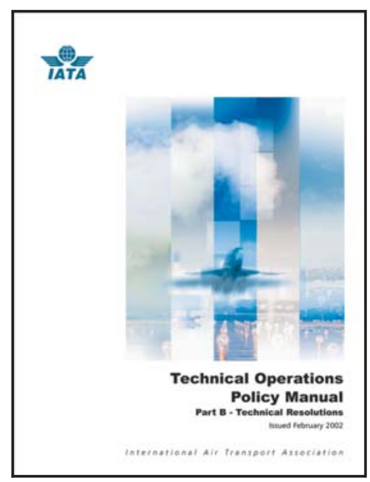
Airlines are advised to review the excellent material prepared by the Regulatory Authorities on Safety Management Systems such as UKCAA CAP 712 and Transport Canada TP 13739 and adopt these processes in their management of safety and risk. Refer to Web Links and Supporting Documents on the enclosed CD-ROM.

Another excellent example of SMS thinking is the FAA (Federal Aviation Administration) ATOS (Air Transportation Oversight System) being developed to oversee the commercial air carriers of the US and verify that they are in compliance with FAA regulations. This approach embraces the system safety methods employed by other industries instead of the more traditional inspections. **Refer to FAA web site for further information on ATOS. Similar SMS processes are being developed for the IOSA and STEADES programmes.**

IATA's Human Factors Working Group is currently reviewing the various SMSs of the world. There is no better example of an airline SMS booklet than that prepared by Emirates.

By adopting these SMS principles and processes, the airline safety departments will be able to interface more effectively with the safety organisations beyond their airline, not least IATA, and thus join forces with a large, business-like enterprise in the cause of accident prevention.

This Safety Report will show that IATA endeavours to document its positions, policies, standards, and best practices. A good example of this is the Technical Operations Policy Manual (TOPM). With the Corporate Safety approach being taken by IATA there could be no better document at its core than the TOPM. The document contains sections on Operations, Safety, Quality, Operational Security, Engineering, Aerodromes and Ground Aids, AirTraffic Management, Meteorology, Communications, ATM_cns, and Radio Aids.



Additionally this Safety Report will describe briefly the main elements of IATA's developing Safety Management Support System (SMSS) and later introduce the following items of operational safety documentation:

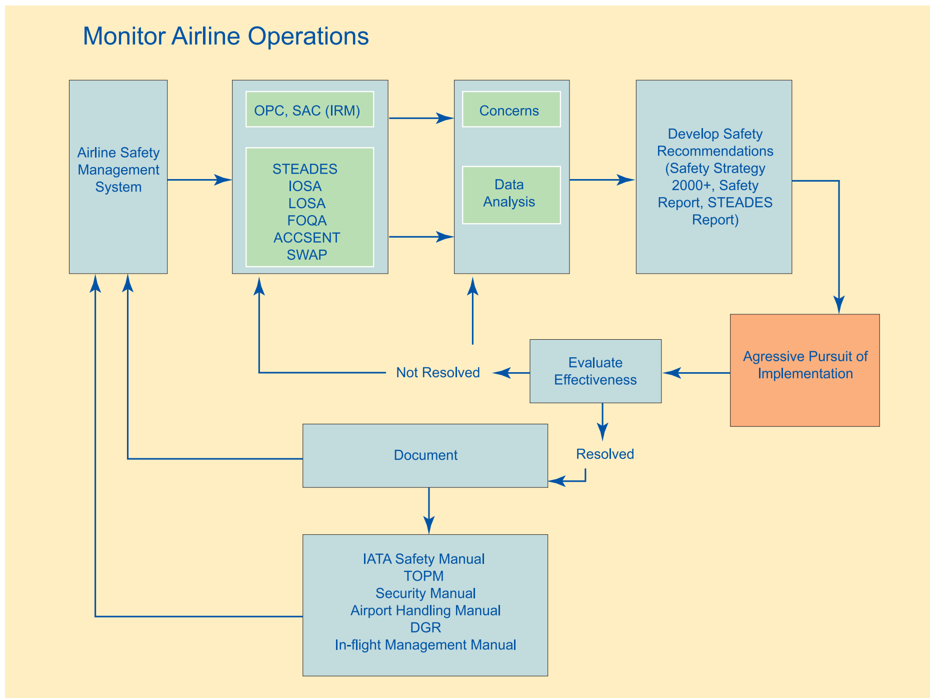
- Security Manual;
- Airport Handling Manual;
- Dangerous Goods Regulations (DGR);
- Inflight Management Manual.

In conjunction with SAC and the Human Factors Working Group, IATA is developing a Safety Manual, which it aims to publish before the end of 2003. This will not only contain an exposition of IATA's own SMS processes but it will also describe all of the best practices considered necessary by IATA for an effective corporate safety organisation.

1.10 DEVELOPMENTS IN THE IATA SAFETY MANAGEMENT SUPPORT SYSTEM

Under Safety Strategy 2000+ proper evaluation of the impact of safety initiatives, in conjunction with constant monitoring of the industry safety performance, is the key to ensuring the strategy is effective and delivers the desired goal of a continuous improvement in safety. IATA has therefore designed its own safety management system based on the above SMS precepts regarding it as a Safety Management "Support" System (SMSS) geared to supporting the airline systems. The following diagram shows where IOSA, STEADES, and the Safety Report fits into the IATA SMSS, and it highlights some of the associated safety products established in the new corporate safety organisation.

Figure 1.D
IATA Safety Management Support System



In this way IATA has established a data-driven approach to developing strategies to enhance safety.

With its focus on accident and air safety incident data of all kinds IATA is moving rapidly towards being accepted as the safety data analysis people for the Industry. Indeed:

> ***"IATA has a specific unique role as a trusted keeper of safety data, a role that no other organisation can play".***
>
> *Captain Dan Maurino, ICAO Human Factors and Flight Safety*

To appreciate further the advances made by IATA in implementing Safety Strategy 2000+, refer to the Supporting Documents Section of the CD-ROM enclosed for a PowerPoint presentation.

1.11 MONITORING AIRLINE OPERATIONS

This section of the report has described the primary components of the IATA SMSS. Having explained the role of the OPC, SAC and the CWG, the section has shown how safety data systems and information exchange systems are increasingly contributing to IATA's SMSS and how these are being developed to assist with more effective monitoring of airline operations. This is not a big-brother function, rather it reflects a customer-driven, more business-like approach to safety which is being taken by IATA.

Against this backdrop, subsequent sections of the report will address the accidents of the year 2002 and search for ways in which IATA, its airlines, and others with the same ideals can prevent accidents. It will show how the safety report can play its part within the IATA SMSS and maintain IATA's focus where it best serves its customers.

The safety metrics to be used by IATA SMSS are fully described at **Appendix C** on the CD-ROM. Some of these have been updated and are therefore reviewed here to complete the backdrop to the subsequent accident classification and analysis presented in the Safety Report.

Today, the ease with which data is exchanged internationally is unprecedented and arising from this is the need to standardise definitions. There are a number of industry initiatives and working groups attempting to do this for the benefit of the Industry as a whole. IATA Safety has endeavoured to participate in this activity in an effort to ensure that this report aligns with the latest safety definitions and metrics.

1.12 IATA REGIONS

At the time of writing the 2002 Safety Report, IATA delineates between regions using the definition set out by IATA's Regional Technical Conferences. **Refer to Appendix D** on the CD-ROM. There is, however, a move in the industry toward aligning the definitions of regions for the purpose of representing regional safety information. There are many organisations (IATA, ICAO, Boeing etc.) producing safety statistics as they relate to regions of the world. Unfortunately there has been little coordination between these organisations and the definitions used, which can lead to variances in the statistics. The Safety Indicator Study Group of ICAO, of which IATA is a member, is endeavouring to develop definitions for regions which are no longer based on jurisdictions of regional offices but based on geographic location of the land mass where the accident occurs or the operator's region of origin. The aim is that through the work of this study group, agreed regional definitions will be developed and thus enable the industry to move yet another step closer to aligning safety statistics.

1.13 CONVENTIONS

Unless otherwise specified, figures shown in square brackets [ ] relate to 2001 data.

IATA salutes the longstanding and valuable contribution of ICAO in the area of global accident statistics. The work of the ICAO/Commercial Aviation Safety Team (CAST) in establishing Common Taxonomy of Aviation Occurrence categories has been invaluable. IATA works in close co-operation with ICAO's Safety Indicators Group and assists ICAO with their categorisation of accidents.

For a variety of reasons, however, ICAO is not in a position to offer any analysis of accident and incident factors of the kind included in Chapters 3 and 4 of this Safety Report. ICAO's work is therefore limited to the categorisation of the accident e.g. CFIT or ALAR. IATA has however, already developed the means of turning safety occurrence (accident and incident) data into useful information by using some powerful analysis tools.

Complementing the IATA Safety Report, which focuses mainly on accident analysis, IATA has also established its STEADES programme, which is filling the concerning gap in incident analysis. With its inclination towards the mature FOQA airlines and the IOSA and LOSA programmes, STEADES is already leading in the global safety analysis arena.

During the very week in which IATA's 2002 CWG was convening, the Flight International editorial had this to say:

> ***"At present, global safety cohesion is missing, and no single organisation is charged with creating the awareness that is essential. Leadership, data, and effective propaganda is needed, and IATA, having started, is the best organisation to take responsibility for it"***
>
> *Flight International, 14-20 January 2003*

The CWG believes that the 2001 Safety Report (while hardly in the realm of propaganda!) made a good start to using data to enhance safety awareness, not only among the 273 airlines of IATA, but also the many other organisations committed to enhancing aviation safety. Together with the publication of the first STEADES report in October 2002 this Safety Report 2002 is further testimony to the fact that the world's largely untapped safety data mines are at last under scrutiny.

CHAPTER 2 — HISTORICAL SAFETY OVERVIEW

The aim of this chapter is to form a setting in which the accidents and incidents of 2002 can be seen in a longer-term context.

2.1 HISTORICAL RECORD JET

ICAO Perspective

IATA monitors Jet accident statistics from 1959, when the first operational airline accident occurred. ICAO, on the other hand, monitors accident statistics from 1947, and it is interesting to begin this review with their perspective. “The average number of fatalities per year is around 600, which is the same as in 1947 when only 9 million people flew”.

According to ICAO in general terms, the accident rates have been reduced by 50% over the past 20 years and this is considered to be a useful benchmark for this Global Safety Overview by IATA. It is important to appreciate however that ICAO employs slightly different safety metrics in terms of accident definition (namely “scheduled operations”, involving passenger fatalities, excluding acts of war or unlawful interference) and uses different aircraft weight criteria.

“The average number of fatalities per year is around 600, which is the same as in 1947 when only 9 million people flew.” [ICAO]

2.1.1 WESTERN-BUILT JET OPERATIONS SINCE 1958

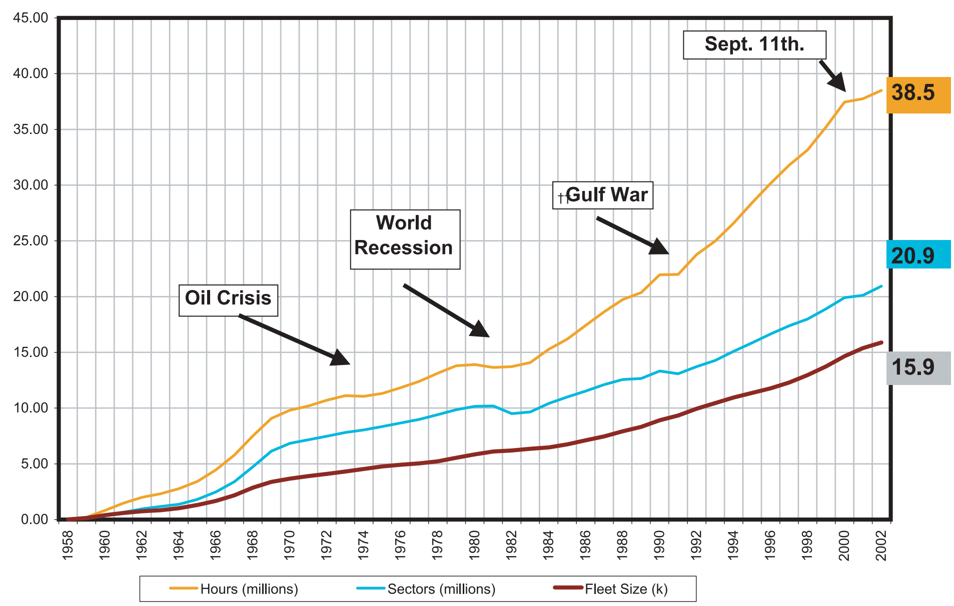
Hours-Sectors-Fleet

Focusing first on the development of Western-built Jet Operations, **Figure 2.1.A** shows the growth of the industry in terms of hours and sectors flown and fleet size. Since IATA records began in 1958, the Western-built fleets have flown some 710 million hours and 433 million sectors.

Until 1984, the number of hours per sector was fairly stable, but since then this ratio has been increasing at a much greater rate. The most likely causes are:

- The transfer of a large amount of short-haul traffic from Jet operators to commuter operators in Turboprops albeit now reverting from Turboprop back to commuter Jets;
- Introduction of ETOPS; and
- Introduction of long-range aircraft (A340, B747-400, etc.).

Figure 2.1.A
Hours – Sectors – Fleet



Growth in Jet Transport — Hours Flown

Remaining with Figure 2.1.A, the plotted line for hours flown shows four points where the steady growth is discontinuous depicting:

- 1974, first crude oil crisis;
- 1981, world economic recession;
- 1991, Gulf War and over-capacity and
- 2001, terrorist attack on the U.S.

Thus, it is apparent that the surging growth of the Jet airliner fleets following those periods where the growth is discontinuous (oil crisis of 1974, World Recession in 1981 and the Gulf War in 1991), can be associated with an increase in the accident rate. 2002 being the year following the September 11th attacks was a period in which “airline growth vigilance” was vital. In difficult economic times there is a need to cut back resources and trim budgets throughout a company. Unfortunately safety departments often find themselves amongst the first to have their budgets reduced. **Although an apparent reduction in the accident rate for 2002 is promising, airlines should beware that history points to the need for particular caution as and when, the predicted upturn in the economy takes hold.** Alternatively, to express this in terms of the fundamental equation of flight safety the need to support the flying task with adequate, well-trained and experienced resources will be paramount if the accident tide of history is to be checked.

Jet Airliner Hull Losses Since 1958

Meanwhile, a total of 911 Hull Losses have occurred according to the following distribution.

Operational	706
Test & Training	40
Violence (flight)	52
Violence (ground)	42
Non-operational (ground)	46
Non-Airline/Unknown	25
Total Hull Losses	**911**

Clearly, acts of violence resulting in Hull Losses are a strong feature of the Jet Airliner tally since 1958.

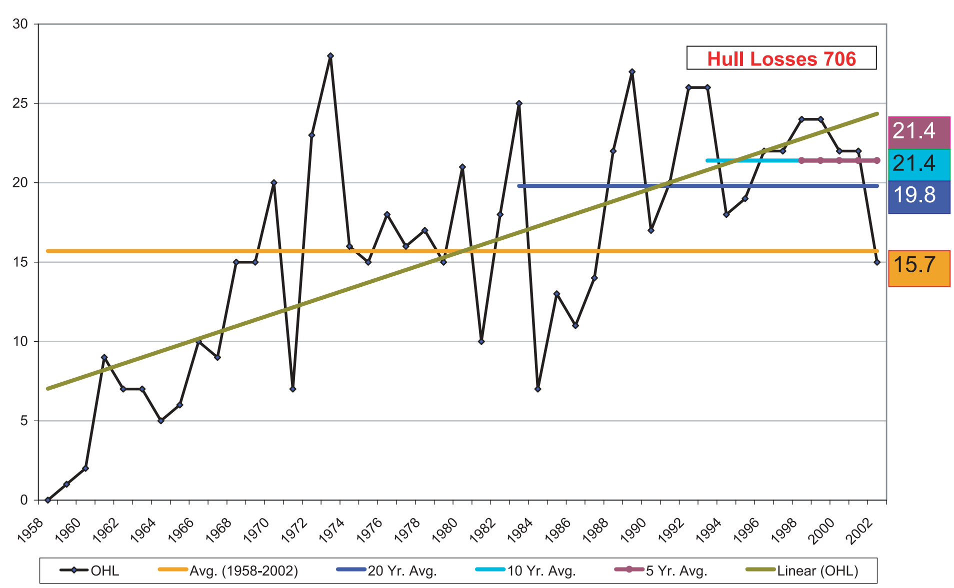
The specific average numbers of Hull Losses are:

- For the period (1958-2002): 15.7
- Last 20 years (1983-2002): 19.8
- Last 10 years (1993-2002): 21.4
- Last 5 years (1996-2002): 21.4

Figure 2.1.B shows in black the operational Jet Hull Losses since 1958. Superimposed on this is the average for the period 1958-2002 (orange), the average over the last 20 years (dark blue), the average over the last 10 years (light blue), and the average over the last 5 years (brown).

Figure 2.1.B

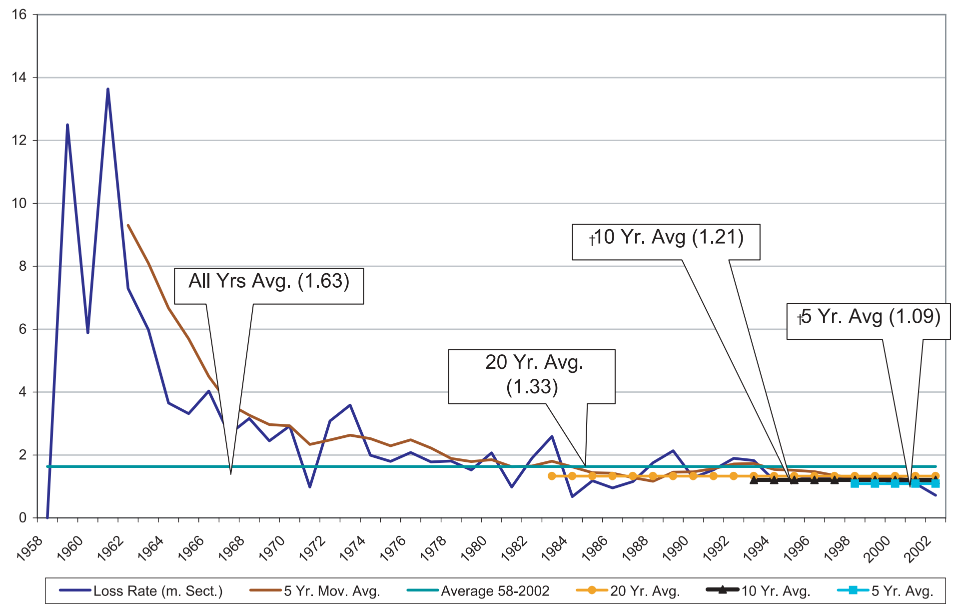
Jet Hull Losses 1958-2002



Therefore, over the past two decades the average number of Jet Hull Losses expressed in terms of 5, 10, and 20- year average is approximately 20 aircraft. The 10-year period is considered to be sufficiently long to indicate significant trends and short enough to eliminate the influence of superseded practices and procedures. **Taking this number of 20 Hull Losses as a principal benchmark for 2002, in which there were only 15 Hull Losses, the year enjoyed a highly significant 25% reduction in Hull Losses compared with significant historical norms.**

Western-built Jet Loss Rate

Figure 2.1.C
Jet Hull Losses per Million Sectors



The problem of scaling when viewing this data over long periods is immediately apparent from Figure 2.1.C. The more recent improvements appear to be very small and the line appears to be flat. By “zooming in” on the more recent data, a better understanding of accident rates can be determined.

Looking at the same time span, i.e. since 1958, in terms of Losses per Million Sectors and taking the same “smoothing” periods (All years average, 20 year, 10 and 5 year average), the most significant “benchmark” is the 20 Year Average which is 1.33 Hull Losses per Million Sectors. **With the 2002 figure being 0.72 Hull Losses per million sectors, the Jet Hull Loss Rate has almost been halved, thus agreeing with the ICAO conclusion, despite their use of different metrics, that overall accident rates have halved during the past 20 years.**

Hull Losses By Aircraft Group

In the year in which we celebrate 100 years of flight it is clear that advances in “safety technology” have been a massive antedote to accidents. Particular systems, such as GPWS and TCAS continue to play a major role in accident prevention. IATA believes that it is relevant to band aircraft approximately into four “age” groups i.e. depending on the date of entry into service to get some feel for how particular generations of aircraft are performing. Debate continues over the assignment of aircraft to groupings but at the time of the 2002 CWG meeting the grouping was as shown in the Figure 2.1.E.

Figure 2.1.D
Jet Hull Losses by Aircraft Group

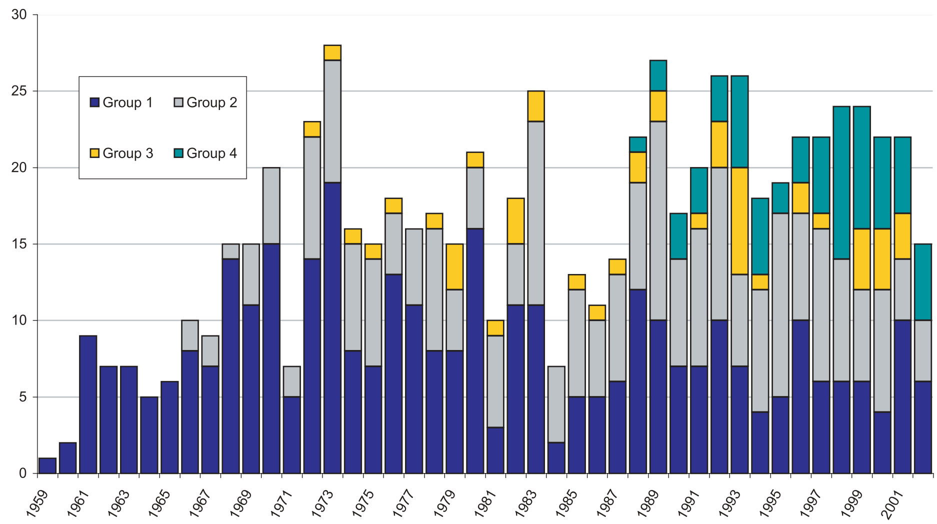


Figure 2.1.D is best reviewed in conjunction with Appendix F on the CD-ROM. **Looking back to 1959 at the accident record of these groupings it is pleasing to note how Group 3 aircraft have managed to achieve an accident free year on 3 occasions and only one accident amongst their kind in 3 other years. Not least Group 3 has suffered significantly fewer accidents overall.** Two aircraft in Group 3 have yet to experience a Hull Loss (Mercure and VFW614.) Within Group 4 the following aircraft have not experienced a Hull Loss: A330/340, A321/319, B717, B737NG (Fleet size of nearly 1000 aircraft having flown 3,000,000 Sectors), B777, D328J, FK70). From Figure 2.1.F it is apparent that Group 1 accident rates are twice that of Group 2, three times that of Group 3, and nearly 6 times that of Group 4.

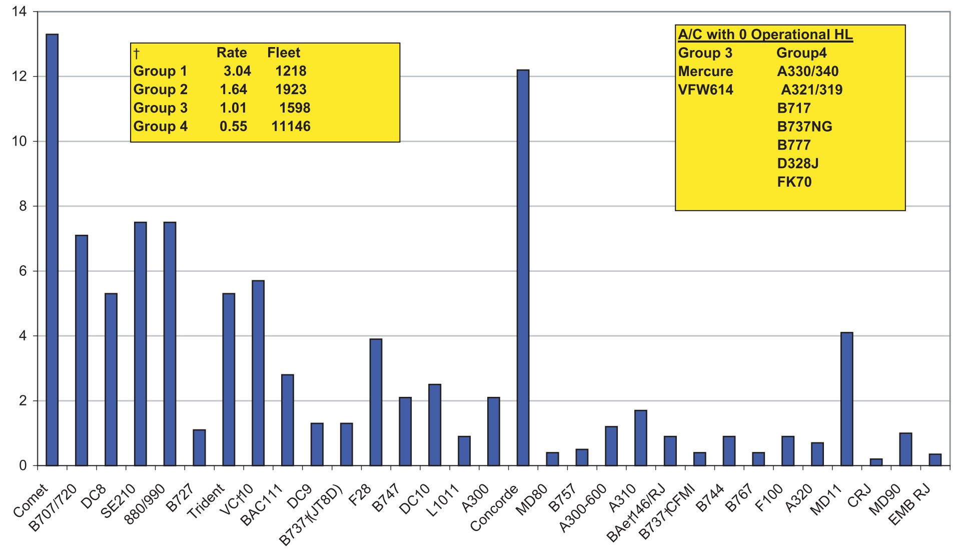
Figure 2.1.E

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
737 (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

Figure 2.1.F

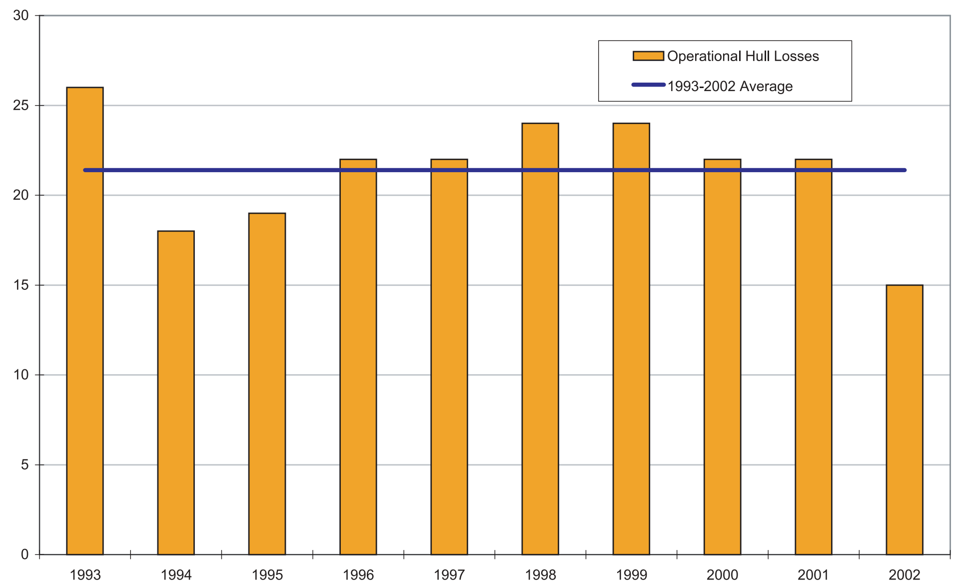
Jet Loss Rate by Aircraft Type
(Hull Losses per Million Sectors Since Entry into Service)



In the year in which we celebrate 100 years of flight it is clear that advances in “safety technology” have been a massive antedote to accidents.

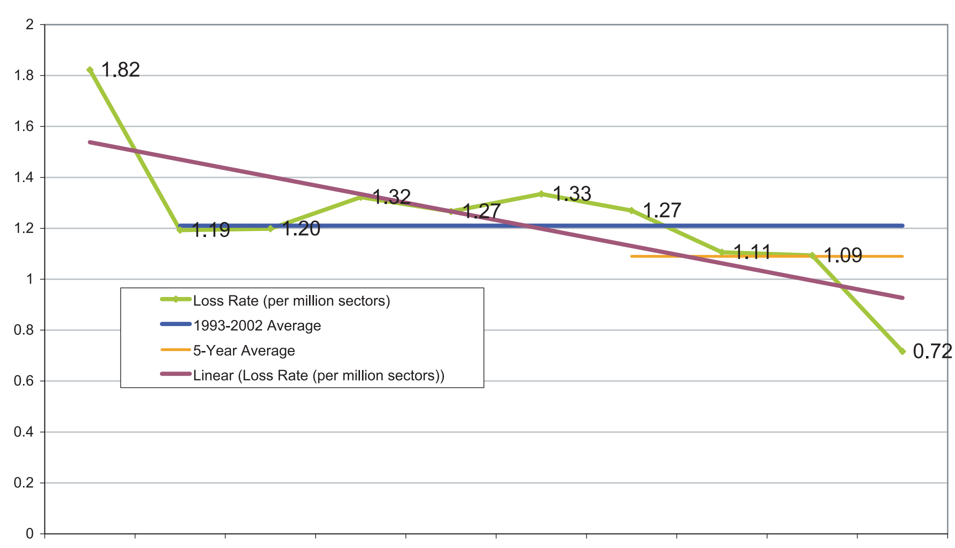
2.2 DATA FOR LAST 10-YEAR PERIOD (1993-2002) JET

Figure 2.2.A
Jet Hull Losses (1993-2002)



Focusing more tightly on the past decade it is apparent from Figure 2.2.A that the average is 22 aircraft destroyed each year. **With only 15 Western-built Hull Losses occurring in 2002 this was a very good year.**

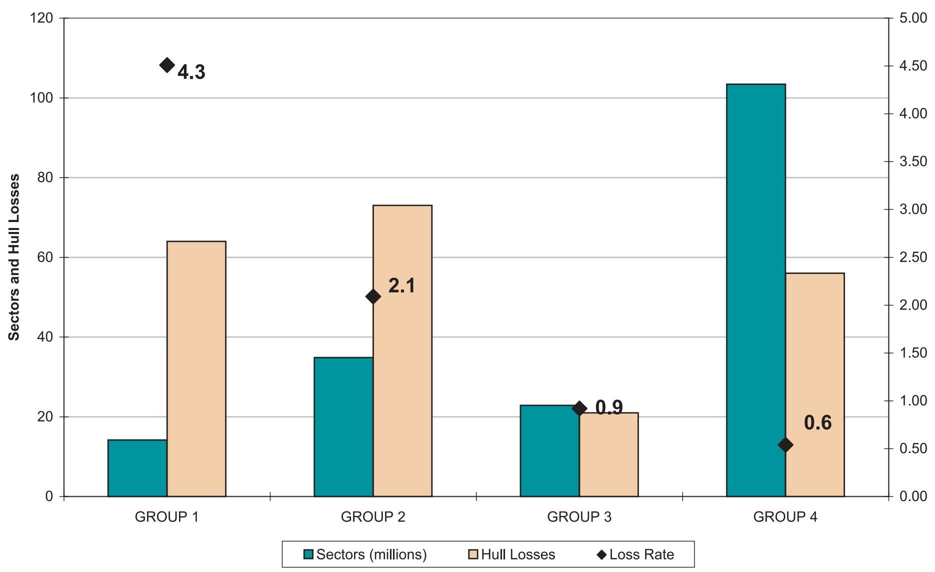
Figure 2.2.B
Jet Loss Rate 1993-2002



Displaying the past decade in terms of the Western-built Jet Loss Rates, this improvement is further accentuated.

Figure 2.2.B shows the Loss Rate (Hull Losses per million sectors), together with the 5 and 10-year averages, and a trendline.

Figure 2.2.C
Jet Loss Rate by Aircraft Group (1993-2002)



Review of the 4 Aircraft Groups in terms of their Loss Rates over the past decade underlines the earlier assessment at Figure 2.1.F. The Loss rate of Western-built Jet Group 1 aircraft is 7 times that of Group 4, therefore, inevitably the gap in the accident rates between the old and the new aircraft types has widened during the past decade.

Therefore, viewed over the past 20 years aviation is enjoying major success in terms of reducing accident rates. This is all the more satisfying because early in the last decade the industry was expecting an increase in the number of accidents to accompany a predicted increase in traffic.

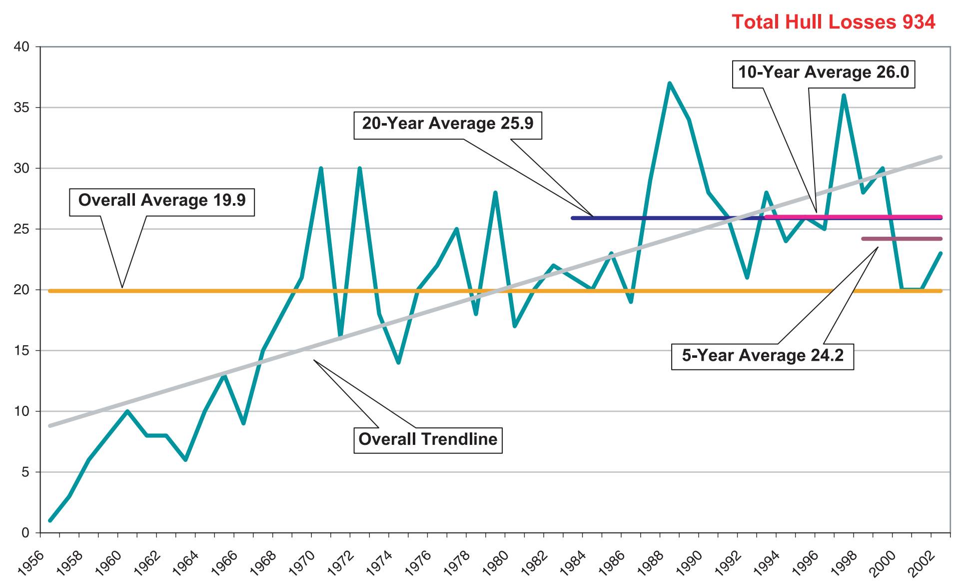
Without careful scrutiny this success may not be apparent because of the perception that accident rates in the Western-built Jet fleets have followed an almost flat rate in recent years. This perception is largely a problem of scaling when viewing traditional accident curves since World War II. However, upon deeper analysis of accident data, the marked drop in the accident rate is apparent. Indeed, **there has been a 50% reduction in the accident rate over the past 20 years. Despite this overall success, history shows that there are grounds for caution. Experience shows that there is a tendency for accident rates to increase following pauses in growth caused by downturn in the world economy.**

2.3 HISTORICAL RECORD TURBOPROP

Operational Hull Losses 1956-2002

The first operational Hull Losses involving Turboprop aircraft occurred in 1956. Since then, there have been 934 Hull Loss accidents. Figure 2.3.A charts the annual Hull Loss accidents by year, with trendline and 5, 10, 20 year overall averages.

Figure 2.3.A
Turboprop Hull Losses 1956-2002



Therefore, over the past two decades the average number of Turboprop Hull Losses is approximately 26 aircraft and is again the same number when viewed as a 10-year average up to 2002. (The 10-year period is considered to be sufficiently long to indicate significant trends and short enough to eliminate the influence of superseded practices and procedures). However, the figure improves markedly to 24 aircraft when viewed as a 5 year average. **Therefore with these historical benchmarks in mind, the 23 Hull Losses that occurred in 2002 represents a steady improvement in the overall Turboprop accident performance. However, 2000 and 2001 were better years with only 20 Hull Losses each year.**

Hull Losses since 1956

Operational	934
Test & Training	112
Violence (operational)	25
Violence (non operational)	23
Non-operational (ground)	55
Non-airline/Unknown	101
Total Hull Losses	**1,250**

Acts of violence are therefore nothing like as dominant as the Jet Fleet.

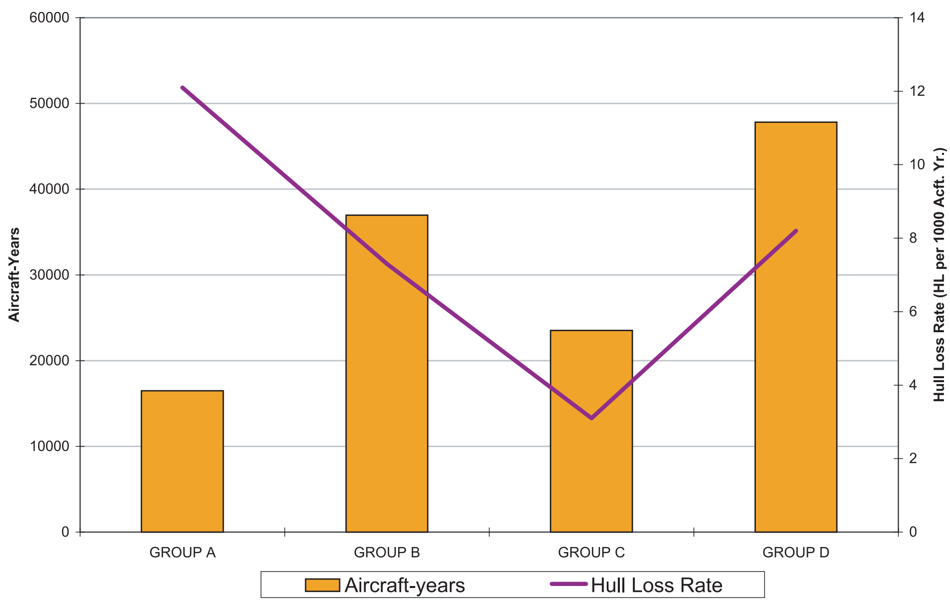
Loss Rates

Because it is in not yet possible to capture timely exposure data for Turboprop aircraft IATA consider the next best way of bringing "rate" comparison into play is to compare in terms of Hull Loss Rates per thousand aircraft years.

The first operational Hull Losses involving Turboprop aircraft occurred in 1956. Since then Turboprop aircraft have accumulated 124,665 aircraft years and have suffered 934 operational Hull Loss accidents. This gives an average Hull Loss rate for the period of 7.5 per 1000 years.

Figure 2.3.B

Turboprop Hull Loss Rate and Exposure 1950-2002



Loss Rates amongst the Turboprop fleets have clearly reduced significantly since Turboprop aircraft have entered service.

The Figure 2.3.B shows the aircraft years flown by each aircraft group and the corresponding Hull Loss rate. Refer to Figure 2.3.C for definitions of aircraft groups. It should be noted that unlike the Jet analysis of Hull Losses by Aircraft Group, which is age related — this Turboprop Grouping is weight related.

Figure 2.3.C

GROUPS AND REPRESENTATIVE TYPES (BY MTOW)							
GROUP A (60,000 lbs and over)				**GROUP C (Over 20,000 lbs and under 40,000 lbs)**			
Super Guppy	Bae Vanguard	L100 Hercules	Shorts Belfast	Nord 262	DHC Dash 8	Gulfstream 1	Saab 340
BAe Argosy	Bae Viscount	L-188 Electra	Transall C160	ATR 42	Dornier 328	Jetstream 41	Shorts 330/360
BAe Brittania	Canadair CL44			CASA CN235	EMB 120		
GROUP B (Over 40,000 lbs and under 60,000 lbs)				**GROUP D (Up to 20,000 lbs)**			
ATR72	DHC Dash 7	Convair 580	NAMC YS-11	ASTA Nomad	CASA 212	EMB 110	Jetstream 31
BAe 748	Fokker F27/F227	HP Dart Herald	Saab 2000	Beech 99	DHC-6 Twin Otter	Fairchild Metro	Saunders ST27
BAeATP	Fokker 50			Beech 1300/1900	Dornier 228	IAI Arava	Shorts Skyvan

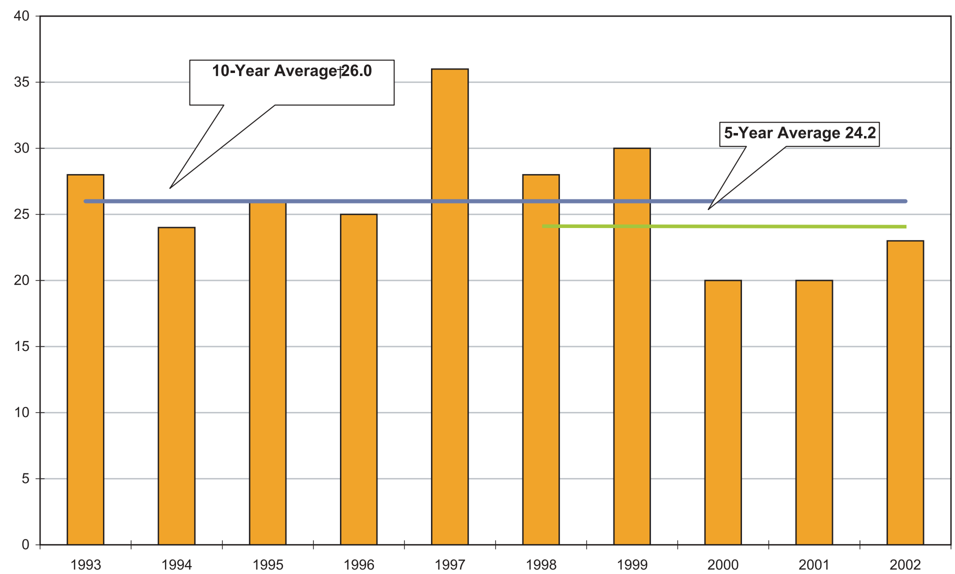
Clearly, as the line shows the Hull Loss rate per 1000 aircraft years has reduced from nearly 12 losses for Group A aircraft, to 7 for Group B, and 3 or so for Group C. However, **Group D aircraft are experiencing a Loss Rate of about 8 Hull Losses per 1000 aircraft years, this being a concerning increase.** Study of Appendix F will show why this has occurred. For example the Twin Otter is experiencing a Hull Loss rate of nearly 11 per 1000 aircraft years, most probably arising from its challenging operating environment and role.

2.4 DATA FOR LAST 10-YEAR PERIOD (1993-2002) TURBOPROP

Focusing more tightly over the past decade in which 51,449 aircraft years were flown, there have been 260 operational Hull Losses averaging 26.0 losses per year.

Figure 2.4.A displays the Turboprop Hull Losses and the 5 and 10 year averages for the 1993 — 2002 period.

Figure 2.4.A
Turboprop Hull Loss 1993-2002



Taking the more recent 5 year period this average becomes 24.2. Therefore with 23 Turboprop Hull Losses occurring in 2002 this was a slightly better than average year.

"Therefore with 23 Turboprop Hull Losses occurring in 2002 this was a slightly better than average year."

Loss Rates

The 10-year average rate was 5.06 Hull Losses per 1000 aircraft years. As can be seen from the Figure 2.4.B for 2002 this rate was 4.5 per 1000 aircraft years, representing a significant improvement compared with the average rate for the decade.

Figure 2.4.B
TurbopropHull Losses per 1000 Aircraft-years

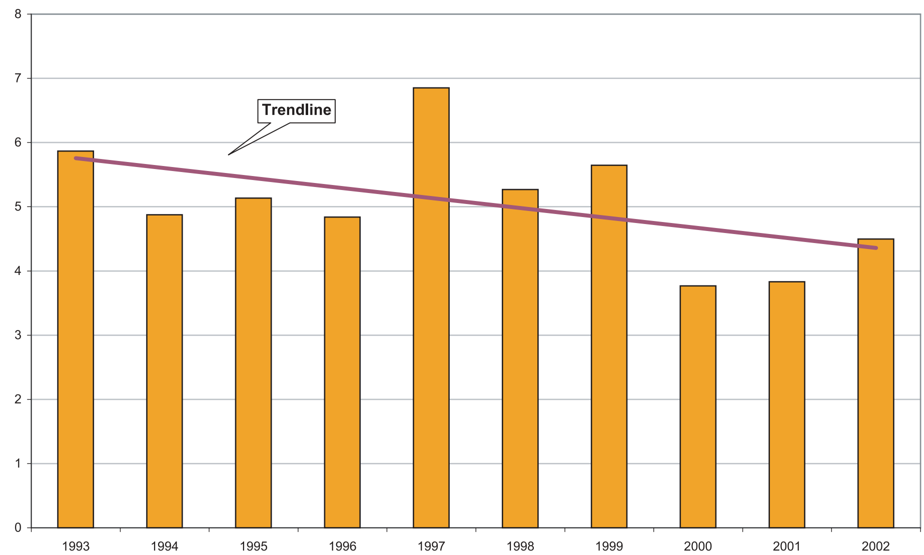
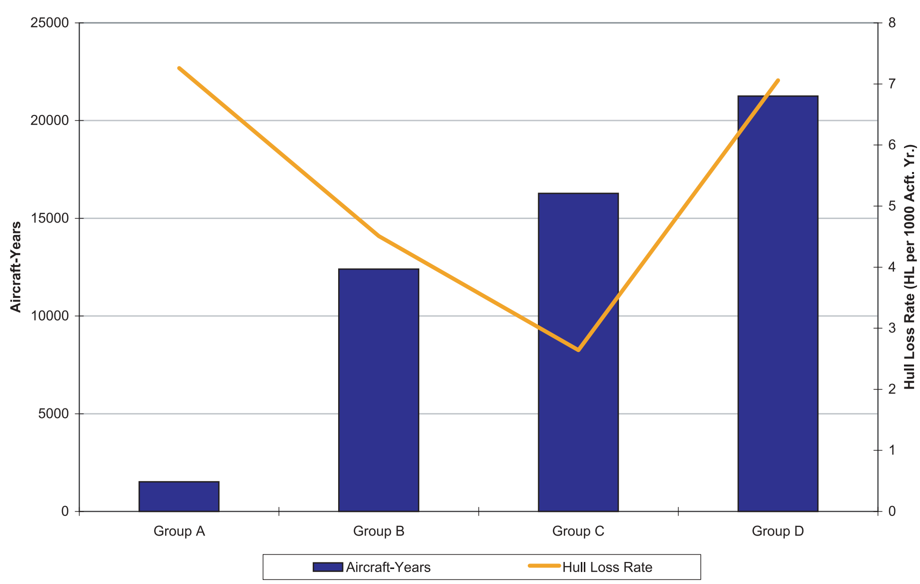


Figure 2.4.C presents the Hull Loss Rate per thousand aircraft years for the 1993-2002 period and the total aircraft years flown for the same period, by Aircraft Group. Refer to Figure 2.3.C for definitions of aircraft groups.

Figure 2.4.C
Turboprop Hull Loss Rate by Aircraft Group 1993-2002



Clearly a very similar trend is seen in the 10 year Loss Rate by Aircraft Group with that of the 1952 — 2002 period. **The higher Hull Loss Rate experienced by Group D aircraft compared with Group C aircraft (from 2.6 to 7.3 per 1000 aircraft years) is apparent.** Again this is largely attributable to the Twin Otter Fleet, joined by five other types apparent from the listing at Appendix F (Beech Commuter, Dornier 228, Embraer EMB 110 Bandeirante, Fairchild Metro Expeditor).

2.5 REVIEW OF FATAL ACCIDENTS AND FATALITIES — JET & TURBOPROP

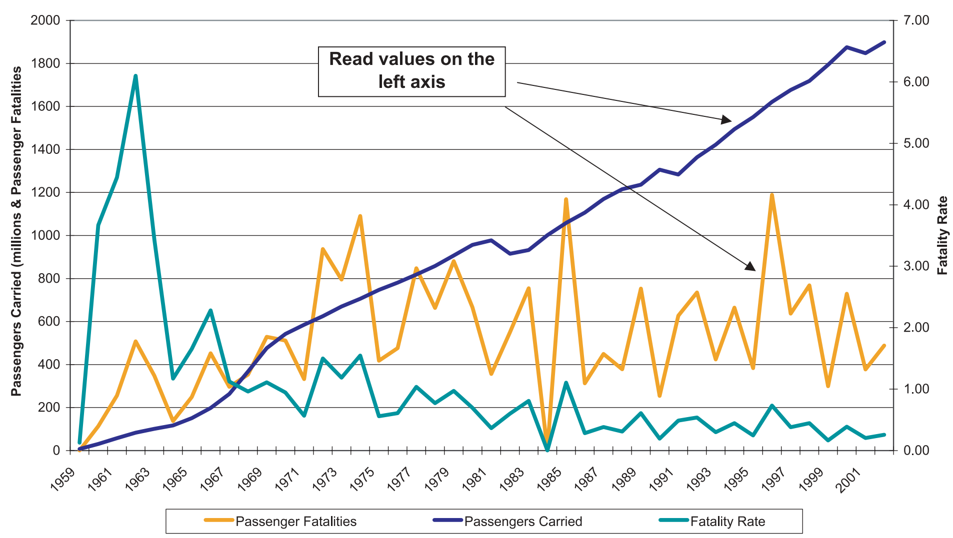
ICAO offers the view that despite the rapid and constant growth in air traffic, the average number of fatalities per year on scheduled flights is less than 600, which is the same as it was in 1947 for instance, when 9 million people flew. This is based on the fact that in 1947 there were 5.02 passenger fatalities per 100 million passenger miles while in 2001 there were 0.03 passenger fatalities per 100 million passenger miles.

Passengers Carried-Fatal Accidents-Fatalities & Fatality Rate 1959-2002

During 2002, 688 passengers and crew lost their lives in accidents involving Western-built Jet and Turboprop aircraft. **A further 286 passengers and crew lost their lives in Eastern-built aircraft during 2002 bringing the fatalities total to 974.** This is therefore higher than the average number of fatalities per year published by ICAO.

Figure 2.5.A

Passengers Carried-Fatalities & Fatality Rate 1959–2002 Jet



IATA's perspective of passenger fatalities for Western-built Jets only is shown in the above chart. (A similar chart going back to 1959 is not available for Turboprop aircraft.) From the mid 60's the fatality rate i.e. passenger fatalities per million passengers carried has reduced steadily.

Western-built Jet Fatalities 1993 — 2002

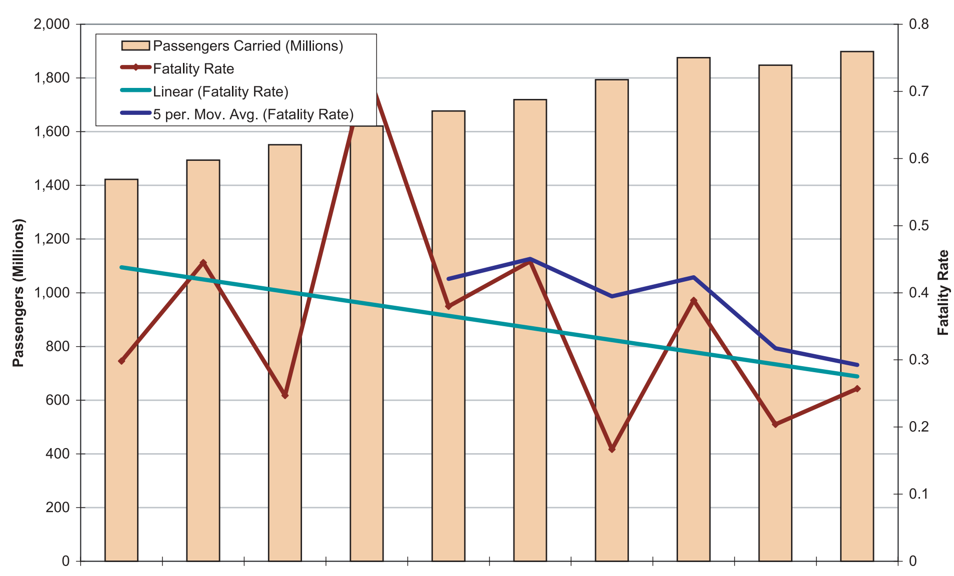
Passengers Carried-Fatal Accidents-Fatalities & Fatality Rate

Passengers Carried:	16,900 million
Fatal Accidents:	96
Fatalities:	
Passenger:	5,959
Crew:	550
Total Fatalities:	**6,509**
Passenger Fatality Rate:	0.35 passenger-fatalities per million passengers carried on board revenue passenger flights

Figure 2.5.B
Western-built Jet Fatal Accidents and Fatalities

From Figure 2.5.B it is apparent that the 8 fatal accident that occurred in 2002 was the lowest number of the decade, the same as last year and in 1995.

Figure 2.5.C
Western-built Jet Passengers Carried & Passenger Fatality Rate



From Figure 2.5.C it is evident that the fatality rate has risen slightly compared with 2001 from 0.20 to 0.26 although the overall trend is downwards.

Western-built Turboprop Fatalities (1993-2002)

Fatal Accidents:	146
Passengers on board fatal flights:	1,976
Crew on board fatal flights:	402
Total on Board:	**2,378**

Fatalities:

Passenger:	1,300
Crew:	318
Total Fatalities:	**1,618**

Figure 2.5.D
Turboprop Fatal Accidents & Fatalities

It is apparent that the Turboprop fleets have been enjoying a steady reduction in the number of fatal accidents up until 2001 when only 7 occurred. **There were however 12 fatal accidents in 2002 representing a concerning increase. With this reversal the number of fatalities, which had also been showing an encouraging reduction since the mid-90s, also increased significantly to 128.**

The total fatalities occurring on Western Jet and Turboprop aircraft in 2002 amounted to 560 + 128, which is almost 100 more than ICAO's published annual average figure. (Even before Eastern-built losses are taken into account).

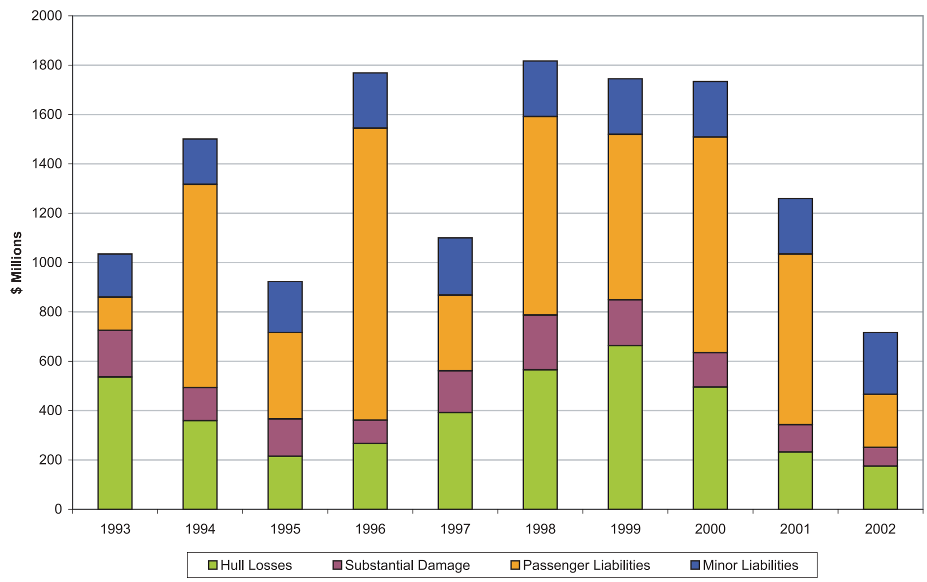
2.6 ACCIDENT COSTS

Western-built Jet

All figures in US$

IATA has obtained the estimated cost for **all losses** involving Western-built Jet airlines over the past decade, excluding acts of violence. These are set out below:

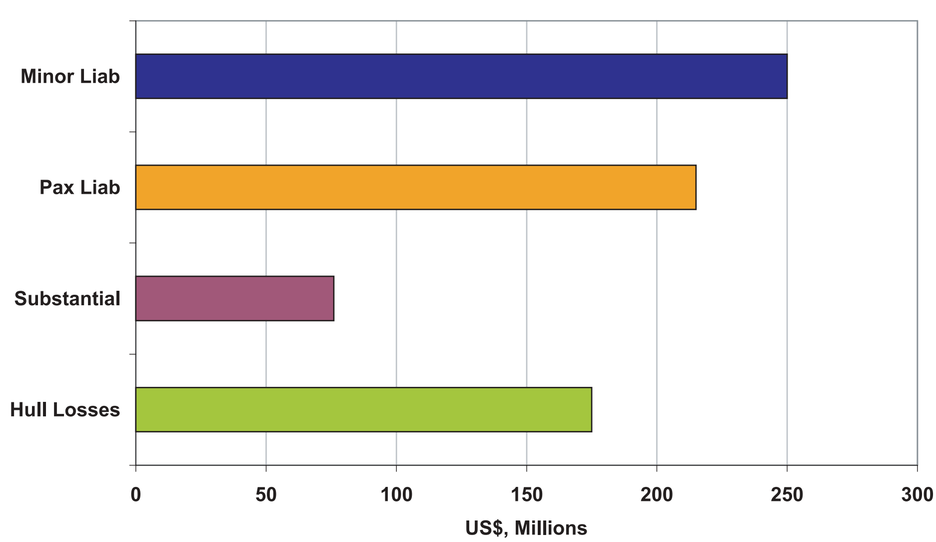
Figure 2.6.A
Jet Accident Costs 1993-2002



Therefore the estimated cost of Hull Losses involving Western-built Jet aircraft over the past decade appears to be cyclical. Costs have dropped from a high of over $ 600M in 1999 (when all losses associated with accidents were peaking around $ 1700M) to the lowest of the decade to below $ 200M in 2002 (when accident costs for the year were just over $ 700M). The cost of accidents for 2002 is detailed in Figure 2.6.B.

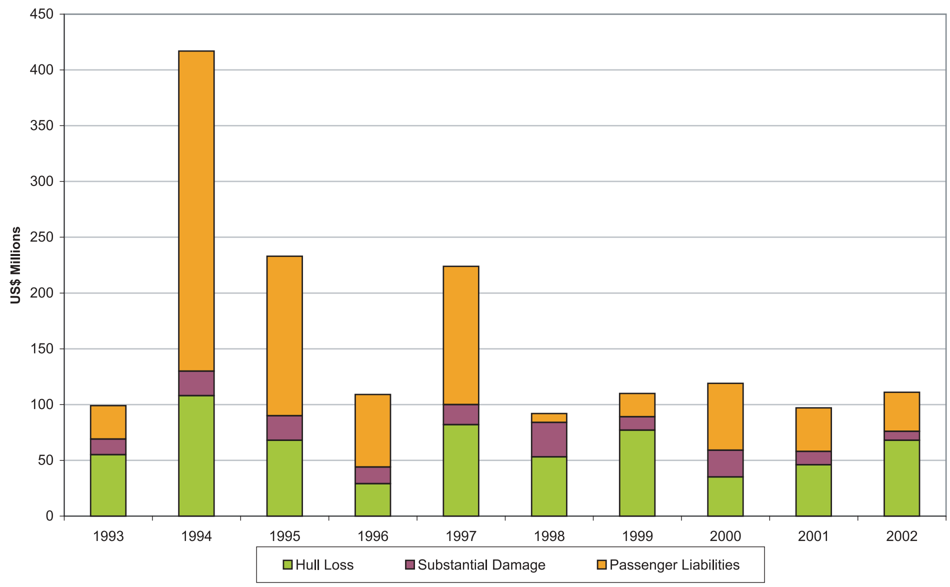
Thus, the lowest number of Western-built Hull Losses of the decade achieved in 2002 has led to the lowest accident costs.

Figure 2.6.B
Jet Accident Costs 2002



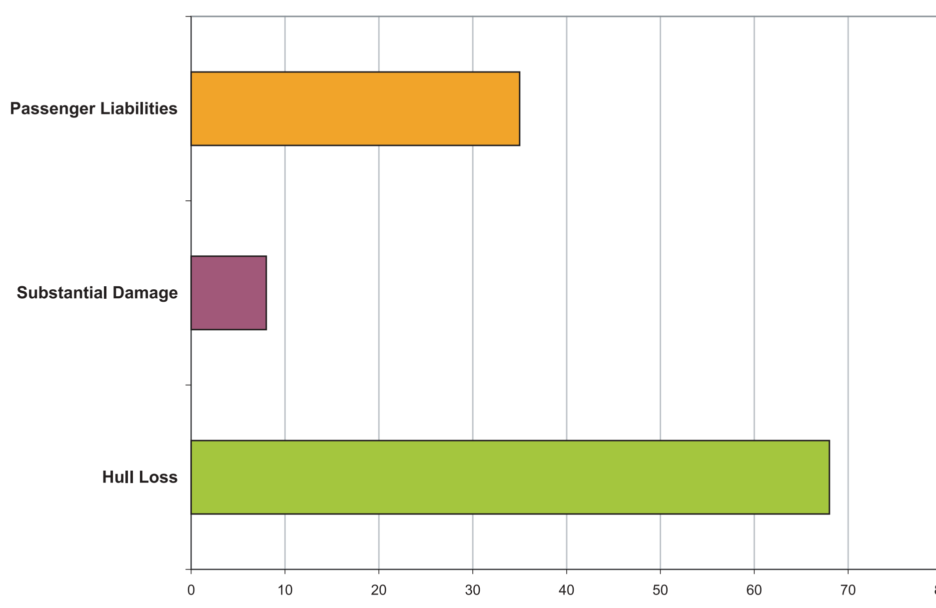
Western-built Turboprops

Figure 2.6.C
Turboprop Accident Costs 1993-2002



Accident costs resulting from Western-built Turboprop aircraft operations have dropped from their decade high in 1994 of over $ 400M to a plateau of around $ 100M. **However, the cost of Western-built Turboprop Hull Losses have continued to increase over the past 3-years to their 2002 level of almost $ 70M as detailed in the Figure 2.6.D.**

Figure 2.6.D
Turboprop Accident Costs 2002



Therefore the total cost of Hull Losses involving Western-built Jet and Turboprop aircraft for 2002 is around $ 243M which is the lowest of the decade. The CWG concluded that these costs were in reality at least five times greater than reflected here, because of commercial impact.

2.7 CHAPTER 2 SUMMARY

- Although the impressive reduction in the accident rate for 2002 is promising, airlines should beware that history points to the need for particular caution during the surge in fleet sizes and utilisation when the upturn in the economy takes hold in 2003.
- Acts of violence resulting in Hull Losses are a strong feature of the Jet Airliner accident tally since 1958.
- Using the historical benchmark of 20 Hull Losses per year for Western-built Jet aircraft as a significant safety performance benchmark, 2002, in which there were only 15 Hull Losses, enjoyed a highly significant 25% reduction in this category of accidents.
- With the 2002 figure being 0.72 Hull Losses per million sectors, the Jet Hull Loss Rate has almost been halved, thus agreeing with the ICAO conclusion, despite the use of slightly different metrics, that overall accident rates have halved during the past 20 years.
- With 23 Turboprop Hull Losses occurring in 2002 this was a slightly better than average year.
- The 10-year average Loss Rate for Western-built Turboprop aircraft is 5.06 Hull Losses per 1000 aircraft years. For 2002 this rate was 4.5, representing a significant improvement, indeed the best performance of the decade.
- There is a concerning difference in the Hull Loss Rate experienced by Group D Turboprop aircraft compared with Group C aircraft (from 2.6 to 7.3 losses per 1000 aircraft years).
- The 8 fatal accidents involving Western-built Jets in 2002 equals the lowest nunber of the decade, the same as last year and in 1995.
- In 2002 the fatality rate (passenger-fatalities per million passengers carried) has risen slightly compared with 2001 from 0.20 to 0.26 although the overall trend is downwards.
- The Turboprop fleets have been enjoying a steady reduction in the number of fatal accidents up until 2001 when only 7 occurred. There was however 12 fatal accidents in 2002 representing a concerning increase. With this reversal the number of fatalities, which had also been showing an encouraging reduction since the mid-90s, also increased significantly to 128.
- The total number of fatalities occurring on Western-built Jet and Turboprop aircraft in 2002 amounted to 688, which is almost 100 more than ICAO’s published annual average figure. Including Eastern-built the total rises to 974. This is therefore significantly higher than the average number of fatalities per year of 600 published by ICAO.
- The estimated cost of Hull Losses involving Western-built Jet aircraft over the past decade have dropped from a high of over $ 600M in 1999 (when all losses associated with accidents were peaking around $ 1700M) to the lowest of the decade to below $ 200M in 2002 (when all accident costs for the year were just over $ 700M). Thus, the lowest number of Western-built Hull Losses of the decade achieved in 2002 has led to the lowest accident costs.
- Accident costs resulting from Western-built Turboprop operations have dropped from their decade high in 1994 of over $ 400M to a plateau of around $ 100M. However, the cost of Western-built Turboprop Hull Losses have continued to increase over the past 3-years to their 2002 level of $ 70M.
- The total cost of Hull Losses involving Western-built Jet and Turboprop aircraft for 2002 is around $ 243M which is the lowest of the decade.

CHAPTER 3 — YEAR 2002 IN REVIEW

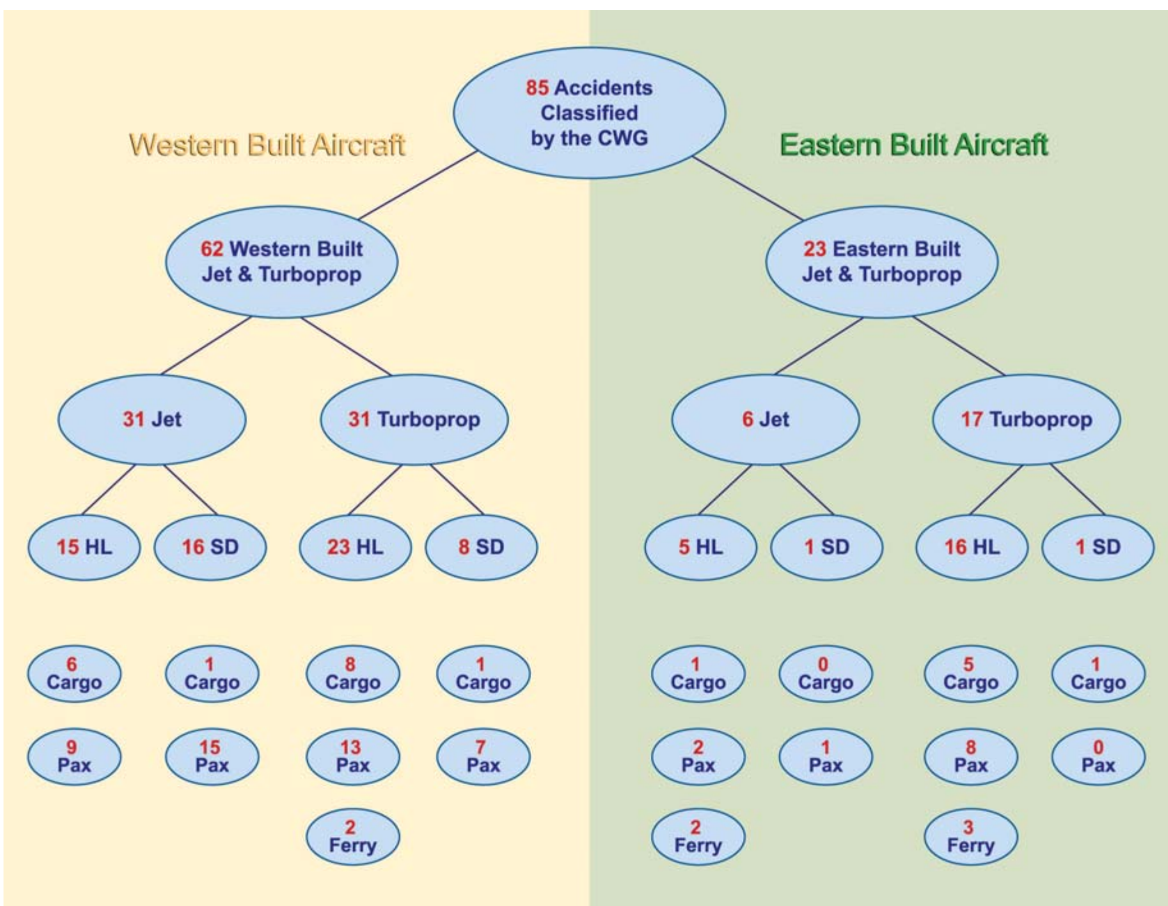
The aim of this chapter is to present the global accident statistics for 2002 with a view to identifying the primary safety issues arising from 2002. The analysis will cover both Western and Eastern Jet and Turboprop aircraft although the primary focus will be on the accidents involving Western-built aircraft.

DATA ANALYSIS

Total of Accidents

The CWG Classified 85 accidents involving Western and Eastern-built Jet and Turboprop categories distributed as shown in Figure 3.A. These are the **Operational** Jet and Turboprop Hull Loss (HL) and Substantial Damage (SD) accidents that occurred in 2002 and are the primary focus of the Safety Report. Throughout this analysis it should be assumed that only operational accidents are being addressed unless specifically stated otherwise. An operational accident is one which occurred during normal revenue operations or positioning flights. This chart therefore **excludes ground events where there was no intention of flight and deliberate acts of violence.**

Figure 3.A
Distribution of 2002 Accidents



3.1 STATISTICS FOR WESTERN-BUILT AIRCRAFT

3.1.1 WESTERN-BUILT JETS

Data for 2002

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

Accident Summaries

Descriptions of Jet airliner operational Hull Loss and substantial damage accidents and certain other losses are presented at Appendix E on the CD-ROM.

Fleet-Hours-Sectors

World Fleet (end of year): 15,885 [15,387]

Hours Flown: 38.50 million [37.75 million]

Sectors (landings): 20.94 million [20.12 million]

Therefore, Fleet size-Hours-Sectors continue to increase.

Operational Accidents

Hull Losses (HL): 15 [22]

Substantial Damage (SD): 16 [34]

Total Accidents: 31 [56]

Figure 3.1.A

Accidents by Aircraft Group/Type (Age Related)

The following table lists the operational Hull Losses (HL) and Substantial Damage (SD) accidents by aircraft group/type (refer to Appendix C for definitions).

GROUP 1				GROUP 2				GROUP 3				GROUP 4			
TYPE	HL	SD	TOT	TYPE	HL	SD	TOT	TYPE	HL	SD	TOT	TYPE	HL	SD	TOT
Passenger				**Passenger**				**Passenger**				**Passenger**			
B727	1		1	BAe 1-11	1		1					A320		3	3
				B737 (JT8)	1		1					A321		2	2
				B747 Classic	1	1	2					A330		1	1
				DC-9	1	1	2					B737 (CFMI)	2	3	5
												B757		1	1
												B767	1		1
												CRJ		2	2
												FK100	1	1	2
Total	1		1	**Total**	4	2	6	**Total**	–	–	–	**Total**	4	13	17
All-Cargo				**All-Cargo**				**All-Cargo**				**All-Cargo**			
B707	2		2									B757	1		1
B727	2		2												
DC-8	1	1	2												
Total	5	1	6	**Total**	–	–	–	**Total**	–	–	–	**Total**	1		1
TOTAL	**6**	**1**	**7**		**4**	**2**	**6**		**0**	**0**	**0**		**5**	**13**	**18**

Loss Rates

Hull losses per million sectors: 0.72 [1.09]

Hull losses per million hours: 0.39 [0.58]

Therefore compared with 2001 a 34% reduction in the Hull Loss Rate was achieved in 2002.

Passengers Carried-Fatal Accidents-Fatalities & Fatality Rate

Passengers carried (million):	1,899 [1,847]
Estimated change since the previous year:	2.7% increase [1.5% decrease]
Fatal accidents:	8 [8]
Fatalities:	
Passenger fatalities on board revenue passenger flights:	488 [377]
Passenger fatalities on board cargo flights:	16 [3]
Crew:	56 [21]
Total:	**560 [401]**

Passenger Fatality Rate: 0.26 [0.20] passenger-fatalities per million passengers or the equivalent of one passenger-fatality per 3.9 [4.9] million passengers carried on board revenue passenger flights.

Figure 3.1.B
Fatal vs Non-Fatal Accidents

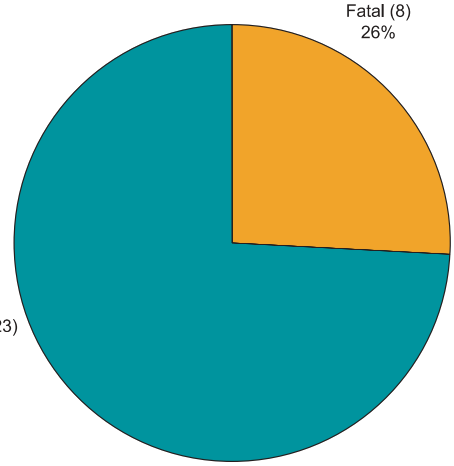
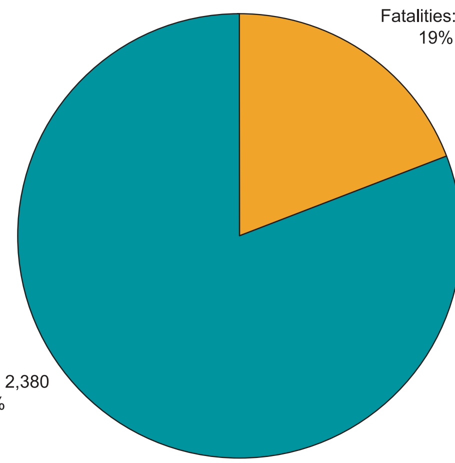


Figure 3.1.C
Accident Survivability (31)



There were 2,940 [5,652] individuals (crew and passengers) aboard the 31 [56] aircraft involved in operational accidents. Of these, 560 [401] suffered fatal injuries as a consequence while 2,380 [5,251] survived, Figure 3.1.C illustrates this relationship.

Therefore, compared with 2001, within the overall **impressive** reduction in accidents, the percentage of fatal accidents increased significantly as did the fatalities percentage.

3.1.2 STATISTICS FOR WESTERN-BUILT TURBOPROPS

Fleet-Aircraft Years Flown

World Fleet (end of year):	5,073 [5,170]
Aircraft Years flown in 2002:	5,114 [5,218]

Therefore, fleet size for Turboprops has continued to decrease over the past 3 years, as has the Aircraft years flown.

Operational Accidents

Hull Losses:	23 [20]
Substantial Damage:	8 [10]
Total accidents:	**31 [30]**

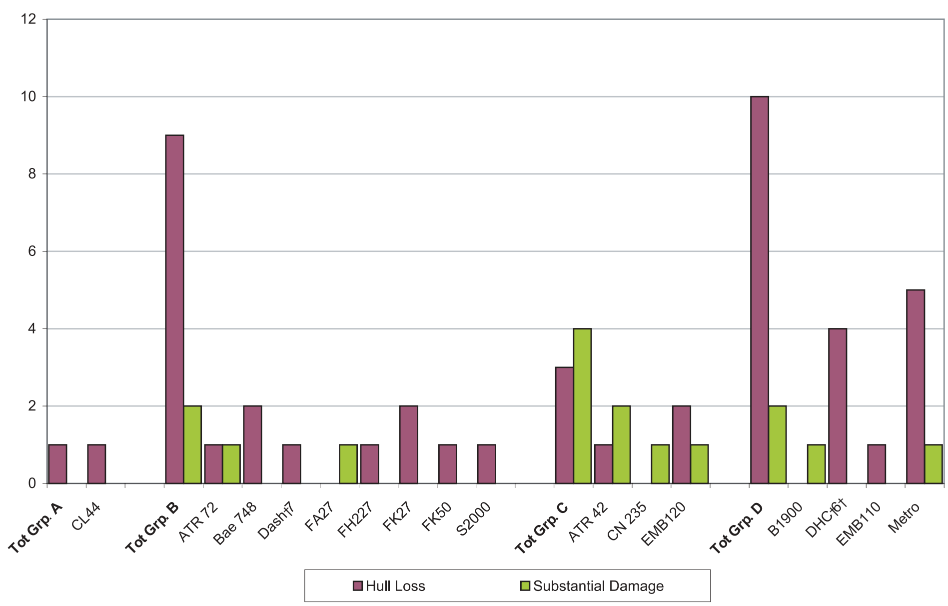
Therefore, 2002 was a step back compared with 2001 but a slightly better than average year when viewed across the decade as a whole. Overall, in terms of accidents (HL plus SD) the accident total was about the same comparing 2002 with 2001.

Accidents by Aircraft Groups (Weight related)

The following figure lists the operational Hull Losses (HL) and Substantial Damage (SD) accidents by aircraft group/type (Refer to Appendix C for definitions).

Figure 3.1.E

2002 Hull Loss/Substantial Damage by Type



Operational Hull Loss Rates

There is insufficient data to calculate Turboprop operational Hull Loss rates on a per million sectors or per million hours basis. Hence, as in previous annual reports, the operational loss rate is expressed per 1000 aircraft-years. (See Appendix C for aircraft-year definition.)

Hull losses per 1000 aircraft-years: 4.5 [3.8]

Fatal Accidents & Fatalities

Fatal accidents:	12 [7]
Fatalities:	
Passengers:	96 [44]
Crew:	32 [10]
Total:	**128 [54]**

Of the 31 operational accidents (23 HL and 8 SD), 12 (39%) resulted in passenger and/or crew fatalities.

Thus, the increase in fatal accidents involving the Turboprop fleets is concerning, more so the increase in fatalities compared with 2001.

3.1.3 SUMMARY ASSESSEMENT OF WESTERN-BUILT AIRCRAFT

Operational Accidents

Western-built

Amongst the Western-built Jet and Turboprop fleets **in 2002 there were 62 accidents** (HL plus SD), which is a great improvement compared with the **86 accidents that occurred in 2001, this representing a 28% reduction.**

The Western-built Jet category is particularly pleasing with a reduction of 25 accidents, a 45% improvement compared with 2001.

However, **in 2002 the Western-built Turboprop category experienced 31 accidents which is 1 worse than in 2001.**

There were 15 [22] Jet Hull Loss accidents and 16 [34] Jet accidents in which aircraft were Substantially Damaged. Therefore, compared with 2001, there was an overall reduction of 45% in the Western-built Jet category.

Of the **Turboprop accidents, 23 [20] were Hull Losses and 8 [10] aircraft were Substantially Damaged. Therefore, compared with 2001, there was a 3% increase in the number of accidents experienced by the Turboprop Fleets** although viewed across the decade 2002 was a slightly better than average year.

Viewed over the 1993-2002 decade as a whole in terms of **Hull Losses** (Jet and Turboprop), the **Hull Loss figure of 38 was 4 better than last year, when it was the lowest of the decade.**

Operational Hull Loss Rates

The **Operational Hull Loss Rates per million sectors for Western-built Jets reduced from 1.09 per million sectors in 2001 to 0.72 per million. Thus over the past decade the Jet Hull Loss Rate has been halved.**

The **Operational Hull Loss Rates for Western-built Turboprops expressed in terms of losses per 1000 aircraft years in 2002 increased from 3.8 to 4.5 which is a concerning increase.** However, this should be viewed as part of an overall improvement in the Loss rate for Turboprop aircraft over the 1993 to 2002 period as a whole.

Fatal Accidents and Fatalities

In the public eye the number of fatalities resulting from aircraft accidents is a compelling feature of aviation safety. However, it is important to remember that the number of people that happen to be onboard an aircraft that is involved in an accident has little to do with the cause of the accident and these numbers, although highly regrettable, are not necessarily a measure of safety. However, for completeness the figures are included here.

Amongst Western-built fleets there were **8 [8] fatal accidents involving Jet aircraft and 12 [7] fatal accidents involving Turboprop aircraft. Therefore in terms of fatal accidents 2002 presented a mixed picture with the same number of Jet accidents as 2001 but a considerable deterioration in safety performance amongst the Turboprops.**

The low figure of 8 fatal accidents involving Western-built Jets in 2002 equals the best performance of the decade for the number of fatal accidents, the same as last year and in 1995.

The Turboprop fleets have been enjoying a steady reduction in the number of fatal accidents up until 2001 when only 7 occurred. The 12 fatal accidents occurring in 2002 is a particularly concerning feature of the 2002 accident statistics, particularly as it was accompanied by an increase in the number of fatalities to 128 which had also been showing an encouraging reduction since the mid-90s.

In **2002 there were 560 [401] fatalities involving Jet aircraft and 128 [54] involving Turboprop aircraft.** Therefore, regrettably, the number of fatalities, excluding deliberate acts of violence, increased significantly compared with 2001. In terms of the fatality rate on the Jet fleets (passenger-fatalities per million passengers carried) the figure has risen slightly compared with 2001 from 0.20 to 0.26 although thankfully the overall trend is downwards over the decade as a whole.

Therefore in 2002 the aviation industry made some great strides forward in reducing Jet Hull Losses but stepped backwards with the Turboprop fleets. Viewed across the decade as a whole the key metrics in aviation safety are reducing. **The most satisfying of these achievements must be the many thousands of lives saved as a result of halving the hull loss rates amongst the Western-built Jet fleets over the decade and particularly the reduction in this rate by one third during 2002.**

Aircraft Group Safety Record

Looking back to 1959 at the accident record of Western-built aircraft accident groupings it is pleasing to note how Group 3 Western aircraft have managed to achieve an accident free year on 3 occasions and only one accident amongst their kind in 3 other years. Not least Group 3 has suffered significantly fewer accidents overall than the other 3 aircraft groupings.

There is however a concerning difference in the Hull Loss Rate experienced by Group D Turboprop aircraft compared with Group C aircraft (from 2.6 to 7.1 per 1000 aircraft years).

3.2 STATISTICS FOR EASTERN-BUILT AIRCRAFT

3.2.1 INTRODUCTION

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

Definitions applicable to Eastern-built Aircraft

Other Operators

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

Eastern-built Aircraft: The main types in current service and considered in this portion of the IATA Safety Report 2002 are:

Jets: An-72, Il-62, Il-76, Il-86, Tu-134, Tu-154, Yak-40 and Yak-42.

Turboprop: An-12, An-24, An-26, An-28, An-32, L-410 and Y-12.

3.2.2 EASTERN-BUILT JET DATA FOR 2002

Hours and Sectors Flown

Hours and sectors flown are not available for the year 2002 but are projected to be in the region of 0.75 million hours and 0.3 million sectors (broad estimate):

Utilisation of Eastern-built Jets has decreased sharply during the 1990s. This significantly reduced exposure would explain, in part, the relatively few hull losses now compared with some earlier years.

Accidents

Hull Losses Former Soviet Union:	4 [4]
Hull Losses Others:	1 [1]
Substantial Damage:	1 [3]
Total Accidents:	**6 [8]**

Fatal Accidents

Former Soviet Union: There were 2 [3] fatal accidents involving aircraft operators of the former Soviet Union. 27 crew and 57 passengers were killed in the accidents.

Others: There was 1 [1] fatal accident in which 9 crew and 108 passengers were killed.

Hull Loss Rate

The operational Hull Loss rate is estimated to have been 16.7 per million sectors and 6.7 per million hours.

3.2.3 EASTERN-BUILT TURBOPROPS DATA FOR 2002

Hours and Sectors Flown

No accurate exposure data is available for Eastern-built aircraft. However, broad estimates have been made for passenger aircraft in operation with Commonwealth of Independent States (CIS) airlines as follows:

Figure 3.2.A

	2002	2001	1992-2001
Hours, million	0.25*	0.25*	4.5*
Landings, million	0.2*	0.2*	3.5*

**Estimated*

Accidents

There were 16 known Hull Loss accidents to Eastern-built Turboprops compared with 10 in 2001.

There was 1 known Substantial Damage accident involving Eastern-built Turboprops compared with 4 in 2000.

Fatal Accidents

9 [7] of the operational Hull Loss accidents resulted in fatalities (25 crew and 60 passengers).

Hull Loss Rates

The operational Hull Loss rate for Eastern-built Turboprop is estimated to have been 80 per million sectors and 64 per million hours.

3.2.4 SUMMARY ASSESSMENT OF EASTERN-BUILT AIRCRAFT

Eastern-built

As far as can be determined by the CWG there were **23 Eastern-built Jet and Turboprop accidents (HL plus SD) during 2002.** Utilisation of Eastern-built Jet and Turboprop aircraft has reduced considerably during the 1990s and this significantly reduced exposure would explain, in part, the relatively few accidents now compared with earlier years.

On this basis the number of **Eastern-built Jet Hull Loss accidents was 6, comparing well with the 8 Hull Losses reported last year. However,** there were **17 Eastern-built Turboprop accidents in 2002 which compares less well with the 14 encountered in the region in 2001.**

In terms of those accidents in which the aircraft was substantially damaged, there was only one Eastern-built Turboprop accident reported compared with 4 in 2001. Therefore, overall **amongst Eastern-built Jet and Turboprop fleets, 2002 was a rather similar year to 2001.**

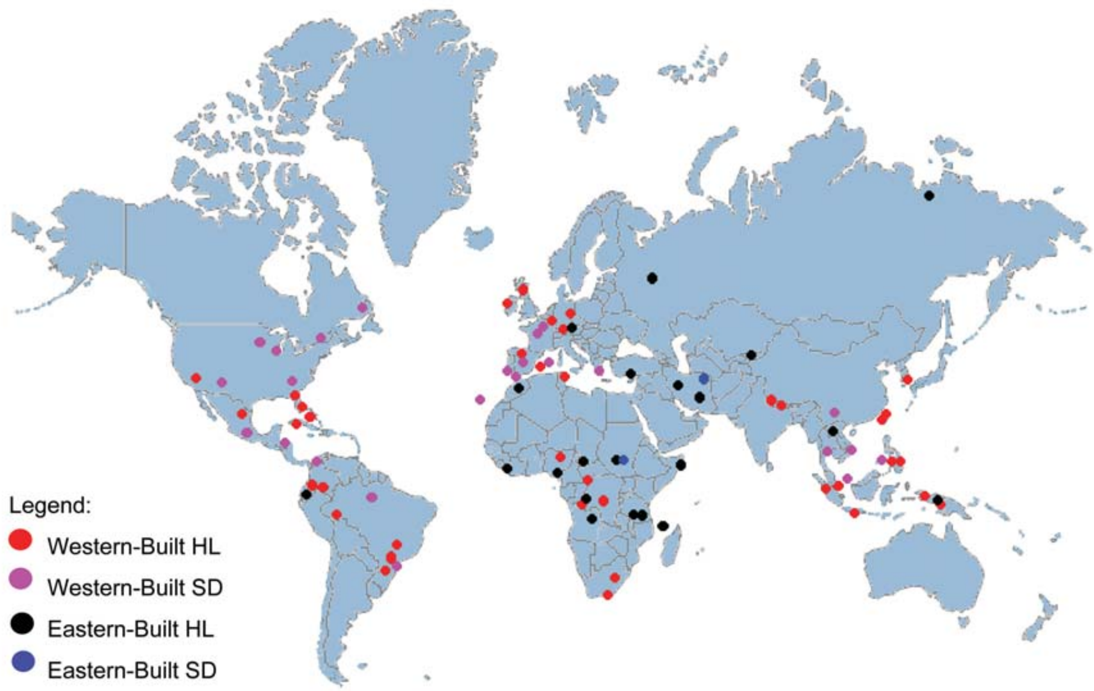
Of the 23 accidents involving Eastern-built Jet and Turboprop aircraft only 3 occurred inside the boundary of the former Soviet Union, 12 of these occurred in Africa.

3.3 AIRCRAFT ACCIDENTS BY IATA REGION

All Accidents

To take a first global look at the accident scene for 2002, by location, **Figure 3.3.A** shows all accidents addressed by the 2002 Safety report.

Figure 3.3.A
2002 Accident Review By Location



This is the sort of early snapshot that is normally shown around the world, sometimes expressed in accidents involving Western-built Jets per million sectors or “multi-engined airliner accidents per year”. It is usually not clear whether the rates quoted include either the Western-built Turboprops or the Eastern-built Jet accidents and Turboprop aircraft. With this bold picture of the accidents for 2002 in terms of this Safety Report it should be noted that the data presented cannot be “normalised” to achieve a rate comparison by region across Western and Eastern-built aircraft because not all of the exposure data (sectors, flying hours) is available at the time of going to press.

Looking back over past decades it is clear to IATA that this lack of timely rate information has been accepted for far too long and should be rectifiable. Certainly, with the development of STEADES and Flight Data programmes this inadequacy must be tackled with greater urgency if these programmes are to be exploited to the full. While IATA receives good exposure data from its 273 members, admittedly representing 98% of all international scheduled air traffic, there are more than 1000 other airlines in the world. There is little point in having a good grasp of what is going on in the world for Western-built Jets, for example, if the aircraft that is involved in a mid-air collision or a catastrophic runway incursion with a Western-built Jet is an Eastern-built Turboprop! IATA, together with ICAO, and Airclaims, is striving to achieve earlier capture of exposure data.

Meanwhile, the serious exponents of safety “propaganda” must remain alert to the limitations and distortions of the data they may be presented. The CWG is mindful of this problem. Every effort will be made in this Safety Report to highlight statistical inadequacy where it occurs as this analysis proceeds into the Turboprop and Eastern-built accident arena of 2002 accidents.

There is another aspect that should concern conscientious communicators of regional safety performance and that is the continuing debate over coding of accident location. IATA welcomes ICAO's work in establishing a Worldwide Regional Classification system. Comparing lists used by IATA, Airclaims, Boeing, ICAO, and the UKCAA, there was total agreement for 73% of countries that appeared on any given list. Further work is being done to establish agreed regional definitions. At the time of writing the 2002 Safety Report, IATA delineates between regions using the definition set out by IATA's Regional Technical Conferences. **Refer to Appendix D** on the CD-ROM.

Not least, the serious safety performance assessor should be alert to the large annual variation in accident rates across regions and the volatility of rates arising from the small numbers involved.

Western-built By Region

Sector and flying hour data are only available for Western-built Jet fleets. Even with this data some estimation and approximation has had to be applied but it may be assumed to be accurate within 2%.

The 2002 data for Western-built Jet utilisation spans 20.6 million sectors with North America (NA) flying 9.3 Million, Europe (EU) 5.1 Million, Far East (FE) 3.6 Million, South America (SA) 1.6 Million, Africa (AF) 0.52 Million, and Near East (NE) 0.46 Million sectors. Sector information for Western-built Turboprops is not available.

The following figures show the best possible picture of the accidents by IATA Region of Operator. It should be noted that Figure 3.3.B is the Western-built Jet **Hull Losses per million sectors,** Figure 3.3.C is the Western-built Turboprop expressed as **Hull Losses per Thousand Aircraft Years.**

Figure 3.3.B
Western-built Jet Loss rate by IATA Region of Operator

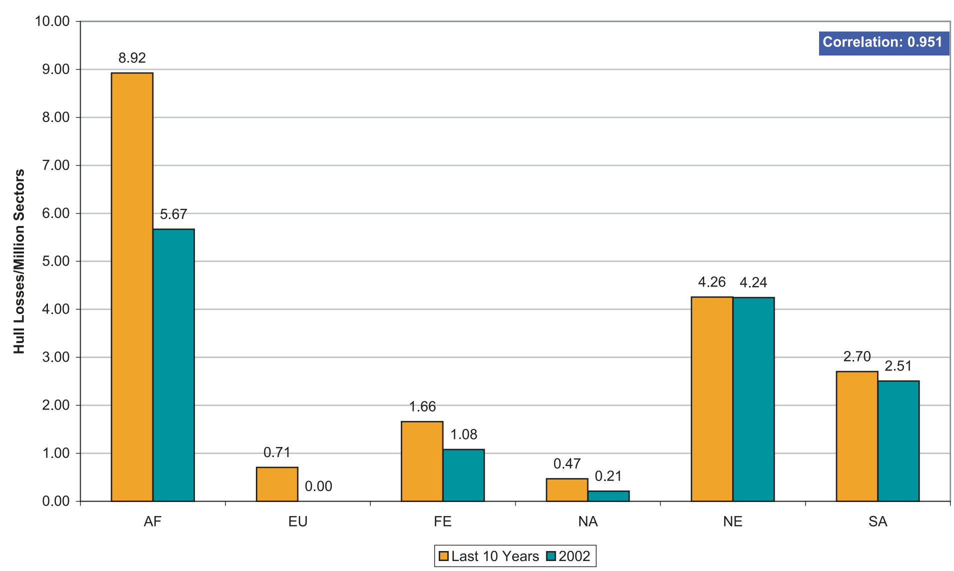
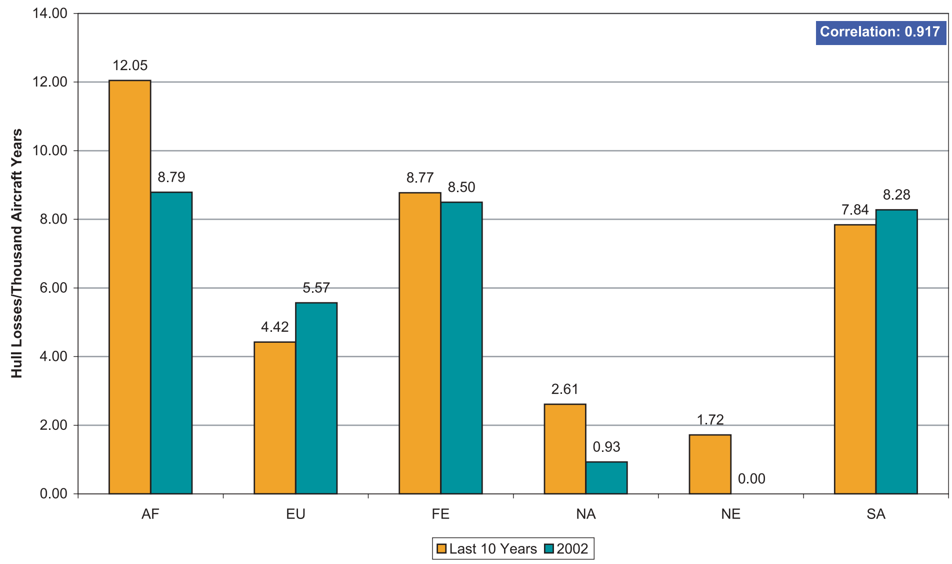


Figure 3.3.C
Western-built Turboprop Loss Rate by IATA Region of Operator



It is apparent from the Western-built data presented in Figures 3.3.B and 3.3.C that there is a close correlation between data for the 10-year period and that for 2002.

Eastern-built By Region

Figure 3.3.D
Eastern-built Aircraft Hull Loss Counts by Region of Operator

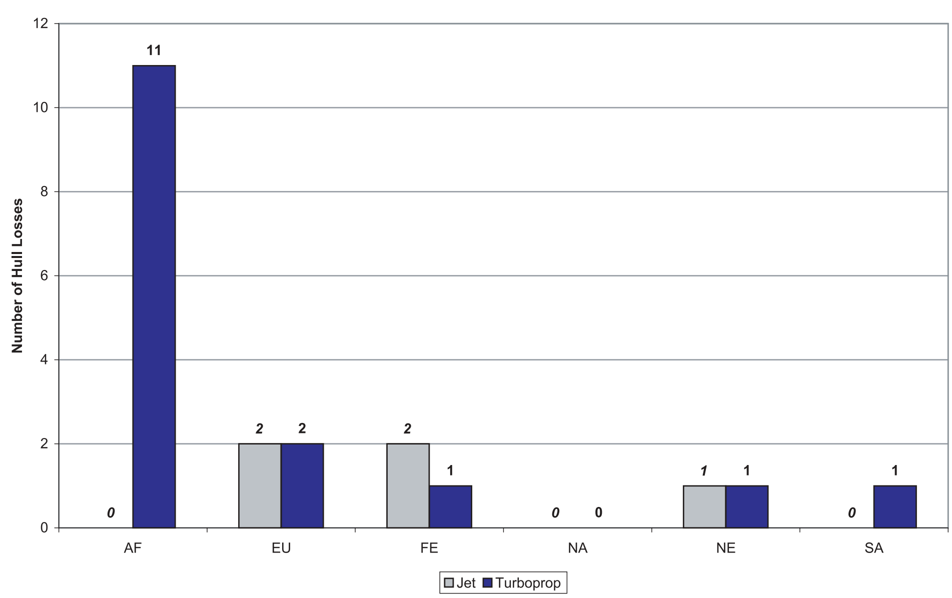


Figure 3.3.D for Eastern-built aircraft is not rate based, the chart simply representing the **hard count of Hull Losses by Region of Operator.**

REVIEW OF ACCIDENTS BY REGION

Therefore, in terms of Hull Loss Rates for 2002, for Western-built aircraft and the hard count numbers for Eastern-built aircraft it is clear that **North America (NA) has achieved its best accident performance over the 1993 — 2002 decade and also in 2002.** Europe's (EU) overall performance over the decade and the year was marred by its Western-built Turboprops whilst the Near East (NE) has a consistently difficult time with its Western-built Jets. Far East (FE) and South America (SA) continue to suffer from higher accident rates amongst their Turboprop fleets. Africa continues to experience serious difficulties although in terms of Western-built fleets 2002 compares more favourably with the 10-year rate. The improvement in the Turboprop arena is considered to be the result of increasing Jet utilisation but this is obviously a welcome development. It is the Eastern-built Turboprop aircraft operated by the airlines of Africa that represent the most serious concern with 11 Hull Losses during 2002. In 2002 nearly 31% of all fatal airliner accidents happened in Africa (AF) while Africa (AF) accounts for only 2.5% of all world aircraft departures. ICAO's published Longer Term Regional rates for the past decade show Africa (AF) as experiencing 5 fatal accidents per 1 million departures with 200 passengers losing their lives per 1 million departures.

Another excellent regional perspective is prepared by Boeing each year in terms of accidents per million departures covering the past decade (1993 through 2002). It is emphasized that these data are for Western-built transport Hull Loss accidents. Like the IATA statistics, there is insufficient fleet experience to generate reliable rate for C.I.S.

Figure 3.3.E

Accidents per Million Departures (1993-2002)

Region	Accident Location	Airline Domicile
United States and Canada	0.3	0.4
Latin America and Caribbean	3.3	2.7
Europe	0.5	0.7
Middle East	2.8	3.1
Africa	12.4	10.7
China	0.9	0.9
Asia (excluding China)	2.3	2.3
Oceana	0.2	0.0

Therefore the message that appeared in the 2000 and 2001 Safety Report continues to be relevant. **Africa's accident rates remain of serious concern to the aviation industry.** Safety oversight of flight operations, aircraft maintenance standards and Air Traffic Control infrastructure is partly the responsibility of Governments and their Regulators. 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 and security performance expected of Society.

IATA recognises that a co-ordinated approach with all of the key players in the regions is the one that is most likely to bring about improvements in these loss rates. Safety Strategy 2000+ calls for the development of targeted programmes on a regional basis. These involve the identification and establishment of Regional Team Leaders (RTLs) to tackle safety issues on a regional basis, like the Pan American Aviation Safety Team (PAAST) in the South America (SA) (Lat/Am/Car) Region. PAAST has now gained sufficient support and momentum to permit a second similar regional initiative to be pursued in the AS/PAC Region. Plans are being formulated to extend this concept to other regions such as Africa, China and the Russian C.I.S.

Some 40% of accidents occurred in Africa (AF) and South America (SA). IATA member airlines in Africa (AF) and South America (SA) experienced 1 Hull Loss and 3 Hull Losses respectively. Of the Hull Losses in Africa (AF) and South America (SA), 6 involved Western-built Cargo aircraft.

FOCUS ON AFRICA

Some separate research conducted by the Boeing representative on the CWG in late 2001 looked at 172 Hull Loss accidents involving over 7000 fatalities occurring worldwide. 69% of the accidents and 34% of the fatalities occurred during ALAs and CFIT accidents. In Africa, 52% of the Hull Loss accidents and 12 percent of the fatalities involved ALA and CFIT. A particularly pragmatic and sensible assessment of the issues involved is set out in the Flight Safety Foundation's Digest entitled "ALAR in Africa". A particular concern cited in the digest is that revenues derived from aviation are not being used to improve the aviation infrastructure in many African Countries, that lack of resources is a primary factor in the failure of some African states to implement ICAO standards and recommended practices.

"Weak or non-existent regulatory oversight of flight operations and maintenance standards is a major contributing factor with the accident rate in Africa."

Non-existent or inadequate ATC service, communication and navigation aids regularly are reported by IATA member airlines. A graphic account of the situation in Africa comes from IATA's Regional Director. He cites an African Airline reporting deficiencies in HF radio communications in Angola and Ghana, inadequate navaids, unsafe approach procedures and absence of appropriate notices to airmen in Rwanda, exclusive use of the French language for ATC service in the Congo and Ivory Coast: a flight crew that was cleared for an instrument landing system (ILS) approach to an airport in Swaziland and received erroneous ILS indications because maintenance was in progress, a flight management system map-shift occurrence caused by publication of inaccurate data in Kenya, a breakdown of VHF communication and no back-up HF communication in Harare, Zimbabwe and inadequate controller proficiency that resulted in lack of adequate separation between aircraft operating in oceanic airspace controlled by Senegal.

From its review of the 2002 accidents the CWG confirms the view that **weak or non-existent regulatory oversight of flight operations and maintenance standards is a major contributing factor with the accident rate in Africa. This deficiency is particularly prevalent in the area of operational regulations and the oversight of third and fourth generation aircraft and so called "Fringe dwellers".** Third country registrations of ageing aircraft, which seem to be registrations of convenience, pose considerable oversight difficulties, as does the inadequate airworthiness certification of these registered ageing aircraft. "On call" crews, especially when used in the freighter role are a concern. Maximum Take-off weights are regularly exceeded and clearly dangerous in the Eastern-built Turboprop operations taking place in Africa.

The CWG notes that the infrastructure difficulties experienced by Africa are immense and well documented amongst the global safety community. However, it is probably the lack of in-country infrastructure to provide appropriate flight training, flight despatch, and procedure development for aircrews which hurts the most.

Meanwhile, the application of the Approach and Landing Accident Reduction (ALAR) Tool Kit provided with last year's IATA Safety Report could do much to counter some of the more daunting shortfalls, especially amongst the smaller airlines of Africa.

It is recommended that:

1. *IATA press regulators harder for improvements in safety regulation, compliance, and infrastructure in Africa and South America at the same time seeking ways of improving co-operation and support.*
2. *IATA expand the role of Regional Directors to include safety data capture, trend verification, and contributing factor comprehension.*
3. *IATA ATDI (Training Institute) to explore ways of improving operational training in Africa.*

IATA Regional Safety Initiatives

Against the backdrop of the 2002 accident statistics and threats identified by the CWG it is appropriate to report on the contribution that IATA has been making in terms of regional safety initiatives.

The Pan American Aviation Safety Team (PAAST) was established in August 2000, with the strong support and leadership of the IATA Regional Director for LAT/AM/CAR and the active help of a number of industry organisations. Since then, PAAST has become a fine model for similar initiatives elsewhere.

Two further initiatives were established in Asia, during 2002. These are the South and Southeast Asia Regional Aviation Safety Teams (SARAST/SEARAST), developed from initial Governmental Co-operative Development of Operational Safety and Continuing Airworthiness Programmes (COSCAP).

IATA and its partners to start a similar initiative in Africa is underway. Regional Safety Workshops are planned for Dakar and Lagos during 2003.

From the outset, IATA management has played a major leadership role in the establishment and continued support for these initiatives.

It is recommended that:

4. *IATA continue ongoing expansion and support for these Regional Safety initiatives, in particular by launching a safety initiative in Africa together with the IATA regional office and other partners.*

3.4 AIR CARGO OPERATIONS 2002 (DEDICATED FREIGHTER AIRCRAFT)

Figure 3.4.A

Cargo vs Passenger Operations for Western-built Jets

	Fleet End of 2002	HL	HL per 1000 Aircraft	SD	Total	Operational Accidents per 1000 Aircraft
Cargo	1,690	6	3.55	1	7	4.14
Passenger	14,195	9	0.63	15	24	1.69
Total	**15,885**	**15**	**0.94**	**16**	**31**	**1.95**

Figure 3.4.B

Cargo vs Passenger Operations for Western-built Turboprops

	Fleet End of 2002	HL	HL per 1000 Aircraft	SD	Total	Operational Accidents per 1000 Aircraft
Cargo	789	9	11.41	1	10	12.67
Passenger	4,284	14	3.27	7	21	4.9
Total	**5,073**	**23**	**4.53**	**8**	**31**	**6.11**

The world's cargo fleet size has grown from 1,662 in 2000 to 1,690 in 2002.

In 2002, there were 23 accidents involving Western/Eastern-built Jet/Turboprop Cargo aircraft representing 27% of the accidents.

Nearly a quarter of the accidents involving Western-built Jets occurred whilst conducting Cargo operations.

Focussing more tightly on the IATA statistics over the past 3 years, amongst the Western-built Cargo Jet fleets there have been 30 accidents in total, 19 of which have been Hull Losses.

According to ICAO there were 11 heavy cargo aircraft destroyed during 2002 (over 27,000 kg). Over the past decade there has been an increase in Cargo Operations Hull Losses from about 7 accidents in 1993 to 11 in 2002 for “heavy” cargo aircraft (more than 27 000 kgs). For “light” cargo aircraft (less than 27 000 kgs) there has been a decline in the number of Hull Losses from about 22 to 14 Hull Losses in 2002. Therefore, the assessment from a review of IATA and ICAO data is that the overall rate, although declining slightly, remains stubbornly high.

The CWG called for further research to understand why this might be, keeping an eye to whether cargo operations might be more relaxed. In their research, the IATA members of the CWG came upon the work of the National Aerospace Laboratory (NLR)-Netherlands and the UKCAA. Their paper entitled “An Analysis of the Safety Performance of Air Cargo Operators” concluded that cargo operators have a disproportionately high number of accidents. In particular, the study found that:

- More than half of all cargo movements take place at night, while only a fifth of all passenger operations take place at night.
- There is an increased risk associated with cargo flights conducted at night, compared with cargo flights conducted during the day. This association could not be found for passenger operations.
- Over the past 18 years, the average age of Western-built cargo aircraft has been increasing steadily from 14 years to 22 years, whereas the average age of Western-built passenger aircraft has remained constant at approximately 10 years.
- The accident rate for ad-hoc cargo operations is almost seven times higher than the accident rate for scheduled passenger operations conducted by major operators.
- The accident rate for cargo operations conducted by major operators is more than three times higher than the accident rate for scheduled passenger operations.
- Africa, Asia and Central America/South America have the highest accident rates for cargo operations.
- The difference in the level of safety between cargo operations and passenger operations is most noteworthy in Africa, Central America/South America and North America.
- In Africa, Asia and Central America/South America, there is no significant difference in the accident rates for major operators and for ad-hoc cargo operators. In North America, however, the accident rate for ad-hoc cargo operators is more than twice the accident rate for major cargo operators.
- In Africa, the accident rate for cargo operations conducted by state-owned airlines is twice the accident rate for cargo operations conducted by privately owned airlines. There is no difference between the accident rate for passenger operations by state-owned airlines and the accident rate for passenger operations by privately owned airlines.
- When the types of accidents that occurred in cargo operations and passenger operations are compared, there are no significant differences in the relative distribution. This indicates that the higher accident rate for cargo operations cannot be attributed to a single cause.
- Compared with accidents in passenger operations, accidents in cargo operations occur more frequently in the Take-off phase and the climb phase.
- Both cargo aircraft and passenger aircraft have lower accident rates for aircraft of newer generation.
- The majority of cargo flights in the past three decades were conducted with first-generation aircraft; the majority of passenger flights in the past three decades were conducted with second-generation aircraft.
- Results of SAFA inspections conducted in the Netherlands indicate that ad-hoc cargo operators are more often noncompliant with ICAO standards than other operators.
- The main cause for the higher accident rates among cargo operators in regions with the lowest economic performance is lack of financial resources.

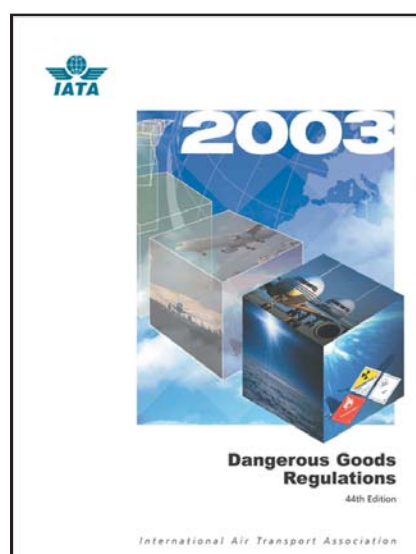
The study called for airlines to adopt a “safety first” attitude toward cargo operations. It stressed that operators should know the potential problems associated with night flying and take steps to minimise the negative effects of night flying. Of particular interest is the conclusion that the operation of older aircraft does not, in itself, compromise safety if adequate maintenance and adequate inspection are performed. Identification of required maintenance procedures is the combined responsibility of regulators, operators and manufacturers; these organisations should cooperate in the continued analysis of problems affecting ageing aircraft. Indeed, the study recommended that civil aviation authorities in regions with the lowest economic performance should be supported in their efforts to become strong and effective. Although grounding of aircraft by authorities is necessary if an immediate safety concern exists, the study points out that this does not solve problems. The prime instrument for safety improvement should be support.

Aircraft Loading

SAC/14 has expressed particular concern about aircraft loading. Airlines have reported a number of mistakes like containers installed in the wrong cargo bay or in the wrong aircraft. This has led to Take-off weight errors and wrong Take-off speeds and/or wrong centre of gravity and aircraft mistrimmed or even tailstrike at power application. One airline has proposed that containers should be assigned bar codes and the aircraft equipped with bar code readers. SAC believes that loading procedures are a weak point in the aviation system but should such a system be retained, a standard, common to all aircraft manufacturers, airlines, and ground services providers must be defined. It is therefore proposed that IATA should define what action should be taken to avoid reoccurrence of such events.

Dangerous Goods

Since 1956, IATA has maintained a comprehensive, detailed set of standard regulations setting out the parameters within which dangerous goods may be carried safely on board aircraft. Important commodities are sometimes hazardous chemicals; flammability, corrosivity and radioactivity are amongst the most commonly carried risks. From 1984, the IATA Dangerous Goods Regulations has been backed up by the ICAO Technical Instructions for the safe transport of dangerous goods by air which ensures active and effective compliance with the regulations. Although every year sees a number of serious dangerous goods incidents, each has been accompanied by a serious breach of the applicable regulation; undeclared dangerous goods, improper packaging and failure to assemble the package properly are amongst the most common violations. IATA maintains a comprehensive set of programmes aimed at increasing world-wide compliance with the regulations through training for carriers, forwarders and shippers, compliance and enforcement programmes particularly aimed at shippers and generalized awareness activities aimed at sensitising ordinary passengers to the precautions necessary for dangerous goods. These strategies are aimed at reducing the number and frequency of undeclared dangerous goods, the most common source of dangerous goods incidents. A summary of IATA’s Dangerous Goods related activities for 2002 is at Annex 5.



It is recommended that:

5. *IATA undertake the task of establishing common standards for aircraft loading for adoption by manufacturers, airlines, and ground services providers.*
6. *IATA focus more on cargo operations, expanding from its existing strong Dangerous Goods and Airport Safety platform, with a view to providing better support in terms of best practice and procedures documentation, incident reporting/data analysis (STEADES), and airline auditing standards (IOSA).*

3.5 FERRY FLIGHTS 2002

A concerning feature of the 2002 accidents is that 8% of all accidents involved ferry/positioning flights.

It is recommended that:

7. *IATA Flight Operations Committee reviews the standards and best practice for operation of ferry flights.*

3.6 CHAPTER 3 SUMMARY

In 2002, the best safety results in the last 20 years were achieved in terms of Hull Losses and Fatal accidents. This is the same conclusion reached by ICAO.

- Jet Hull Loss rate has been halved since 10 years ago and since 2001 dropped 34% to 0.72 per million sectors in 2002;
- With only 8 fatal accidents involving Western-built Jets in 2002, the best performance of the decade has been achieved;
- Concerning increase in fatal accidents and Hull Loss rate for Western-built Turboprops;
- Total fatal accidents 32, total fatalities 974;
- Lowest number of Western-built Jet Hull Loss of the decade leading to lowest accident costs;
- With 40% of all accidents occurring in Africa and South America weak or non-existing regulatory oversight is a serious concern and IATA needs to press the regulators harder for improvements in safety in these regions;
- There were 23 accidents involving Western/Eastern-built Jet/Turboprop cargo aircraft representing 27% of all accidents. IATA must increase its focus and support of cargo operations, building on its existing Dangerous Goods and airport safety platform;
- 8% of all accidents involved ferry/positioning flights.

CHAPTER 4 — ACCIDENT ANALYSIS 2002

4.1 ACCIDENT DATA ANALYSIS

When viewing the impressive overall improvement in the accident statistics of 2002, it is important to understand that the industry already has a good safety record and low rate of accidents. The task of reducing this rate still further is mainly concerned with the reduction of inherent risk in the system. Such risk management demands great effort and enterprise. To manage risk we need to understand what the data in the form accident and incident "near-miss" reports is saying. To be data-driven IATA must therefore analyse the data and it is this aspect which is of greatest interest to the CWG participants. To learn from the experience of accidents the data must be turned into useful information and only analysis will make this possible. This analysis conducted by the CWG will therefore derive directly from the accident statistics presented in the earlier sections and will proceed to "drill down" another level into the contributing factors behind the Operational Jet and Turboprop accidents.

Flight Safety Priorities

IATA is very conscious of the prevailing industry flight safety Priorities in aviation and this "drill down" analysis will focus to a large extent on these. Approach and Landing Accidents (ALAs) and Controlled Flight Into Terrain (CFIT) accidents are together the primary causes of accidents in aviation and have necessarily attracted the greatest focus in the past decade. The Human Factors, Loss of Control and Situational Awareness categories have also featured strongly in recent IATA Safety Reports. Against a general analysis of the 2002 data those categories attracting the highest safety priority will be addressed in subsequent paragraphs together with other special categories of accident identified by the CWG as being in need of particular attention.

IATA Contributory Factor Classifications

To understand further the nature of accident causation the IATA CWG has developed its own contributory Factors Classifications system, essentially a grouping of factors attributable to accidents. These classifications can help to identify the main areas of concern where remedial action should be taken. They are deemed to be particularly beneficial in helping airlines to enhance their training programmes for flight crew, cabin crew and other airline employees. The Classifications are arranged in five categories: Technical (T), Environmental (E), Organisational (O) and Human (H) and Insufficient data (I). 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.

It should be understood that the assignment of these classifications is a subjective assessment of the most apparent contributory factors leading to accidents. The advantage of this practice is that it facilitates early identification of emerging problems. The disadvantages are that occasionally some accidents cannot be assessed at all because of insufficient data, and that no update of these initial assessments is made. However, experience has shown that these early assessments are invariably born out by the eventual publication of the accident reports.

Threat and Error Management

Through its Human Factors Working Group activities, and in particular its close working relationship with Captain Dan Maurino of ICAO, IATA has learned about Threat and Error Management (TEM). TEM is an offshoot of Line Operations Safety Auditing (LOSA) and provides a good framework for the much longer established Crew Resource Management doctrines. These, together with TEM, have reached a "sixth generation" of CRM doctrine, which is being brought into IATA's own training programme. However, IATA's HFWG and CWG have identified a further application of the TEM thinking and has harnessed it to help with accident and incident analysis. Already this approach has been practised in the SAC/15 IRM sessions. Use of the TEM model leads naturally to remedial actions, preventative strategies and countermeasures. The model helps to reinforce positive strategies and highlights areas and issues that need to be addressed. It also helps to keep the focus on the relevant lessons learned from the event, moving away from the "who" and "what" and towards understanding the "why". **Refer to the CD-ROM for more information about TEM as an analytical tool.**

When TEM is employed as a framework for CRM, it reinforces the idea that threats are part of normal airline operations. The pilot's job is to anticipate, recognise and employ strategies and countermeasures in dealing with these threats so that they do not have negative impacts on the flight. An error can occur when a threat is not anticipated or recognised or a perceived threat induces an error. The error can then either be recognised at a later stage and mitigated or it can lead to additional errors or result in an undesired aircraft state, for example a deviation from an assigned altitude. So TEM reinforces the notion of anticipation, recognition and mitigation of threats and errors. A normal example of this arises from the pre-flight weather briefing. If the weather at destination is close to minimums the pilot will anticipate going to the alternate airport, and thus brief the Go-around procedures as well as brief the approach at the alternate. The interesting characteristic of TEM, when introduced in CRM, is that it drew a common reaction of "that's what we've always been doing." While this is most certainly true, TEM has formalised a powerful concept that can be reinforced. The same sort of synergy exists between the CWG accident classifications process and TEM.

Since the mid 1970's IATA has been analysing accidents in its Jet and Turboprop Safety Reports and identifying areas of concern and making recommendations. IATA has done this by identifying contributing factors to accidents. There is synergy between IATA's contributory factors and threats as seen in TEM. In the TEM sense "threats" are defined as: situations external to the flight deck, that must be managed by the cockpit crew during normal, everyday flights. Such events increase the operational complexity of flight and pose a safety risk to the flight at some level. TEM places the flight crew at the centre and relates the environment to the flight crew. "Errors" then, in the TEM sense, are defined as actions or inactions by the flight crew that lead to deviations from organisational or crew intentions or expectations. Errors in the operational context tend to reduce the margin of safety and increase the probability of accidents or incidents.

If a comparison is made between the definition of "threats" and those of the categories of IATA's contributory factors, a distinct similarity is apparent. Technical, Environmental and Organisational factors are all external to the flight deck and are essentially "threats" to the flight, they increase the operational complexity and include errors outside the cockpit. For example, in this year's classifications there is a high number of Technical Classifications, more specifically concerning T3 — Gear and tyre problems. A problem with the gear and/or tyres on an aircraft is certainly a threat in the TEM context. A safe landing can still be made, but the threat of the technical failure increases the complexity for completing a successful Take-off or landing. Therefore the 2002 CWG was mindful of TEM philosophy throughout its determination of contributory factors to the accidents in 2002.

Refer to the CD-ROM for the HFWG TEM Analytical Toolkit.

The Safety Report will next present the analysis of the accident classifications for Western-built Jet and Turboprop aircraft followed by a brief analysis of Eastern-built Jets and Turboprops.

Time to Get Focussed

"There is synergy between IATA's contributory factors and threats as seen in Threat and Error Management."

4.2 CLASSIFICATIONS FOR WESTERN-BUILT AIRCRAFT

4.2.1 2002 Events

This year, unlike in previous Safety Reports, the Western-built Jet and Turboprop classifications are combined. The analysis of the accidents will be undertaken against the backdrop of the more significant events identified in 2002 that resulted in a Hull Loss or Substantial Damage accident for Western-built Jet or Turboprop aircraft. These are as follows:

- 11 CFITs (4 Jet, 7 Turboprop);
- 11 loss of situational awareness;
- 20 weather related events;
- 8 undercarriage failures;
- 7 events where night/darkness was considered to be a contributory factor;
- 7 runway excursions;
- 7 events may have been prevented had a timely Go-around been initiated;
- 7 lack of system knowledge;
- 5 ATC safety net;
- 2 loss of control;
- 2 events related to fuel management.

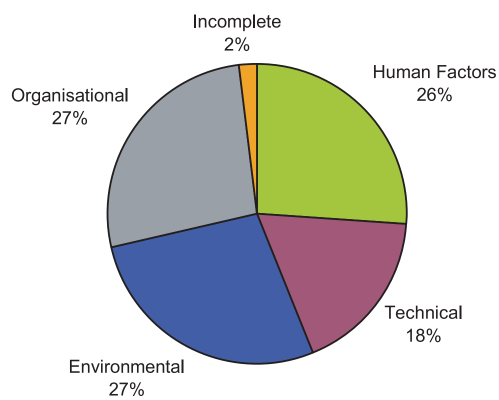
4.2.2 Contributory Factors

There was sufficient information to classify all but 4 of the Western-built Jet and Turboprop accidents. This resulted in 198 classifications.

Contributory Factors			HUM		TEC		ENV		ORG		I
Human Factors	**HUM**	**51**	H1 — Active Failure	8	T1	2	E1	20	O1	14	
Technical	**TEC**	**35**	H2 — Passive Failure	17	T2	5	E2	3	O2	15	
Environmental	**ENV**	**54**	H3 — Proficiency/Skill Failure	26	T3	10	E3	2	O3	0	
Organisational	**ORG**	**54**	H4 — Incapacitation	0	T4	0	E4	3	O4	7	
Insufficient Data	**I**	**4**			T5	1	E5	6	O5	6	
					T6	0	E6	1	O6	0	
					T7	6	E7	2	O7	0	
					T8	0	E8	0	O8	12	
					T9	7	E9	0			
					T10	0	E10	1			
					T11	4	E11	16			
					T12	0					
	Total	**198**		**51**		**35**		**54**		**54**	**4**

The relationship between contributory factor codes is illustrated in the figure below:

Figure 4.1
Contributory Factors



4.2.3 Technical Factors

The technical category relates specifically to systems and components of the involved aircraft and their suitability or serviceability.

Of the 62 Western-built Jet and Turboprop accidents there were 22 in which a technical failure contributed. Eleven of these aircraft were more than 20 years old and 5 were more than 30 years old. The most prevalent Technical Factor was T3-Gear and Tyre, which contributed to 10 of the 62 accidents. Eight of the 10 were an outright failure of the landing gear. The next most prevalent technical factor was T7-Company maintenance, servicing (including human error).

Thus, as in previous years, the engineering domain continues to be at least partly responsible for about a third of accidents with landing gear being a dominant area of concern along with human performance issues which may need to be addressed.

4.2.4 Environmental Factors

The environmental category relates to the physical world in which the involved aircraft is operating and the infrastructure (other than corporate) resources required for successful performance.

Of the 62 accidents there were 35 in which an environmental factor was identified as contributing to the accident. The most prevalent environmental factor was E1 — Weather, which is used to classify accidents in which, for example, windshear, turbulence, icing, volcanic ash, sand storm, lightning, poor visibility, etc. played a part. In 2002 these forms of weather contributed to 22 accidents, and when combined with H3 — Proficiency and Skill Failure, led to 16 accidents. In 3 of the accidents extreme weather conditions were encountered and this aspect will be addressed later in the analysis.

In the 2002 classifications there is a higher prevalence of classifications regarding regulatory oversight (E11). This is due in part to better representation on the CWG from regions of the world where regulatory oversight is perceived to be poor or lacking. Representation from these regions permitted the CWG to deal with this important safety issue with greater certainty than previously. Poor regulatory oversight can lead to a multitude of safety issues, one of which relates to maintenance of the Digital Flight Data Recorder (DFDR) and Cockpit Voice Recorder (CVR). For instance there were at least 3 accidents where it is known to the CWG that lack of or poor maintenance of the CVR and DFDR impeded the investigation efforts to get at the lessons learned.

Night operations result in more difficulties caused, for example, by fewer visual cues or by spatial disorientation. Of the 17 accidents that are known to have occurred at night 65% of these involved cargo operations. Of the 17 accidents known to have occurred at night there are 7 in which it was felt that darkness contributed to the accident. Although 2 of these were Jet aircraft the majority were Turboprop accidents. This probably stems from the fact that Turboprops are often employed in more challenging operating environments and may not have the same resources in terms of experienced flight crews, equipment and airport facilities as their Jet counterparts.

4.2.5 Organisational Factors

The organisational category relates to the corporate environment in which the involved flight crew operated, including cultural, administrative and management aspects.

Of the 62 accidents the CWG identified 26 accidents in which Organisational factors were apparent. The greatest number of organisational factors is Inadequate SOPs (O2), and Selection and training (O1) of the flight crew and closely followed by Other (O8). The latter code applies to available safety equipment i.e. Enhanced Ground Proximity Warning Systems (EGPWS) not installed on aircraft. Refer to the forthcoming sections on Training and CFIT for more detailed analysis.

Inadequate Control and Monitoring (O5) was a contributing factor in 6 accidents which is significantly better than 2001. However, it still points to a concerning lack of quality assurance and an underdeveloped safety culture within the company. This area will be discussed later in this analysis but as already highlighted in the Introduction of this Safety Report, organisations operating and maintaining aircraft must establish effective safety and quality management systems in a corporate culture which extends to the boardroom. The Organisational factor classifications for 2002 underline this requirement.

4.2.6 Human Factors

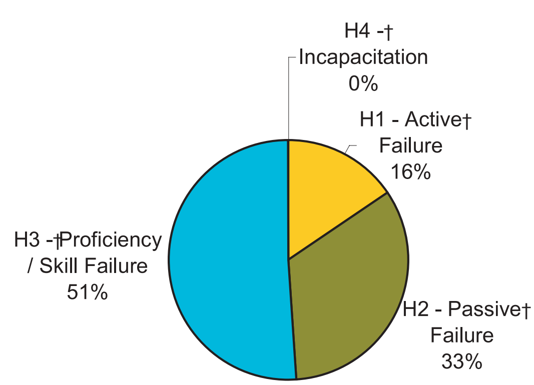
In recent years a great deal of effort has been devoted to understanding how accidents happen in aviation and other industries. It is now generally accepted that most accidents result from human error. It would be easy to conclude that these human errors indicate carelessness or incompetence on the job but that would not be accurate. Air Safety investigators are finding that the human is only the last link in a chain that leads to an accident. In the 1990's the term 'organisational accident' was coined because most of the links in the accident chain are under the control of the organisation. Since the greatest threats to aviation safety originate in organisational issues, making the system even safer requires action by the organisation to establish the right safety culture.

The IATA Accident Classification System accommodates this relationship in that it distinguishes between Human (H), and Organizational (O) factors but there is an inevitable overlap and certainly a connection between the two categories. For example, there is likely to be a strong association between H3 (Flight Crew Proficiency and Skill Failure) and O1 (Selection or Training of Crewmembers). Thus, there may be a human performance issue for which the organisation should take some responsibility, perhaps, for example, in terms of the possible impact of flight crew currency/recency and fatigue on proficiency.

The human factors category relates only to the flight crew. However, the equivalent human factors implications are captured in the Technical, Environmental and Organisational classifications.

The breakdown of Human Factors is shown in the following chart and clearly indicates pilot proficiency/ skill failure (H3) as dominant, which is similar to previous years.

Figure 4.2
Human Factors



In fact skill failures are seen to have contributed to 26 of 62 accidents, which at 42% is more prevalent than any other contributory factor. 81% (21 of 26) of the skill failures are associated with approach and landing phase accidents and 13 of these were also combined with poor weather (E1). **Therefore, as in previous years, a particularly dominant "threat" arising from the analysis of 2002 accidents is conducting an approach and landing in poor weather.**

"Touchdown"

"81% of the skill failures are associated with approach and landing phase accidents.

4.2.7 Phase of Flight

The Approach and Landing "threat" is brought starkly into focus by reviewing the 2002 accidents in terms of the phase of flight in which they occurred. Here the recently published ATA phase of flight criteria are used.

FLP	Flight Planning	**DST**	Descent
PRF	Pre-flight	**APR**	Approach
ESD	Engine Start/Depart	**GOA**	Go-around
TXO	Taxi-out	**LND**	Landing
TOF	Take-off	**TXI**	Taxi-in
RTO	Rejected Take-off	**AES**	Arrival/Engine Shutdown
ICL	Initial Climb	**PSF**	Post-flight
ECL	En Route Climb	**FLC**	Flight Close
CRZ	Cruise	**GDS**	Ground Servicing

The figure below shows that once again approach and landing are by far the most critical phases of flight. In 2002, 47% of Jet and Turboprop accidents occurred in these phases of flight. The greatest number of Hull Losses result from accidents during approach.

Figure 4.3

Accidents by Phase of Flight

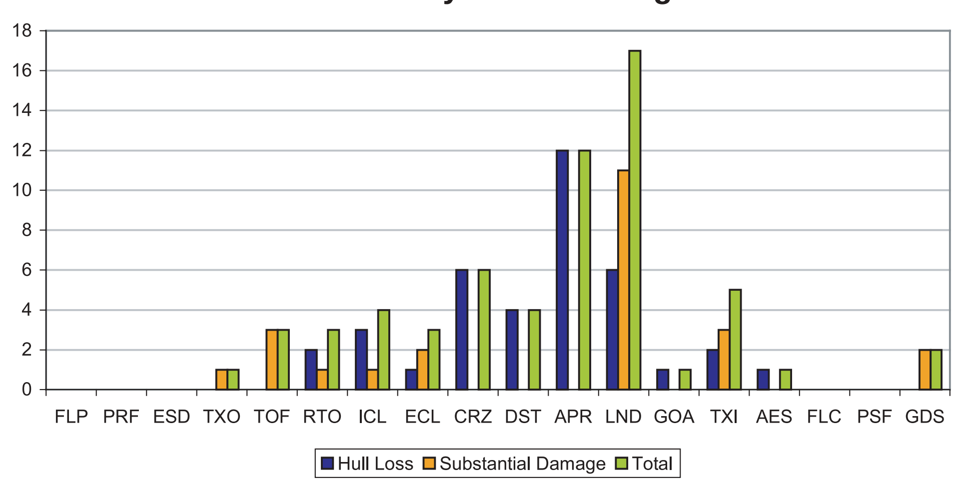
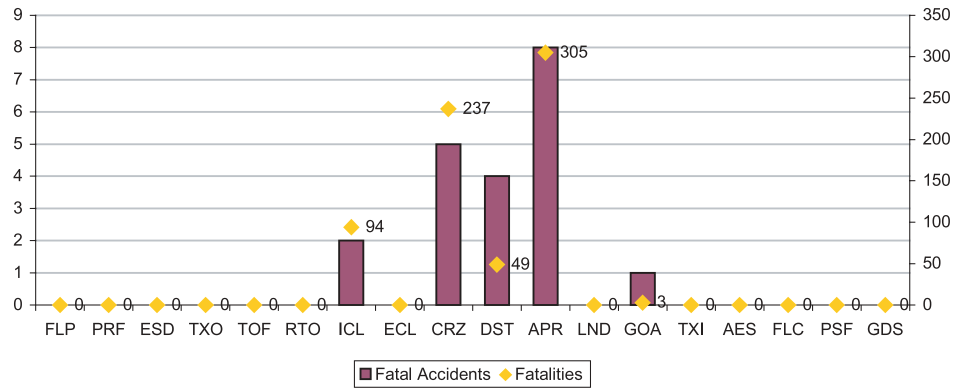


Figure 4.4
Fatal Accidents and Fatalities by Phase of Flight



The greatest number of fatal accidents and fatalities result from accidents during approach.

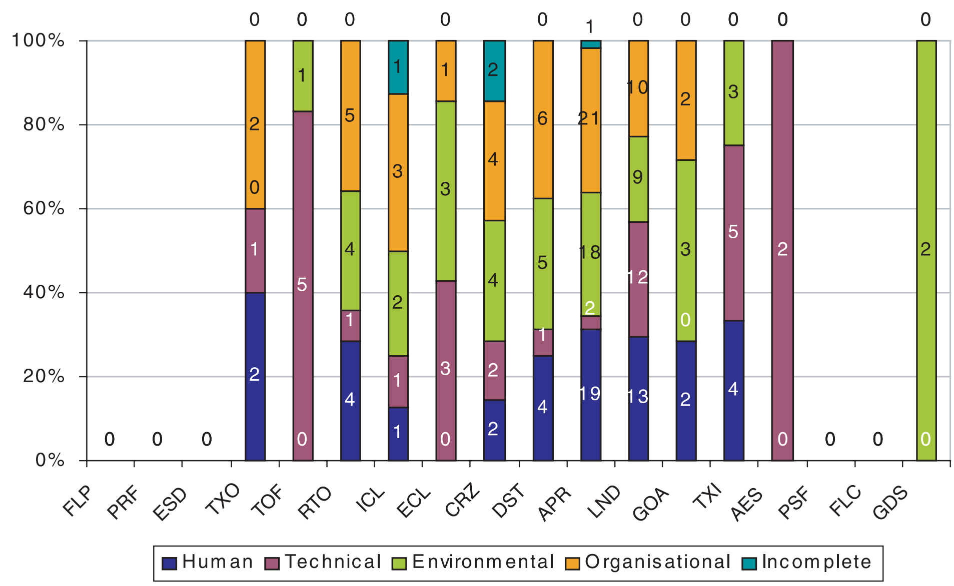
Contributory Factors by Phase of Flight

The table and graph below show the contributory factors by phase of flight.

Phase	Human	Technical	Environmental	Organisational	Insufficient Data	Total
FLP	0	0	0	0	0	**0**
PRF	0	0	0	0	0	**0**
ESD	0	0	0	0	0	**0**
TXO	2	1	0	2	0	**5**
TOF	0	5	1	0	0	**6**
RTO	4	1	4	5	0	**14**
ICL	1	1	2	3	1	**8**
ECL	0	3	3	1	0	**7**
CRZ	2	2	4	4	2	**14**
DST	4	1	5	6	0	**16**
APR	19	2	18	21	1	**61**
LND	13	12	9	10	0	**44**
GOA	2	0	3	2	0	**7**
TXI	4	5	3	0	0	**12**
AES	0	2	0	0	0	**2**
PSF	0	0	0	0	0	**0**
FLC	0	0	0	0	0	**0**
GDS	0	0	2	0	0	**2**
Total	51	35	54	54	4	**198**

Amongst the Western-built Jet and Turboprop fleets 47% of the accidents occurred during approach and landing phases of flight. These accidents also account for 53% (105 of 198) of the classifications.

Figure 4.5
Contributory Factors by Phase of Flight



There are 105 classifications attributable to approach and landing. Most significantly, there are more classifications attributed to accidents occurring during the approach phase (61) compared with landing (44), despite the fact that there are 5 more events during the landing phase.

A closer look at approach and landing occurrences shows that landing accidents have a high number of technical factors (12), mainly due to T3-gear and tyre. There is also a high number of proficiency/skill failures during landing, although these were not seen in combination with the gear and tyre problems. **In fact, the highest correlation with landing phase accidents is poor weather in combination with proficiency/skill failures. There were no fatal landing accidents.**

Approach is of particular concern. All accidents during approach resulted in a Hull Loss of the aircraft and 67% were fatal accidents which account for the greatest number of fatal accidents and fatalities for all accidents. Accidents occurring during approach have a high number of Human factors (21). On closer look, 83% of the accidents during approach are associated with proficiency/skill failures. These skill failures are seen in combination with poor weather in 7 accidents, 6 of which resulted in either a CFIT or undershoot accident.

Take-off

"The recently published ATA phase of flight criteria are used [by IATA's Classification Working Group]."

4.3 CLASSIFICATIONS FOR EASTERN-BUILT AIRCRAFT

4.3.1 2002 Events

The significant events identified in 2002 that resulted in a Hull Loss or Substantial Damage accident for Eastern-built Jet or Turboprop were as follows:

- 4 CFITs;
- 4 loss of situational awareness;
- 5 events where night /darkness was considered to be a contributory factor;
- 3 runway excursions;
- 4 events may have been prevented had a timely Go-around been initiated;
- 1 loss of control;
- 5 accidents occurred during ferry/positioning flights.

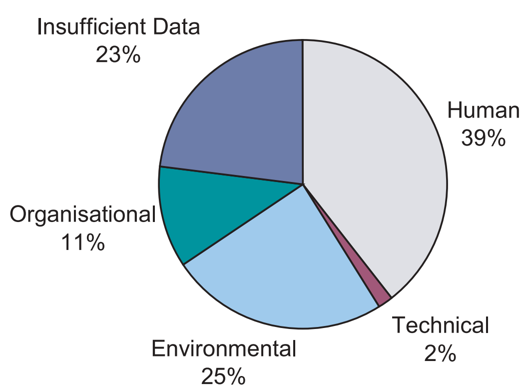
4.3.2 Contributory Factors

There was sufficient information to classify 16 of the 23 Eastern-built Accidents, which resulted in a total of 62 classifications.

			HUM		TEC		ENV		ORG		I
Human Factors	**HUM**	**24**	H1 — Active Failure	8	T1	0	E1	2	O1	7	
Technical	**TEC**	**2**	H2 — Passive Failure	6	T2	2	E2	1	O2	2	
Environmental	**ENV**	**15**	H3 — Proficiency/Skill Failure	10	T3	0	E3	0	O3	0	
Organisational	**ORG**	**14**	H4 — Incapacitation	0	T4	0	E4	2	O4	0	
Insufficient Data	**I**	**7**			T5	0	E5	2	O5	1	
					T6	0	E6	0	O6	0	
					T7	0	E7	0	O7	0	
					T8	0	E8	0	O8	4	
					T9	0	E9	0			
					T10	0	E10	0			
					T11	0	E11	8			
					T12	0					
	Total	**62**		**24**		**2**		**15**		**14**	**7**

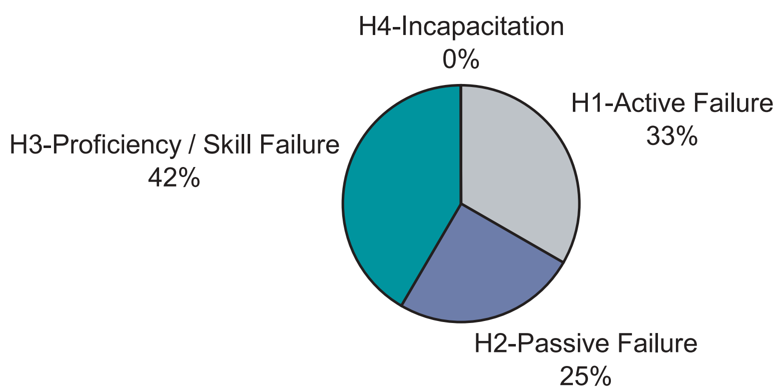
The relationship between the contributory factor codes is illustrated in the diagram below.

Figure 4.6
Contributory Factors



The greatest number of classifications are in the domain of Human Factors, which is similar to the contributory factors for Western-built aircraft, although 30% of the 23 accidents to the Eastern-built fleet could not be classified at all. This is due to the limited information that is available. Most of the accidents involving Eastern-built aircraft occur in Africa or Eastern Europe. Looking more closely at the human factors shows that the prevalent human factors are with proficiency and skill failures which is also similar the Western-built fleet.

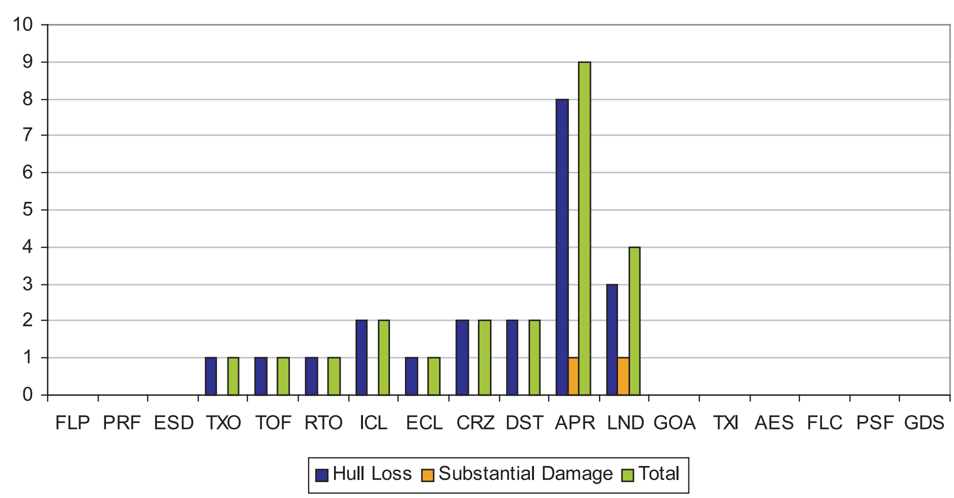
Figure 4.7
Human Factors



4.3.3 Phase of Flight

The graph above shows that once again approach and landing are critical phases of flight. In 2002, 57% of Eastern-built Jet and Turboprop accidents occurred in these phases of flight. The greatest number of Hull Losses result from accidents during approach.

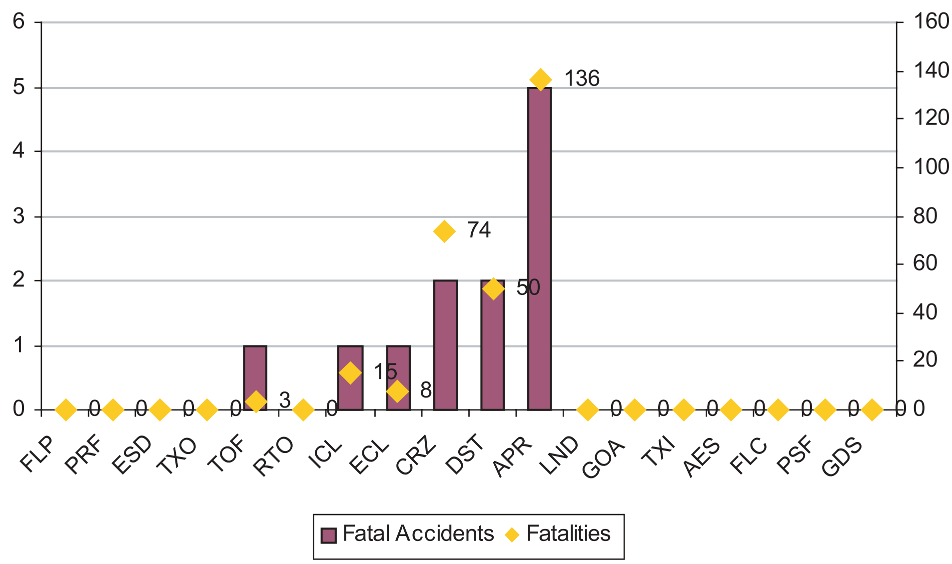
Figure 4.8
Accidents by Phase of Flight



Amongst Eastern-built fleets during 2002, the greatest number of fatal accidents and fatalities occur during approach, which is similar to the Western-built fleet.

Figure 4.9

Fatal Accidents and Fatalities by Phase of Flight



Summary of Analysis of Contributory Factors

Combining the contributory factors for Eastern and Western-built Jet and Turboprop, it is apparent that current emphasis by the industry in reducing the ALA threat is fully justified on the basis of the 2002 analysis. The principal threat to human life is during the approach phase where the most Hull Losses occur and there is greatest call on human factors in the form of proficiency and skill. The most prevalent environmental factor was E1-Weather which contributed to 22 accidents, and when combined with H3-Proficiency/skill failure contribute to 16 accidents. Extreme weather was a major threat in 3 accidents. There were no fatal landing accidents.

"The greatest number of Hull Losses result from accidents during approach."

4.4 PRIMARY SAFETY THREATS

This analysis will now focus on the primary safety threats apparent for the accident classifications addressing the Western-built fleets, and therefore the statistics mentioned in this part of the report apply only to the Western-built fleets unless otherwise mentioned. Operators of Eastern-built fleets should keep in mind however that the analysis of the Eastern-built fleets demonstrate that there are similar areas of concern and therefore the analysis presented here can be applied to Eastern-built fleet operators as well.

4.4.1 Approach and Landing (ALA) Accidents

As is already apparent from the above analysis of the 2002 Accident Contributory factors, ALAs are dominated by proficiency and skill failures. This has been so for many years. In response to this concern the Flight Safety Foundation (FSF) created an Approach and Landing Reduction (ALAR) Task Force in 1996 as another phase of the CFIT accident reduction campaign launched in the early 1990s. This work, published in a FSF Digest in February 1999, provides a comprehensive analysis of ALA from 1980 to 1996. The IATA 2002 ALA statistics confirm that the recommendations made by the ALAR Task force in 1999 remain valid.

The ALAR task force defines ALAs as events that occurred in flight phases after initiation of the descent (includes approach and landing, circling manoeuvres and Go-arounds).

The need for improvement in the ALA record is reflected in the 2002 statistics where the data indicate that **47% of the Western-built Jet and Turboprop accidents occurred during the ALA phases of flight. Moreover, skill failures (H3) contributed to 26 of 62 accidents, which at 42% is more prevalent than any other IATA Classification system contributory factor. Most importantly 81% of the skill failures are associated with the ALA phases, and 13 of these accidents were also combined with poor weather (E1).**

Within the Western-built fleets there were 7 runway excursions and 8 accidents involving Landing gear failure. This persistently high number of runway excursions during the past 4 years remains disturbing. There were 2 undershoot accidents involving the Western-built aircraft one of which involved a cargo aircraft, which is a significant reduction from 2001.

In all there are 105 classifications attributed to approach and landing. Most significantly, there are more classifications attributed to accidents occurring during the approach phase (61) compared with landing (44), despite the fact that there are 5 more accidents during the landing phase.

A closer look at approach and landing accidents shows that landing accidents have a high number of technical factors (12), mainly due to T3-gear and tyre. There is also a high number of proficiency/ skill failures during landing, but these were not seen in combination with the gear and tyre problems. In fact, the highest correlation with landing phase accidents is poor weather in combination with proficiency/skill failures. There were no fatal landing accidents.

Approach is of particular concern. All accidents during approach resulted in a Hull Loss of the aircraft and 67% were fatal accidents which accounts for the greatest number of fatal accidents and fatalities for all accidents. Accidents occurring during approach have a high number of Human factors (21). On closer look, 83% of the accidents during approach are associated with proficiency/skill failures. These skill failures are seen in combination with poor weather in 7 accidents, 6 of which resulted in either CFIT or undershoot accidents.

The CWG expressed concern about the constant angle versus step-down approach choices facing pilots. It was perceived that there was still too much “diving and driving” going on and airlines should take steps to eliminate this practice. Those using traditional non-precision approach procedures should transition to constant angle methods where practical.

The lack of experience amongst line pilots of circling approaches is a concern. These issues will be discussed further under the paragraphs on Training.

Operators are strongly advised by the CWG to incorporate the ALAR Tool Kit within their training programmes. The Tool Kit, which is committed to a CD-ROM, became available in March 2001 and was included with IATA’s 2001 Safety Report.

Manufacturers representatives on the CWG advise that they too are concerned about the ALA threat. During 2002 both Airbus and Boeing have distributed training videos on various aspects of approach and landing technique. Operators should obtain and incorporate this training material to update crew proficiency in those areas. Most noteworthy is the Boeing material presented at their 2002 Flight Operations Symposium (VNAV and V/S (FPA) Approaches).

The hazard of erroneous glideslope indication has been identified by the CWG earlier, but the production of a video concerning the NZ60 incident — 'A Free Lesson' is considered to be particularly helpful. The video deals with an event experienced by a B767 crew conducting an instrument arrival into Apia, Western Samoa and draws on the findings from the in depth investigation that followed. There is a full description of the ILS system and the errors that we now know can occur. As in all events there is a human side to the event. In this case it was how the crew responded that prevented the incident from becoming a CFIT accident. An analysis of the broken defences using the Reason Model is provided.

As in the 2001 Safety Report it is recommended that:

8. *In view of the clear message coming from this 2002 ALA analysis, that the approach and landing phases of flight present the highest threat, airlines are urged to incorporate the CFIT/ALAR Toolkit in their training programmes.*
9. *As both Airbus and Boeing have distributed training videos/CD-ROMs during 2002 covering various aspects of approach and landing technique, operators should obtain and incorporate this training material to improve crew proficiency.*
10. *IATA campaigns to highlight the value of the Video NZ60 which addresses the CFIT/ALAR hazard of erroneous glideslope indications and the Flight Safety Bulletin on the same subject.*

"The approach and landing phases of flight present the highest threat."

4.4.2 Go-around

In 2001 there were 22 accidents which indicated that if a "timely" Go-around had been carried out they may not have occurred. **Likewise in 2002 there were 7 accidents which could have been avoided if a timely Go-around had been initiated. This has led the CWG to believe that there is a lack of Go-arounds being initiated.**

Analysis of accident and incident data and feedback obtained from airline LOSA and FOQA programmes during 2002 has been undertaken in an effort to understand further the reluctance of crews to initiate Go-arounds. It is apparent that one of the biggest challenges for any operation is to have crews initiate a Go-around when they are not in a position to perform a stabilised approach and landing. Too often, there have been incidents and accidents because salvaging the landing seemed to be the crew's only option. In the past, many companies required a crew to file a report on why they performed a Go-around and may have even called upon the crew to question their decision. Occasionally, crews have been disciplined following a Go-around.

By establishing a retribution-free Go-around policy, an airline puts in place a strategy — a so-called preventative strategy — to counter the threat of a crew trying to salvage an un-stabilised approach and landing. Too often because of operational pressures and policies, crews are hesitant to use the Go-around, which is invariably the most effective defence against approach and landing accidents.

In concert with an effective Go-around policy, airlines must train and encourage the desired behaviour. Crews need to understand that a thorough briefing of the Go-around procedures on every approach establishes it as an option. Pilots have often viewed a Go-around as a failure. A retribution-free Go-around policy represents an essential pilot strategy that ensures continued safe flight operations.

A retribution-free policy will also encourage crews to more openly report Go-arounds so that an analysis of the factors leading to the missed approach can be determined. Part of the policy should include guidelines to crews on the importance of conducting self debriefs in regard to the threats and errors that may have led to the Go-around.

A paper prepared by Captain Don Gunther, Manager Human Factors, Continental Airlines and Chairman of the IATA HFWG, addresses the Value of Non-Jeopardy Reporting to a Safety Management System. The paper, which is included in the support documentation on the enclosed CD-ROM, shows how data collected through Non-Jeopardy reporting programmes is used to minimise the threat from pilots conducting non-stabilised approaches.

It is recommended that:

11. *IATA campaigns for the adoption of a retribution free Go-around policy amongst its airlines, documenting that policy in the TOPM. Part of this policy should include guidelines to crews on the importance of conducting self-debriefs in regard to threats and errors that may have led to the Go-around. The policy should also set recurrent training requirements which encourage the desired Go-around behaviour.*

4.4.3 Controlled Flight Into Terrain (CFIT)

In general terms a CFIT accident is an in flight collision or near collision with terrain, water, or obstacle without indication of loss of control. The CWG has adopted this CFIT definition from the CAST/ICAO Common Taxonomy Team document included in Appendix C — Definitions, where a more specific definition of a CFIT accident is provided.

During the first half of the 1990s there were more fatalities due to CFIT than from any other type of accident. Although recent years have shown a decline in the number of CFIT accidents the annual average of CFIT accidents has been about 4 concerning the Jet fleets over the past decade and 7 amongst the Turboprop fleets when viewed over the past 5 years. ICAO takes the view, share by IATA, that the success in the overall accident rate is driven to a large extent by the sustained programme of CFIT countermeasures put in place during the past decade.

In 2001 there were 5 CFITs involving Western-built aircraft and a further 3 involving Eastern-built aircraft. This welcome improvement however has been reversed in 2002 when 11 (4 Jet, 7 Turboprop) CFIT accidents occurred to Western-built Aircraft. There were 4 additional CFIT accidents to Eastern-built aircraft for a total of 15 CFIT accidents in 2002. Figures 4.10 and 4.11 show CFIT accidents and fatalities for the Western-built aircraft.

Figure 4.10
Western-built Jet CFIT Accidents & Fatalities

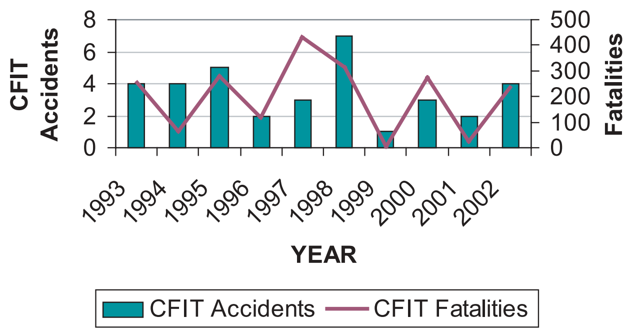
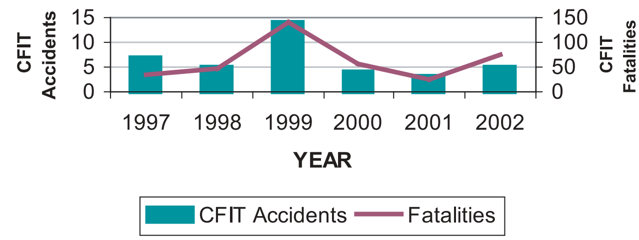


Figure 4.11
Western-built Turboprop CFIT Accidents & Fatalities



Analysis of the contributory factors linked to the 11 Western built CFIT accidents shows that dominant factors include H2-passive failure (10), O2-Inadequate SOPs (9), O8-Other (11), E1-Weather (8), E11-Regulatory Oversight (7). O8-Other applies to available safety equipment, including EGPWS, not installed on aircraft.

Every CFIT accident is a loss of situational awareness. The most common combination of contributory factors concerning CFIT accidents are Passive Failure combined with inadequate SOPs and Non fitment of EGPWS, a combination which is seen in 8 of the 11 CFIT accidents. This shows the importance of having adequate and correct SOPs. It could be argued that good SOPs can contribute to good situational awareness and thus serve to prevent CFITs. SOPs are strategies or countermeasures against threats and errors provided by the company, therefore weak or inadequate SOPs weaken this defence. Companies must work together with their flight crew to ensure that SOPs are continually updated and improved to ensure that they form a relevant defence.

None of the aircraft involved in the 15 CFIT accidents that occurred in 2002 had Enhanced GPWS installed. With all of these accidents it is considered by the CWG that they would have been prevented had those aircraft been fitted with EGPWS. No aircraft fitted with EGPWS has ever had a CFIT accident. Three of the 11 CFIT accidents that occurred in 2002 involved cargo aircraft.

Having concluded that EGPWS could have prevented all of these accidents the CWG called for not only passenger aircraft to be upgraded but also freighter aircraft. IATA SAC in turn has called for the EGPWS to be considered as an IOSA Standard.

Adoption of the CFIT/ALAR Toolkit by those airlines who have not done so is of paramount importance. Most of the airlines that experienced the CFIT accidents had not implemented the CFIT/ALAR Toolkit. Therefore, what is regarded as the accident black spot of 2002 — the increase in CFIT accidents — occurred because the highly developed CFIT countermeasures have not been applied.

It should be noted that the ALAR toolkit mentioned earlier is not only designed to help prevent ALAs but also CFIT accidents. Additionally, the earlier mentioned FSF Safety Digest, which carries articles about CFIT accident prevention remains highly pertinent to this day. It is important to remember from these earlier analyses that 75% of the aircraft involved in those accidents lacked a GPWS and a significant percentage of CFIT accidents occurred in areas without high terrain. The advent of EGPWS has put another defence in place with some 60% of the world Jet fleets fitted. However, only 3% of regional Jets are so fitted. Hence, the widespread installation of EGPWS is seen by the CWG as vital to achieving a further reduction and eventual elimination of CFIT accidents.

It is recommended that:

12. IATA should monitor industry compliance with EGPWS installation and campaign for all IATA aircraft to be upgraded at the earliest opportunity.

Before leaving the CFIT arena, acknowledging that EGPWS is still beyond the horizon for many airlines, it is vital to remember the unfortunate experience of others when flying the approach. Some 60% of CFIT accidents occur on Non-Precision approaches, 47% occur during step-down Non-Precision approaches, almost all accidents of this kind occur in darkness or IMC, and 48% occur in mostly flat terrain, and most commonly while operating below minimums.

The momentum of the industry wide campaign to minimise CFIT accidents must therefore be maintained. Most of the tools to prevent this type of accident are now available. It is the adoption and implementation of these tools that is not widespread and this situation must be reversed.

It is recommended that:

13. *IATA arrange for IOSA to include specific confirmation that the CFIT/ALAR Toolkit has been adopted and implemented by airline training programmes.*

Approach Plates

Reflecting on the CFIT/ALAR/Circling accidents, the CWG also felt that some improvements to the presentation of data on Jeppesen charts and those from other suppliers would be helpful. Cross sectional view where available of terrain should be included on approach plates/charts and holding information should be in larger print.

It is recommended that:

14. *IATA pursue with Jeppesen the need for side profile of terrain to be shown on approach charts and holding information to be entered in larger print.*

4.4.4 ATC "Safety Net"

The very nature of a CFIT accident — *"a controlled flight into terrain, inflight collision, or near collision with terrain, water or obstacle without indication of loss of control"* — suggests lack of situational awareness on the part of the pilot. This focus on the pilot as principal player in a CFIT accident may be why thus far there has been little work done regarding the role of those outside the cockpit. Most certainly, initiatives to reduce CFIT accidents have been mainly targeted extensively at airborne equipment and pilots. The CWG has addressed this issue and has concluded that there may be a way for ATC to assist further in the prevention of CFIT accidents. With at least 3 CFIT accidents the CWG felt that there was a missed opportunity for ATC to prevent the accidents. These accidents occurred within the vicinity of the airport in radar coverage. Notwithstanding an era when all aircraft are equipped with EGPWS, the CWG felt that it was appropriate to explore other ways of reducing CFIT accidents and it was interested in the concept of an ATC Safety Net.

The concept of an ATC Safety Net is not a failure of ATC/ATS which contributed to an accident. In fact, there were only 3 accidents to Western-built aircraft where it was felt Air Traffic Services contributed to the accident, none of which was a CFIT. Rather, in referring to ATC Safety Net, the CWG is concerned about those situations in which ATC is not mandated to intervene but where it could have a role in preventing accidents. Such a role need not of course be limited to CFIT accident prevention but it was this aspect which first caught the attention of the CWG.

Amongst the 2002 accidents the CWG classified a total of 5 accidents where it was felt that ATC missed an opportunity to prevent the accident. Clearly this is an area which must be carefully thought through for it is imperative that any intervention by ATC, whether it be an instruction or simply a hint of the threat, would need to be issued clearly. For such enhancement of the system new levels of co-operation and understanding between the airlines and their local ATC would be necessary.

During the course of the CWG discussions a range of other ATC related issues arose as follows:

- Use of English By Ground Emergency Services.
- Guidelines to ATC controllers for dealing with aircraft in distress (UKFSC Document).
- ATC Human Factors issues in light of the midair collision threat.
- Reporting of runway condition (e.g. blocked storm drains). Ground controller intervention — ditch between aircraft and marshaller — no edge lighting — trap scenario. IATA to pursue runway condition reporting with ICAO.

- Cockpit workload — impact of late runway changes for take-off and landing and the “both pilots head down threat” while taxiing, perhaps caused by late runway change.
- TCAS — Commend Eurocontrol TCAS leaflet entitled “Follow the RA”.
- Birds are getting heavier.
- Harmonisation of Fire frequency on a world-wide basis in English.
- IATA to take note of findings of ISASI ATS Working Group.
- ATC (Eurocontrol or IFATCA) representative should be invited to attend the CWG.

These topics all to a greater or lesser degree point to the need for improvements in the ATC Safety Net through organisational interaction.

The position of the CWG is that accidents are not only bad for airlines but also for airports and the dedicated people of the ATC community. ATC can implement non-punitive reporting systems to interact with those used by pilots while Airlines can help by working together with their local ATC. Airlines can implement formal safety meetings with their local ATC organisation and review events from the non-punitive reporting system database as the basis for discussions.

It is recommended that:

15. *IATA ATC WG to address the ATC issues identified above and report back to SAC.*
16. *IATA, through Eurocontrol and other ATC authorities, seek active participation of ATC groups and associations at local level with a view to bringing ATC more into the operating loop. Airline/ Airport ATC Authority safety meetings.*
17. *IATA promote UK Flight Safety Committee “Guidelines to ATC Controllers”.*

“There is always time to Go-around.”

4.4.5 LANDING

The CWG identified the following additional hazards associated with the landing phase:

With respect to landing technique there are still pilots who have a repeated tendency to employ a derotation technique resulting in a hard nosewheel touchdown or a nosewheel first touchdown, tendencies which are detectable by an effective flight data monitoring programme.

The 8 undercarriage failures leading to accidents during 2002 were a concern to the CWG. Obviously heavy landings or skip/bounce landings will impart high compressive stress to the landing gear and therefore cause damage to the components and fittings. Less well appreciated by some pilots is that higher taxi speed turning and braking or differential turning and braking will also cause excessively high compressive stress. Therefore, when exiting a runway via a normal taxiway (90 degrees to the runway) pilots should ensure that the aircraft is at appropriate normal taxi speed prior to initiating the turn. The combination of high speed and simultaneous use of brakes and nose wheel tiller should be avoided. When exiting a runway via high speed turn off, the use of the nose wheel steering tiller/ rudder steering in combination with brakes should be minimized until the aircraft is at an appropriate taxi speed. Should heavy braking be required, the aircraft should be aligned with the runway. These aspects should be considered by pilots when ATC request specified runway exits or when on-time performance dictates early high speed turn off.

Whilst addressing the issue of good operational husbandry of landing gears, the latent threat arising from tight turn while taxiing is also of concern. The tortional stresses imparted to the landing gear during tight turns are graphically illustrated by the photograph below.

It is recommended that:

18. *IATA campaign the use of flight data monitoring to detect those pilots who have a tendency to employ a hard nose wheel touchdown or a nose wheel first touchdown.*
19. *IATA campaign the hazards of compressive stress imparted to the landing gear associated with braking and turning the aircraft at high speed after landing and the tortional stress arising from slow tight turns during taxi.*

“A Tight Turn”

4.4.6 LOSS OF CONTROL

The CWG noted only 2 Loss of Control (LOC) accidents in 2002 both involving Western-built Turboprop aircraft.

The CWG have traditionally focussed on those Loss of Control (LOC) accidents that arise from aircraft handling factors, perhaps following a wake turbulence encounter, whereas more typically the industry regards LOC in a wider context. Naturally if a LOC arises exclusively from a catastrophic failure of a flying control system in which the crew do not have a fair chance of recovering the aircraft, it would not be appropriate to classify the LOC by assigning any human factors to the accident. Such an event would be the result of a downfall in airworthiness. However, most defects in flight control systems should be manageable given the redundancy in modern flying control systems and the quality of pilots and training that exists today. While such airworthiness related incidents may indeed present complications and distractions for the crew they should not lead to the loss or the damage of the aircraft. If the crew were to mismanage, say a runaway trim defect, then they should perhaps be judged on the way they performed in managing the incident and human factors under the IATA classification system would be assigned accordingly. Finally, there is the most difficult mix of circumstances in which airworthiness, including aircraft design, flight training, and weather factors conspire to result in a LOC accident. This is an area in which, short of a full accident investigation, it becomes increasingly presumptuous for the CWG to make an early assessment and the CWG would be cautious not to do so. It is this cocktail of human factors, environmental, and airworthiness issues which lead the various safety organisations to cite rather different figures in the LOC category, as indeed they have for 2002.

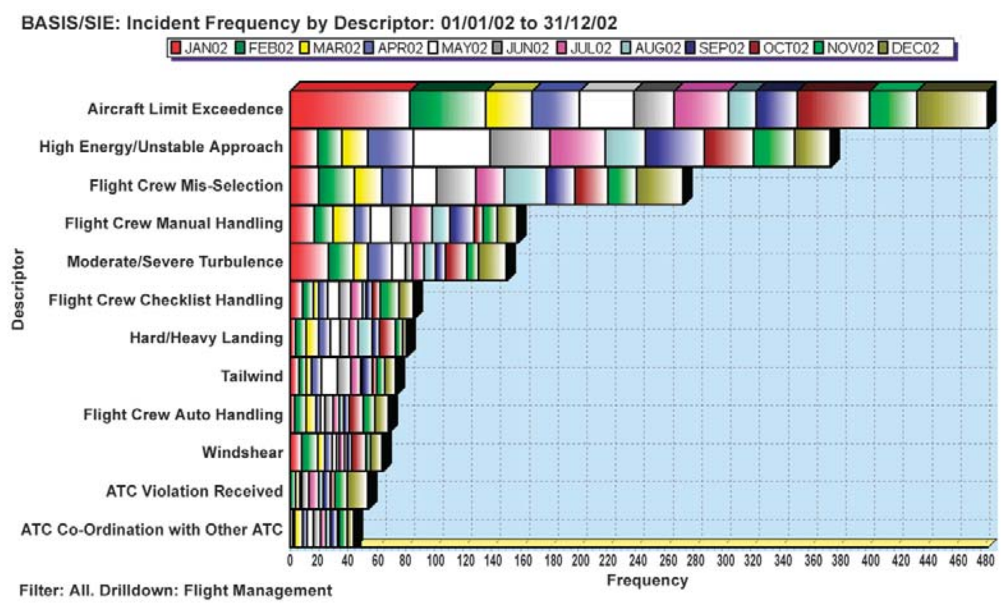
However, the LOC category is becoming better defined and IATA notes the **definition used by the ICAO/Commercial Aviation Safety Team (CAST) common Taxonomy of Aviation Occurrences for Loss of Control in Flight included on the CD-ROM.**

The discussion about LOC in the CWG centred on the issue of trim runaway concluding that such events should normally be manageable in a multi-crew cockpit.

To explore the LOC category more fully a search has also been carried out of the STEADES Air Safety Report (ASRs) incident database in terms of Flight Management category (formerly classified as Pilot Handling/Airmanship). Figure 4.12 shows the 12 most prevalent ASR incident descriptors associated with Flight Management that occurred during 2002. The highest ranking occurrence is Aircraft Limit Exceedences followed by High energy/Unstable Approach. Combined with the other incident descriptors identified from the ASRs the potential for a LOC accident is evident, reminding us that the LOC, whilst featuring in low numbers over the past two years as accidents is still a significant threat when viewed in the context of incidents reported through STEADES.

Figure 4.12

STEADES Flight Management Incidents



Further research is being undertaken using STEADES to address flight control incidents, particularly in the area of aircraft rudder and lateral control events but the results will not be available until the next STEADES report is published in May 2003.

The STEADES database also shows that there were some 400 trim related incidents reported in 2002 by the 50 or so airlines currently contributing data. These are also being analysed and again the outcome will be reported in the forthcoming STEADES report.

<u>*It is therefore recommended that:*</u>

20. IATA STEADES continue to conduct research into the Flight Management (aircraft handling) and Flight Control incidents database to assist with minimising the Loss of Control threat.

4.4.7 LOSS OF SITUATIONAL AWARENESS

2002 was the third year in which the CWG has included Loss of Situational Awareness as one of its Special Categories. Safety Report 2000 introduced the topic for the first time and it is appropriate to explain again the background to this Category.

Helmreich & Foushee 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 accepts these views, adding that situational 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 regarded as loss of situational awareness.

Loss of Situational Awareness continued to feature strongly in the 2002 accidents by contributing to 11 accidents.

Although this category continues to show a modest improvement in the number of accidents, the CWG focus on situational awareness should be maintained. 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 continuing evidence in 2002 suggests that this would be a most unfortunate trend. **Acknowledging the outstanding contribution to aviation safety made by the CFIT and ALAR task forces it is important to recognise that the ensuing training packages must be fully integrated into the overall pilot training programme which should include training in situational awareness.** The essential tool for CFIT or terrain avoidance, along with other threats such as windshear and mid-air collision avoidance is situational awareness. A CFIT accident is the result of a situational awareness failure. Airlines should therefore continue to review training practices and SOPs to ensure that specific training is given to pilots regarding situational awareness i.e. during initial conversion training as well as during recurrent training exercises.

As a result of an IATA Safety Committee action the Human Factors Working Group was asked to investigate Situational Awareness from an ATC viewpoint. A particular area considered was the threat to situational awareness of using language other than English in the ATC environment and to pursue wider use of English through ICAO, States, and Regions.

At its October 2002 meeting the HFWG was briefed by ICAO on the proposed ICAO language proficiency requirements for pilots and air traffic controllers. This outstanding work by ICAO resulted in the adoption of the proposals by the ICAO council on 5 March 2003. The Requirements will become applicable on March 5, 2008, a great contribution to the prevention of accidents through Loss of Situational Awareness. An updated copy of the ICAO presentation is included in the Supporting Documents of the CD-ROM. Also included is the text of the adopted amendments to Annexes 1 (Licensing) and 10 (Communication), which establish the requirement to use English and proficiency requirements. Additional amendments to Annexes 6 (Commercial Airline Operations) and 11 (Air Traffic Services) establish owner/operator/service provider responsibility to ensure proficiency requirements. The documents are rather complex, but they put the amendments in context for those interested. In addition, information about the non-profit International Civil Aviation English Association (ICAEA) is provided, including details about the September 2003 seminar on testing for aviation English proficiency.

4.4.8 HUMAN FACTORS AND MID-AIR COLLISION AVOIDANCE

One of the most disturbing accidents of 2002 was the 1 July mid-air collision which is an interesting case from a human factors viewpoint. A Boeing 757 and a Tupolev 154M collided over Ueberlingen, Germany when the Tupolev-crew complied with ATC instructions to descend rather than follow the TCAS Resolution Advisory (RA) instruction to climb. The HFWG addressed the issue of how pilots will react to a TCAS RA and has this to say.

Recent events in our industry and reports received from non-jeopardy reporting programs have given rise to a concern of how pilots will react to a TCAS RA. Much like a GPWS/EPGWS warning, pilots must react to a TCAS alert immediately. These events seem to occur at the most unexpected times and, therefore, crews must review and rehearse their response ahead of time. The articles and reports below led the HFWG to believe that pilots were not as ready as they should be.

> **... The aircraft -- a DHL Boeing 757 (A9C-DHL) and a Bashkirian Airlines Tupolev Tu-154 (RA-85816) -- collided over the northern shore of Lake Constance near the town of Ueberlingen close to Akabi waypoint. All 71 on both aircraft died.**

This article illustrates the difficult position encountered by the pilots of the Tu-154 with ATC telling them to descend and TCAS calling for a climb. Today a mid-air collision seems extremely unlikely. Yet that very threat occurred eighteen months earlier in Japan and almost cost several hundred lives.

> The accident took place on JAN, 31, 2001, 18 km south-southwest of Yaizu, Shizuoka Prefecture, injuring 88 passengers and 12 crew members aboard JAL Flight 907, a jumbo Jet heading for Naha, Okinawa Prefecture, from Tokyo's Haneda airport.
>
> **According to the report, the Boeing 747-400, which was ascending, followed an order from the air control centre to descend. The descent was meant for another aircraft, but the controller used the wrong callsign. The aircraft's TCAS then prompted it to climb, but the pilot continued his descent, resulting in a near-collision with JAL Flight 958, a DC-10 that was heading for Narita airport in Chiba Prefecture from Pusan, South Korea.**

The reports following both of these accidents cited several threats and in particular the policy and training of proper crew response when they receive an RA. Yet, even with the policy and training of how best to respond to an RA in place, crews do not always follow the SOP. The following are two (of several) reports regarding TCAS events.

1. *"On assigned ATC heading of 270 deg, climbing to 10,000 ft, flight received a TCAS RA at 9700 ft. Captain saw other aircraft on TCAS and visually that appeared to be at a 250 degree heading Flight leveled at 10,000 ft and the traffic (Baron B-55) descended from 10,300 ft to 10,000 ft while the flight was being given a frequency change. Traffic was already talking to the new controller. New controller called traffic to the flight and flight told the controller that they had the traffic. Captain then turned right to avoid the traffic. Traffic was also turned right to avoid the flight, as stated on the radio to ATC. Captain then turned left at steep bank angle (60 deg per Captain) to avoid traffic. PA was made to cabin regarding incident. Crew notes that they should have stopped the climb, but neither the crew nor ATC knew the intentions of the traffic. <u>FO notes that the crew did not follow the RA commands to level off but continued the climb to 10,000 ft as assigned."</u>*

2. *“Flight was level at 13,000 ft and centre was pointed out traffic at 1 o’clock and cleared the flight to climb visually regarding the traffic. Flight thought that they were flying parallel courses, but after starting the climb, it became apparent that there was going to be a conflict. Flight turned to go behind the traffic and passed 1.5 miles behind the traffic, but in the process caused several seconds of TCAS RAs and the traffic aircraft climbed as directed. Flight leveled and continued the turn away. Captain notes that the flight failed to realize that the 2 aircraft paths were merging due to slow (Turboprop) traffic and more acute convergence of flight paths. <u>Even though the flight could see that we were passing behind the traffic, the crew should have taken more positive action to level off/descend as per RA to (take) the pressure off the Turboprop, who was getting a climb RA ...”</u>*

The difficulty the pilots over Germany and Japan faced in following the RA’s in spite of all other inputs is no different than what flight crews face daily. Following SOP’s and good judgment are effective strategies to counter the threat of a midair collision.

“The time to decide how you and your crew will respond to an RA is now and not when the event occurs, ***because RA’s are real.”***

The following is from the FAA Advisory Circular 120-55B, dated 10/22/01 and titled “APPROVAL AND USE OF TCAS II:”

When an RA occurs, the pilot flying should respond immediately by direct attention to RA displays and maneuver as indicated, unless doing so would jeopardize the safe operation of the flight or the flightcrew can assure separation with the help of definitive visual acquisition of the aircraft causing the RA. By not responding to an RA, the flightcrew effectively takes responsibility for achieving safe separation. In so choosing, the following cautions should be considered:

(a) The traffic may also be equipped with TCAS and it may maneuver in response to an RA that has been coordinated with your own TCAS.

(b) The traffic acquired visually may not be the same traffic causing the RA.

(c) Visual perception of the encounter may be misleading. Unless it is unequivocally clear that the target acquired visually is the one generating the RA and there are no complicating circumstances, the pilot’s instinctive reaction should always be to respond to RAs in the direction and to the degree displayed.

The following is from a Eurocontrol ACAS II bulletin:

TCAS II is a last resort system, which operates with very short time thresholds before a potential near mid-air collision. It assesses the situation every second, based on accurate surveillance in range and altitude. For maximum efficiency, when both aircraft are operating TCAS II in RA mode, TCAS II coordinates the RAs. TCAS II is extremely effective.

It is important that pilots follow all RAs even when there is:

- **An opposite avoiding instruction by the controller.** If the RA is not followed, it can adversely affect safety when the other aircraft responds to a coordinated RA.

- **Traffic information from the controller.** The slower update rate of the radar display, even with Radar Data Processing System (RDPS) multi-radar data, means that the vertical situation seen by the controller may be inaccurate, particularly when aircraft are rapidly climbing or descending.
- **Conflict close to the top of the operating envelope.** If a "Climb" RA is generated, it may be possible to climb at least a little but do not descend, opposite to the RA.

It is recognised that workload is often high during a TCAS RA encounter; nonetheless pilots shall notify ATC as soon as possible using the standard phraseology (e.g. "[callsign] TCAS CLIMB").

This information will help the controller in his task (cf. ICAO Doc 4444, PANS-ATM). When a controller is informed that a pilot is following an RA, the controller shall not attempt to modify the aircraft flight path until the pilot reports returning to the clearance. He shall provide traffic information as appropriate.

"For maximum safety benefit from TCAS II, follow RAs promptly and accurately."

It is recommended that:

21. *IATA campaigns for its pilots to regard TCAS RAs as real and follow them promptly and accurately. This account in the Safety Report 2002 is regarded as the beginning of that campaign.*

The significance of the human factors aspects of midair collisions and near misses has not been lost on the CWG. In considering the midair collision scenario, as mentioned earlier, the group focussed on the significant contribution to safety that ATC can make. This is not intended to make ATC more liable or to make the challenging ATC task more onerous. Rather, the intention is to seek ATCs active participation to improve safety. Investigations of ATC related accidents have shown that ATC often possesses valuable information which, had it been provided to the pilot of the aircraft involved in the incident, may have produced a more positive outcome. The CWG feel that a bottom up approach by integrating ATC groups and associations at local level would be the best approach. To this end the CWG will also seek an appropriate ATC representative to attend future meetings.

Further reflection on this concern by IATA has highlighted the fact that there are many excellent ATC agencies already engaged in safety net type activity with impeccable standards and best practice. However, it is understood that ICAO does not yet have an ATC universal oversight programme. IATA is of the view therefore that an ATC version of IOSA may be valuable to the propagation of ATC best practice around the world. The principles of ATC Safety net could therefore be encouraged through the new audit system.

It is recommended that:

22. *IATA investigate the feasibility of an ATC version of IOSA.*

4.4.9 TRAINING

Rather like flight safety, training is a never-ending cause. Rarely are we satisfied with the standards achieved, which is probably why the process of continuous development in the aviation industry is so effective. Given that "training was more thorough when we were going through the system" and "2nd officers don't get the hands on experience that we did in our day" and, of course, "the military training is the best possible grounding" it is important to be both impartial and specific in identifying those aspects which need attention in the light of the 2002 accidents.

The preceding classification analysis points to shortcomings in training being a contributing factor in many of the occurrences. Naturally training plays a most important part in the prevention of incidents and accidents, not only on the flight deck, but also within the cabin and ground support environment including air traffic control.

The CWG has the following concerns, which may be regarded as threats to aviation safety, and which therefore need to be specifically addressed:

- An inadequate or no response by flight crew to warning systems such as TCAS and GPWS. Greater exposure to these and other warnings such as configuration/take-off warning horns is necessary.
- A lack of awareness among pilots of approach constraints and the possible consequences. Poor judgement in the holding pattern and a lack of experience of the decision making process continue to be apparent.

- Training overload in an operational context where an artificially high workload is imposed within the flightdeck to the potential exclusion of vital procedures or actions. An actual operation must not be turned into a simulator session. On Training flights, emphasis must be on safety of flight, not on instructional value. Departure and Arrival are not good times for training instruction and so called “20 questions”.
- Inappropriate aircraft handling techniques in abnormal or demanding environmental conditions particularly with regard to weather cell penetration. “There is weather out there in which we should not be flying”.
- Many operators of modern aircraft now emphasise systems management and automation which is a potential threat to the maintenance of basic handling skills. A lack of systems status awareness is still a concern as is the a lack of exposure amongst pilots to flying autopilot in basic modes when needed in unusual situations.
- Incestuous, authoritarian, ex-military culture is still apparent on some flight decks.
- While some flight control failures will be beyond the capability of pilots most are not if properly handled. As already indicated under the Loss of Control paragraph, trim runaways, for example, should in most circumstances be manageable.
- A psychological reluctance by flight crews to declare an emergency, possibly through fear of complicating the situation. Better threat assessment is needed.

The specific follow-up of the above concerns should be undertaken by the IATA FOC and its working groups. For its part the CWG would advocate through SAC the deployment of the threat and error management concept for enhancing the decision-making and judgement process and that it should be applied very early in all training. The recent CFIT and ALAR checklists provide models of TEM application.

The CWG sees evidence that over time the perceived requirements of the industry have significantly changed and this has brought about many changes in the very culture of the training environment. Accidents in 2002 have shown standards of training to be a factor in around 20% of those under review. Basic issues such as “airmanship” seem to have slipped in priority or been deleted within both the training syllabus and practical line oriented education. With each advance or generation change, previously well-established practices have either been deleted as being considered no longer relevant within today’s hi-tech environment, or perhaps are just put to one side in an effort to provide an end product that meets today’s specific requirements.

These changes in training methodologies and priorities, say the CWG, have progressed slowly through the industry from the very basic flight training schools to areas within many of the major air carriers. Exposure and training in situational awareness and threat and error management continue to be below levels the CWG believe appropriate, which has been a factor in accidents such as CFIT and approach and landing accidents. The introduction of many contemporary or high-technology systems and aids has turned many aircrew into system managers. The Group believes that basic mental and flying skills are suffering as a result.

With little or no corporate history available within the training domain, the aims or bench marks within the training departments and flying schools have sometimes been modified with little or no understanding of why many well established practices are in place. This, the Group believes, permeating right through the industry and unless recognised and addressed on a worldwide basis will only bring about further reduction in standards that will in time be shown in the accident statistics.

The Group is of the view that the philosophy of training be examined in today’s context so that the use of modern systems does not come at the expense of a reduction in skills that are otherwise expected.

It is recommended that:

23. *IATA FOC and its working groups should address the following flying training proficiency, skill, and procedural related safety hazards/threats.*
24. *IATA campaign the need for cockpit crews to be more comprehensively exposed in training to all the difference warning systems in the cockpit.*
25. *IATA promote and implement Threat and Error Management training*

26. IATA ATDI (Training Institute) to promote safety training more actively in IATA; in particular, exploring the need for enhancement of its operational safety training in light of the proficiency and skill related concerns identified in the 2001 and 2002 Safety Reports.

4.4.10 TECHNICAL KNOWLEDGE AND SYSTEM UNDERSTANDING

At present Threat and Error Management (TEM) principles find their place in CRM training. TEM as a framework for CRM, essentially means that traditional skills taught through CRM courses become strategies to mitigate threats and errors. TEM is also revealing benefits in accident and incident analysis as the use of the TEM model leads naturally to remedial actions, preventative strategies and countermeasures. The model helps to reinforce positive strategies and highlights areas and issues that need to be addressed. It also helps to keep the focus on the relevant lessons learned from the event, moving away from the “who” and “what” and towards understanding the “Why”. Getting at the “why” is particularly important, and it is this very concept that can move across and benefit other areas of concern that the CWG have identified, namely lack of technical knowledge and system understanding.

The CWG discussed an area of concern regarding lack of system knowledge and understanding which was apparent from a number of accidents. This topic was addressed extensively in the 2001 Report, but the focus of the discussion this year was that training appeared to be falling short in assessing and teaching the “Why”, indeed, understanding “Why”. In many cases, the learning environment for pilots is focused on procedures and checklists and this potential reveals a weak spot in training. Moreover, the overall system for testing, only confirms whether the pilot has executed a procedure properly and rarely tests the level of understanding of procedures. It is understanding the background, or the “why” of procedures that can end up being a pilot’s last defence when faced with a situation that falls outside of the normal operations. Furthermore, some manuals do not provide enough system knowledge information therefore this is not only an issue for airlines but also for manufacturers.

The CWG discussed the notion of applying the concept of TEM training more widely than CRM, essentially encouraging training organisations to embrace the TEM philosophy of drilling down and getting at “Why”. In this way, it was felt that TEM philosophy could very well find its way into abinitio training. For instance, most abinitio training does not involve CRM training, so if TEM concepts were left to reside within the CRM fold, abinitio pilots risk missing out on this powerful tool, whereas there are plenty of opportunities for them to apply the concept earlier.

4.4.11 AIRWORTHINESS

The CWG identified a considerable range of airworthiness and maintenance concerns as listed below:

- Maintenance reporting and control of circuit breaker disablement is suspect;
- There is evidence from at least four accidents of poor serviceability of Digital Flight Data Recorders and Cockpit Voice Recorders;
- Failure of back-up systems when called upon e.g alternate landing gear deployment system;
- Electrical wiring repair techniques and adequacy of crimped connections;
- Review trim runaway occurrences and landing gear incidents using STEADES;
- Possible design “trap” exists with some Turboprop aircraft through the ability to select “ground fine (pitch)” in the air;
- Management of post inspection requirements following structural repairs to aircraft. Tailstrikes of the past may lead to structural failure type accidents in the future.

It is recommended that:

27. IATA follow-up on the above range of airworthiness concerns through its Maintenance WG

4.4.12 METEOROLOGY

As mentioned in the earlier analysis of Environmental Factors, it was apparent that 3 accidents were associated with extreme or at least unusual weather encounters. While such conditions have always been a threat to pilots it did appear to the CWG that the challenging 2002 occurrences were partly indicative of the much heralded global climate changes of recent years and were therefore likely to be encountered more frequently in future operations. This raises the question as to whether the issue of climate change is being studied in relation to the impact it is having on airline safety. In some cases the hazard is not necessarily extreme weather per se, but unusual weather for a given geographic location. Recent examples of these climate changes are the heavy rain and flooding experienced in Europe in 2002, or the unusually heavy snow-falls being experienced in various parts of the world. Thus there is a continuing need to monitor the impact such weather is having on airline safety. Moreover, those airlines that are accustomed to such weather must share their experience with the airlines that are finding that their operating environment is markedly changing.

Given that the weather hazard is apparent in about a third of the accidents that occurred in 2002 and that this hazard has long dominated accident statistics the threat from extreme or unusual weather is less clear, but it does appear to be increasing. In such circumstances pilots need to be reminded that aircraft certification requirements do not cover all meteorological phenomena likely to be experienced and such weather can strike suddenly. Although aircraft are designed to operate in a wide variety of environments, a chief pilot serving on the CWG states: “There is weather out there in which we shouldn’t be flying”.

Pre-flight planning and judgement of fuel requirements are as vital as they have ever been. One characteristic of extreme weather, however, is that it is not always predictable and pilots should always bear this in mind during flight planning. Timely communication from ATC and/or Flight Despatch continues to be a vital part of minimising the hazard of extreme or unusual weather but inevitably there will be a need to supplement this with more timely weather information in the air.

The IATA Met WG is therefore involved in research for real-time cockpit weather display studying both the technical requirements and the human factor issues. The current economic outlook has hindered progress but the need to pursue this avenue of development is well recognised by IATA and the 2002 accident statistics reaffirm this strategy.

IATA is currently involved in several other research projects involving the enhancement of aircraft automatic weather reports (WMO - AMDAR project) as well as several ICAO Met activities (the WAFSOPSG, the International Airways Volcano Watch Ops Group, Met Link Study Group, and the Op Met Data Task Force for Europe and Asia Pacific).

It is recommended that:

28. *The IATA METWG pursue its support for the development of technological advances to provide flight crews with timely weather information.*
29. *In light of questionable aircraft handling methods and judgement noted by pilots encountering abnormal or demanding weather conditions, IATA to campaign the issue that “there is weather out there in which you should not be flying”.*

4.4.13 AIRCRAFT SYSTEM DESIGN

Recommendation 10 in the Safety Report 2001 called for the HFWG to examine examples of “design traps” cited in the Safety Report and make recommendations. What becomes essential to the mitigation of these is the airline’s and industry’s SMS.

The IATA Human Factors Working Group (HFWG) recommends that the aircraft manufacturers, along with the operators of their equipment, improve existing users’ forums so that carriers can share safety information affecting the operation of specific aircraft types. As Dr. Tom Chidester, of NASA Ames Research Center, has pointed out in referring to safety data collection, we must learn in parallel and not in series. For that reason, when an operator experiences a safety event and develops a procedure, policy, training method, etc. as a counter-measure to a design related feature of a particular aircraft type, then that operator and the manufacturer must ensure that this information, once validated, is passed to all other current and new operators of the same equipment. By sharing this information, operators can learn in parallel instead of experiencing a similar safety event and learning in series months or years later.

Therefore, when developing an airline Safety Management Systems (SMS), it is important that operators develop a method to share safety data with the manufacturers as well as with other operators. When an operator develops a new procedure, policy, training method, etc. due to an event unique to a specific aircraft and its design, this information needs to be disseminated accordingly . The IATA SAC provides one such forum, the IRM, for serious incidents.

The IATA HFWG strongly supports the efforts of the FAA/JAA Human Factors Harmonization Working Group (HF HWG) in addressing flight crew error/flight crew performance considerations in the flight deck certification process. The HF HWG has reviewed the operational record and is developing recommendations about what regulatory standards and/or advisory material should be updated or developed to consistently address design-related flight crew performance vulnerabilities, and the prevention and management (detection, tolerance, and recovery) of flight crew error. While such new regulatory material can only be applied to future designs, including flight deck modifications, it should significantly improve the ability of manufacturers and regulators at the design stage to identify and correct design features likely to lead to errors and related safety events. Improving safety data sharing among operators and manufacturers, as suggested above, will also better inform designers about how well designs achieve their intended use in service and what features should be avoided or mitigated in future designs.

4.4.14 SAFETY INCIDENT REPORTING CULTURE

The CWG identified 6 accidents in 2002 in which Control and Monitoring of the operation was considered to be inadequate. This particular category (05) points to a lack of an effective Safety/Quality Management System and safety culture. One of the principal components of a mature SMS is an effective incident reporting scheme. Fundamental to the success of such a scheme is the willingness of pilots, flight attendants, engineers, ramp personnel, air traffic controllers, indeed any person concerned with supporting air operations such as security staff, to report events. Previous IATA Safety Reports have highlighted the benefits of non-jeopardy reporting within an airline. This year IATA's HFWG wishes to continue this emphasis by urging the establishment of a trusted non-jeopardy policy statement embracing all areas of the airline and to ensure that it is an inherent part of the airline-wide safety management system. **Refer to the Safety Documentation on the CD-ROM enclosed for a paper by Captain Don Gunther, Manager Human Factors, Continental Airlines on the value of Non-jeopardy reporting to a Safety Management System.**

IATA should therefore maintain emphasis on the promotion of just, non-punitive, air and ground safety reporting and investigation systems, with deeper involvement of the aircraft manufacturers and wider circulation of de-identified investigation reports.

It is recommended that:

30. *IATA maintain emphasis on the promotion of just, non-jeopardy, air and ground safety reporting and investigation systems calling for such reporting to be an essential part of an airline Safety Management System.*

4.4.15 CEO'S ROLE FOR SAFETY ACCOUNTABILITY

Having reviewed the accidents for 2002, the CWG wishes to emphasize the importance of proper assignment of Safety accountability in airlines. Safety accountability must cascade clearly from the boardroom to the shop floor. The IATA Board of Governors has expressed its support to reinforce the airline CEO role for safety accountability but only limited material for implementing this initiative has been secured. More examples of suitable and convincing material is sought by IATA Safety.

IATA Safety is developing a paper entitled "A CEO's Responsibility For Safety" a copy of which is included on the accompanying CD-ROM. The paper is in the form of a script for eventual presentation to CEOs by the IATA Senior Executive. During the past year airline safety executives and other interested parties have been invited to contribute their views on this important Safety Strategy 2000 initiative and some SAC members/observers in particular have kindly contributed. The latest version of the paper is included on the CD-ROM.

Meanwhile IATA is conscious of the debate that is taking place around the world with the introduction of SMS on the issue of "accountable executive". The holder of an operations certificate should naturally be accountable under the terms of the Air Operating Certificate. However, IATA supports the view that the appointed delegated accountable executive should have control of the financial and human resources required for the operations authorised to be conducted under the operations certificate.

It is recommended that:

31. *IATA calls for final input from airlines on the IATA paper included on the CD-ROM addressing the topic "A CEO's Responsibility For Safety".*

4.4.16 OPERATIONAL QUALITY STANDARDS (OQS)

For the past three years IATA has been conducting OQS reviews of airlines applying for membership. These reviews provide an insight to some of the safety issues affecting emerging airlines, often in less developed parts of the world. This is therefore a useful de-identified source of information for the IATA Safety Management Support System. Similarly, with the introduction of IOSA, IATA expects to communicate the safety concerns identified by the IOSA programme.

Since the introduction of OQS in 2000, IATA has conducted over 30 audits. Whilst never aspiring to be a safety audit OQS naturally focuses on many safety issues during these reviews of "new-joiner" airlines. The following key deficiencies have been reported:

- Identification of a lack of regulatory control in certain regions, in certain cases resulting in deficiencies in operator control systems and structures;
- Engineering and Maintenance departments continue to lack structure, accountability and resources;
- Although most Engineering and Maintenance departments had some form of operating Quality Assurance (QA) program, there was a general lack of any (or only marginal) Quality Assurance programs functional in all operational airline departments;
- Safety Departments were occasionally non-existent, or lacking;
- A general lack of awareness of the benefits of an active safety culture at all levels;
- Lack of written, functional safety policies;
- Lack of sufficient resources, specialised training and/or appropriate experience;
- Lack of functional FDM/FOQA systems;
- Awareness of the benefits of safety databases;
- Lack of minimal Security structures and procedures;
- A consistent lack of Emergency Response and Crisis Management awareness, procedures and facilities;
- Lack of awareness of CRM training benefits.

"It is important to remember that when using sub-contractors, the responsibility for the quality of the product or services remains with the operator."

The requirement for the IATA OQS audit generates a beneficial review of company structures, which would not have otherwise taken place in the development of the applicant airline. In most cases, this review has had a significant impact on operating efficiency, leading ultimately to improvements in safety standards.

It is interesting to note the similarity between what is seen by OQS and what has been detected by the CWG during the 2001 and 2002 sessions. The CWG accident classifications also point to a concerning lack of quality assurance and an underdeveloped safety culture within the company. Organisations operating and maintaining aircraft must establish effective safety and quality management systems in a corporate culture, which extends to the boardroom. This is not an unreasonable expectation for IATA has noted during their OQS reviews that there are examples around the world of small organisations operating with limited resources in challenging operating environments achieving high standards in quality with the right attitude to safety.

The CWG expressed particular concern that airlines were not exercising adequate oversight of maintenance contractors quality and therefore safety standards. Airline Operational and Engineering Executives are encouraged to ensure that they regularly review the key safety indicators they have set for their maintenance contractors. One effective way of achieving safety performance monitoring is to ensure that the Airline Safety Committee includes the operational executive of the maintenance contractor and other engineering service providers. Airline safety and quality departments should also be adequately resourced to deploy periodically their people to the maintenance contractor for investigations and audits. It is important to remember that when using sub-contractors, the responsibility for the quality of the product or services remains with the operator.

It is recommended that:

32. *To counter the lack of quality oversight in airlines IATA should encourage Regulators to mandate the implementation of a Safety Management System with a fully documented exposition of the processes used by that system.*
33. *To support this initiative IATA should publish a pamphlet in which the best practice in Safety Management Systems can be communicated to airlines.*
34. *The key issue of Safety Practices of Contractors, sub-contractors and other Third Parties should be addressed in the SMS Safety Pamphlet and the new IATA Safety Manual.*

4.4.17 GROUND SUPPORT

The CWG is concerned that ramp safety failures continue to feature in aircraft accident statistics and represent a serious threat to aviation safety. Such incidents are also expensive and are costing the industry billions of dollars annually. IATA has long been developing and promoting best practice on the ramp as reflected in the Airport Handling Manual. The report at Annex 6 of the activities of the Airside Safety Group (ASG) is evidence of this effort. However, the ASG is actively re-engineering its strategies and goals for the coming years to meet the industry needs.

A particular area of concern is the damage to aircraft caused by ground servicing vehicles. The vastly increased use of composite materials in aircraft manufacture brings with it a rather different set of damage detection difficulties increasing the need for operators to ensure that all ground damage is reported and properly assessed prior to flight. The need to establish and preserve an effective safety reporting culture is apparent and is not only applicable to ground handling personnel but also in other ground support areas such as cargo loading and catering.

Those 2002 events where the aircraft sustained ground damage were coded E6 which deals with the procedures and training of ground support personnel. Emphasis should therefore be placed on competency and skill levels. Whilst flight crew training and standards are mostly well developed, many airside ground handling personnel 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 ramp personnel is high, supervision often falls to the inexperienced, all amidst the ever present pressure of on-time performance. A better balance of the task and resources, consisting of properly trained personnel, would not only pay dividends in accident prevention but also in cost saving.

"A particular area of concern is the damage to aircraft caused by ground servicing vehicles."

A review of the Initiatives set out at Annex 6 will show that ramp safety concerns are well understood by IATA and being comprehensively addressed.

4.4.18 REVIEW OF AIR SAFETY INCIDENTS

One of the recommendations appearing in the year 2000 Safety Report was for IATA to investigate the capture of incident data for analysis in the Safety Report. To this end, IATA Safety has since taken great strides in developing STEADES project and now has a database of some 200,000 Air Safety Reports. Much effort has gone into improving the database descriptors for safety information exchange and Analysis purposes. The direction and methodology of the STEADES programme has advanced during 2002 to enable more data collection and therefore achieve more comprehensive output from the data analysis. The first STEADES Trend Analysis Report was released to STEADES members in October 2002, one year after the launch of the project.

The Safety Report 2001 made 3 recommendations for action by STEADES to:

- Create an on-line Destination Airport Information database accessible through the STEADES web-site;
- Create a Flight Data Monitoring Animation Library accessible on-line through the STEADES web-site;
- Study and report on the occurrences and frequency of Runway Incursions reported through STEADES.

Destination Airport Information Database. This project is intended to provide a simple and readily accessible database for well-known information on likely problems and/or issues, which is not available from formal aeronautical information sources (e.g. Aeronautical Information Publications (AIP), Notices to Airmen (NOTAM), commercial Charting organisations, etc.). It is envisaged that this information will be informal, anecdotal, information contributed by members concerning particular events and procedures at airports, which may be accessed to assist in planning and briefing flights on which an operator may be flying for the first time, or to which operators do not fly frequently. The Destination Airport Information Database has been scheduled into the future work programme for STEADES under the STEADES 2004 expansion plans.

Animated Flight Data Monitoring Library. The recommendation for a Flight Data Monitoring (FDM) library within STEADES containing animated replays of actual incidents is intended to provide a training library of how such incidents occurred, and the steps to overcome future similar occurrences. The idea has been expanded into the inclusion of an FDM module into the future STEADES 2003+ expansion programme to provide an "event" monitoring tool, by which operators who subscribe to the service will be able to monitor their own operations against a global yardstick. The data input into the FDM programme would be much more generalised than the QAR/FDR data input to an operator's own FDM programme. The viability of an FDM Animation library would depend on the willingness of operators to release suitably de-identified details of incidents that they would be willing to share with the industry.

RUNWAY INCURSIONS

The CWG noted the good news of 2002 in that there were no accidents resulting from runway incursions. However, the Group was interested to know whether the threat was reducing and was interested to know the outcome of the recommendation placed on the STEADES programme in this regard.

During 2002 there were 66 reports of Runway/Taxiway Incursions received through the STEADES/SIE system, compared with 80 reports during 2001. Statistically normalised against the number of Air Safety Reports received this represents a drop from 3.2 per thousand reports to 3.0 per thousand reports, a minor and perhaps insignificant reduction. Reporting against numbers of reports received, however, does not represent a true picture as the ASRs received cover all aspects of flight safety. In 2002 STEADES is able, for the first time, to normalise reports against sectors flown and, the results are presented against this normalisation.

The Runway/Taxiway incidents were analysed for Contributory Factors; it should be noted that there may be more than one contributory factor involved in each incident, so the factors are shown in the statistics as percentages of the overall numbers of factors.

- The 66 Incursion incidents reported resulted in 8 Rejected Take Off events and 9 Go-Arounds events.
- 2 events were reported as Severe Risk and 6 as High Risk. The remainder were assessed as either Medium or Low Risk, a significant change from 2001, when a majority of incidents were reported as Minimal, Low or Medium Risk.

Figure 4.13
2001 Incursions by Risk

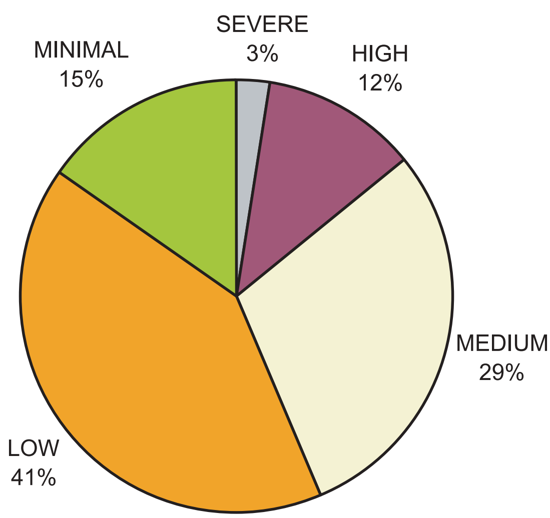
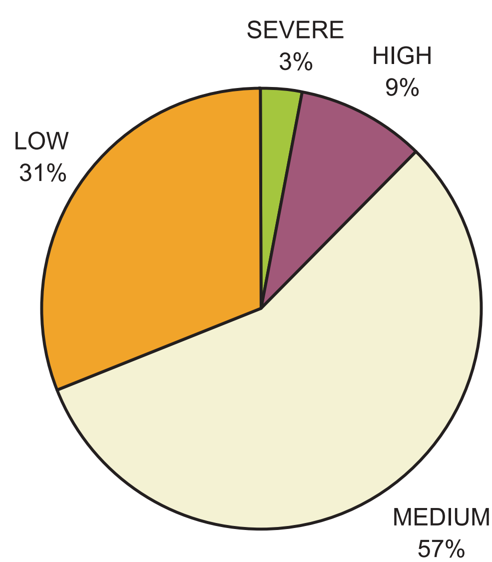
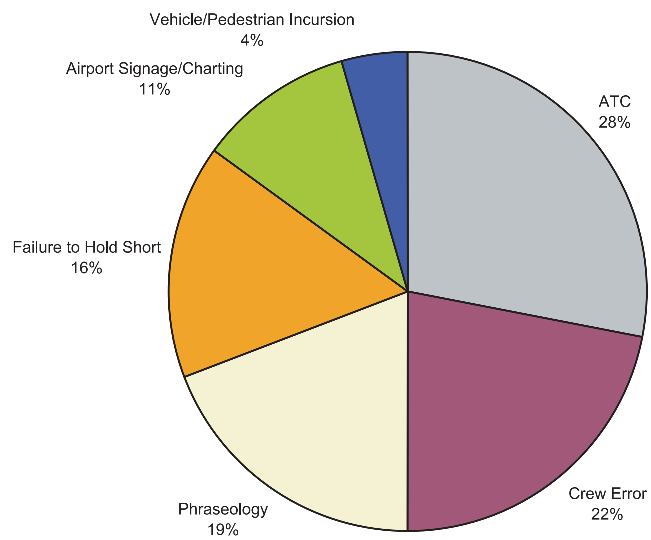


Figure 4.14
2002 Incursions by Risk



- The Severe and High Risk assessments are fairly similar in both years, and the inference can therefore be drawn that operators are becoming more aware of Runway Incursion risk importance, and are accordingly assessing Risk more accurately.
- The contributory factors to Runway/Taxiway Incursions are presented in Figure 4.15. These factors are presented as they are reported on the operator ASR Cause Assessment, and reflect, as in so many incidents, that no one single factor is the primary cause, but that each incident is a result of many factors.

Figure 4.15
Contributory Factors to Runway/Taxiway Incursions



- The general distribution of contributory factors is not significantly different to that for 2001, although the exposure data for 2001 is not available, and therefore the rate data for 2001 could not be assessed.
- The overall Runway/Taxiway Incursion Rate for 2002 is assessed at 39.5 per million Sectors flown by the reporting operators. Exposure data for previous years, using the same parameters, is not available. The Severe/High Risk Factor Risk for 2002 is assessed as 3.64 per million sectors using the same parameters.
- The Severe/High Risk Events comprised the following events:
  Severe:
  Landing aircraft — unable to hold short — crew distraction
  Landing aircraft — unable to take requested turn-off — poor signage

  High:
  Clearance confusion — language — 3 events
  Landing aircraft — unable to hold short — crew distraction
  Inadequate lighting/signage
  Crew error (admitted)
- There are many and varied contributory causes attributed to the incidents reported, including the honest "Crew Error" reports; some of the alleged causes include:
  — Poor airfield lighting and signage;
  — Misunderstanding of ATC clearances;
  — Inadequate ATC instructions;
  — Inadequate and misleading Airport Charts;
  — Crew distraction due to flight deck workload at critical periods:
- A number of ASRs cited crew distraction as a cause of crew error. This category included flight deck workload at crucial times during the crossing of active runways, where the "non-flying" member of the flight crew was occupied with "domestic" activities instead of maintaining external look-out and situational awareness. It is recommended that operators ensure that their Standard Operating Procedures adopt a "situational awareness" approach to manoeuvring between ramp and runway similar to that for the actual Flight phase. This is also a concern raised by the 2002 CWG.

- A major factor (19%) in Runway/Taxiway Incursion incidents appears to be Phraseology, covering both language and meaning. For instance, "Taxi into Position and Hold" (TIPH) and "Cleared to Holding Point Runway XX" may sound very similar, but are considerably different in meaning in different geographical/demographic areas. It is therefore urged that ICAO Standard Phraseology terms are adopted globally as a matter of urgency.
- It is a reflection of the efforts being made by Airport Operators, Airlines, Regulatory Authorities and Air Traffic Control that no Runway Incursion accident occurred during 2002, and that the overall Incursion rates appear to be reducing.
- **The statistics produced above bear out in a very large measure the findings of a joint IATA /FAA Runway Incursion Prevention Programme (RIPP), which is included on a second CD-ROM accompanying this Safety Report.**

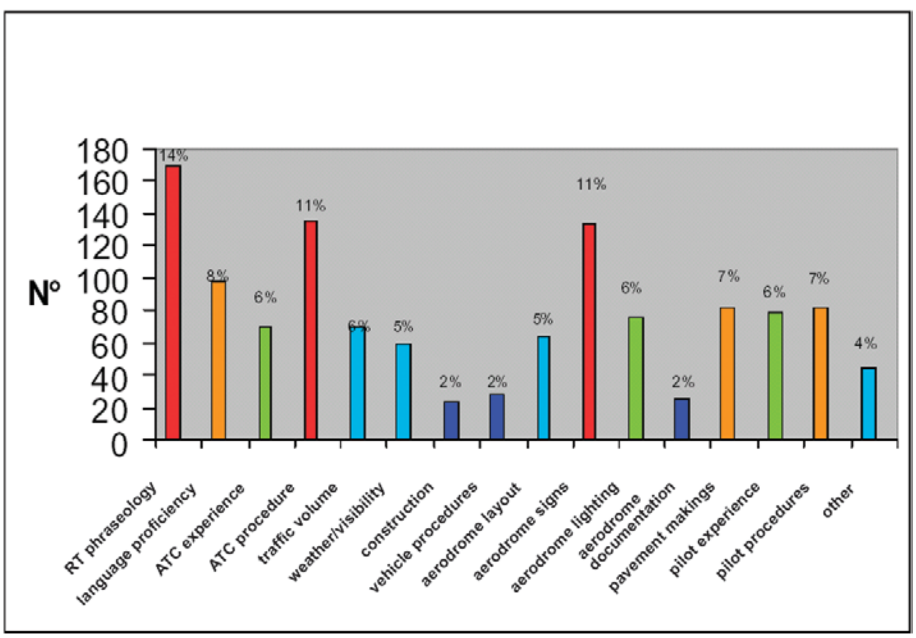
Figure 4.16 shows the results of a 2002 IATA/Eurocontrol survey of professional pilots having experienced a runway incursion on the most common perceived contributory causes of runway incursions. The most common causes identified were:

- R/T Phraseology;
- Aerodrome Signage;
- ATC Procedures;
- Language proficiency.

The full survey results, **Runway Safety Survey,** are included in the supporting documentation.

Figure 4.16

Contributory Causes to Experienced Runway Incursions



The following paragraph is an extract from the **Final Report of the European Action Group for ATM Safety (AGAS):**

"Runway safety is a vital component of aviation safety as a whole, which calls for preventative actions. Over recent years there have been a number of runway incursions across the European region, which resulted in two actual collisions, both with loss of life. Analysis of the available data indicates that **there is one runway incursion every three to four days within the European region.** Action is required to reduce the number of runway safety occurrences, in particular runway incursions."

In July 2001 a joint runway safety initiative was launched by GASR, JAA, ICAO and EUROCONTROL to investigate specific runway safety issues and to identify preventative actions. The ensuing study of incidents at airports and associated concomitant preventative actions are set out in the "European Action Plan for the Prevention of Runway Incursion". The specific actions required are:

- All stakeholders to implement the recommendations in the "European Action Plan for the Prevention of Runway Incursion" that relate to their activities.
- The document is considered to be a living document that will be updated as necessary. Stakeholders should therefore have mechanisms in place to capture updates of the Action Plan.

Actions are required by national ATM safety regulators, Aerodrome Operators, ANSPs, Aircraft Operators, Aircraft Operators Associations and EUROCONTROL.

A target timescale for implementation is laid down for each action in the Action Plan. A process will be put in place for safety regulators to monitor progress with implementation prior to commencement of the ICAO Safety Oversight Programme foreseen for 2004.

Readers are further referred to the **European Action Plan for the Prevention of Runway Incursion,** available from Eurocontrol at runway.safety@eurocontrol.int

In summary, despite the fact that 2002 did not experience an accident resulting from runway incursion, and that the number of incursions appear to be reducing, the threat from a runway incursion remains very real. Excellent work is going on around the world to address this threat and STEADES will play its part.

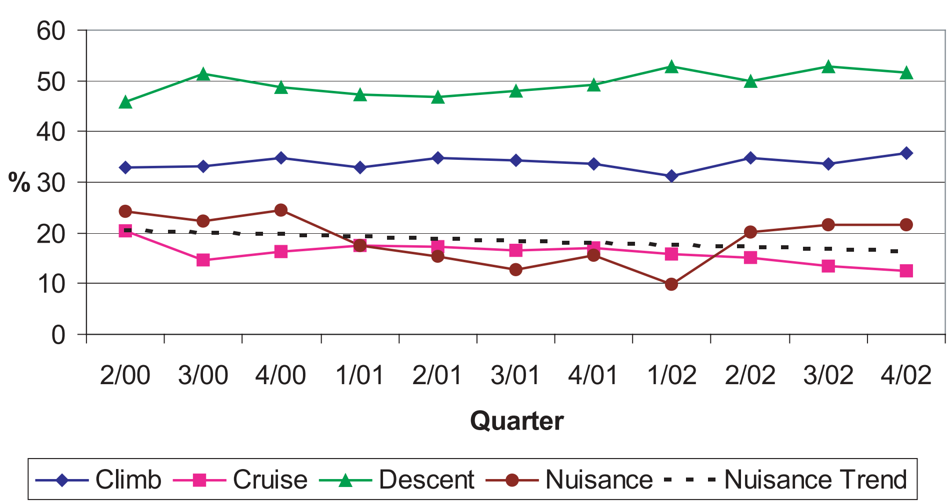
It is recommended that:

35. IATA campaigns for operators to ensure that their Standard Operating Procedures adopt a "situational awareness" approach to manoeuvring between ramp and runway similar to that for the actual Flight phase.

INCIDENTS RELATING TO AIRBORNE COLLISION AVOIDANCE SYSTEM (ACAS/TCAS)

The CWG remains concerned that ATC events, particularly those involving TCAS Resolution Advisories (RA), ranked so highly in their respective safety data bases, especially in light of the 2002 mid-air collision. In view of the CWG's concern, STEADES was used to analyse TCAS incidents occurring over the past two years. The report was generated showing percentage of reports by generic Flight Phase (Climb, Cruise and Descent), plus the category of "nuisance" events (events which were filed under this category). The results of this study are shown at Figure 4.17.

Figure 4.17
TCAS Events



TCAS events continued to show a decrease in the number of reported events. As previously, the number of TCAS events was analysed against the total number of events and presented as a percentage to give the best approximation to normalisation.

The continuing decrease in Nuisance reports reported in the 2001 Safety Report continued into the first quarter of 2002, however, this decrease showed an unexpected rise in the second quarter of 2002 although the percentage of events in the Climb, Cruise and Descent phases of flight remained fairly stable. This rise stabilised during the remainder of 2002, and the increase is attributed to the introduction of RVSM in European Airspace during the first quarter of 2002. Subsequent discussions with Eurocontrol have indicated that the number of TCAS events, particularly in Nuisance events, was more than double what Eurocontrol was expecting. This may be due to many smaller aircraft in the European environment not being equipped for RVSM.

FUEL MANAGEMENT

There were 2 accidents related to fuel management. Amongst the incidents reviewed by STEADES the major trend observed during 2002 appears to be concentrated on ground refuelling errors and a succession of fuel problems relating to flight planning errors.

4.4.19 OTHER SAFETY ISSUES

Thus the analysis of the accidents and incidents of 2002 is nearing completion. There were, however, other safety issues which surfaced during the CWG discussions and these are addressed below.

"UNACCOMMODATED" AIRLINE FLEET GROWTH

There is evidence in more than one accident in 2002, and a number of others over the past decade, where airline expansion plans, often opportunistic in nature, appear to have overtaken the ability of the airline to put in place competent pilots and the right equipment to operate safely. Suddenly, for example, 6 B747s are available at the best price which must be put into service rapidly. This sort of concern was expressed by the CWG in the context of the accidents under review but on further reflection any airline that is in transition, not simply expanding, but merging, and downsizing is potentially more vulnerable. Change makes any organisation more vulnerable and aviation is no exception. If overload leading to accidents is to be contained, the operational managers of this world must wrestle daily with the challenge of matching task and resources. As highlighted in Chapter 2, the history of accidents points to the need for this vital equation of safety to be kept in balance. Maintaining safety is a continuous struggle, whether the airline grows or shrinks. Airline people must learn to manage all this change safely and an effective safety management system help to do this.

But today's big threat to aviation safety in these financially troublesome times is the need to reduce ("downsize") operations. Downsizing and the inevitable restructuring is sometimes managed by those who have little or no knowledge of airline safety. To help manage change effectively, therefore, safety people must come out of their shell and challenge airline economics, show that the Safety Management System is just as vital as the Financial Management System, speak the language of business efficiency, and show that safety makes good business sense. Accidents can bring airlines down. Effective safety management means good operational efficiency and high standards of quality — an excellent cocktail for survival. Above all, experienced, knowledgeable, and fearless safety managers will be the CEO's best ally and friend of the airline as a whole — not just in times of change, but always!

It is recommended that:

36. *IOSA and OQS to be developed to assess the risk not only of "unaccommodated" airline fleet growth but also the management of task and resources during times of change.*

ACCIDENT PREVENTION

Amidst the many Safety Managers of the world with the above qualities it is appropriate to single out the thoughtful work of Captain Bertrand de Courville who serves on the IATA Safety Committee and the Classification Working Group. He rightly points out that making safety trends and events visible, understandable and usable are the main challenges for any safety management system. In his paper on this topic, Captain de Courville focusses on the importance of identifying precursors. He cites, for example, that Runway Incursion and Confusion are the precursors of Runway Collision: Altitude

Deviations and TCAS RAs are precursors to Midair collisions: Nonstabilized Approaches are the precursors of a CFIT accident: and deviations from Standards Procedures are the precursors of all accidents.

Some accidents are clearly “more unacceptable” than others: Controlled Flight into Terrain, Midair Collisions, Runway collisions and Loss of Control in flight are such accidents. They represent a high probability of a total loss of an aircraft and its occupants. Primarily focusing on these accident families and using them as reference gives clear objectives and helps to structure a safety programme. By referring to these accidents, safety managers can orientate data mining and more clearly identify the precursers. Provided the safety manager is able to analyse them correctly they are valuable opportunities for evaluating “defences” (procedures, checklists, equipment) in real situations. **The process for achieving this precurser approach to accident prevention is set out in Captain de Courville’s paper which appeared in the ICAO Journal Issue Number 1, 2003 and is included in the enclosed CD-ROM.** It will be apparent that the precurser approach is one which has been taken in Chapters 3 and 4 of this safety report when addressing the 2002 Safety Priorites.

The CWG agreed that IATA SAC participants should be encouraged in future to brief the forum in terms of accident pre-cursors. This is entirely compatible with the Threat and Error Management approach described earlier in this report.

<u>It is recommended that</u>:

37. *Participants in the SAC Incident Review Meeting be invited to brief the forum in terms of Accident precursers.*

SAFETY AND SECURITY

The events of September 11, 2001 remain very much in the mind of the aviation industry and society as a whole. In the eyes of the Public, the Media and Politicians, Safety and Security have now become indistinguishable and some of the consequences must be mentioned in this IATA Safety Report. The 2001 Safety Report carried a strong message to the aviation industry to maintain and improve safety in these financially troubled times following the September 11th. The message remains pertinent as the industry faces renewed economic turmoil and is therefore repeated in Annex 1.

IATA has achieved much during 2002 in the aviation security arena. The publication of the new IATA Security Manual reflects these advances. The document sets out the IATA Security Policies and provides guidance and reference material to assist airlines in upgrading their security and how to better manage the risks and threat to aviation.

As one of its immediate initiatives following the September 11th crisis, IATA established the **Global Aviation Security Action Group (GASAG),** to co-ordinate the global aviation industry’s inputs to achieve an effective world-wide security system and to ensure public confidence in civil aviation. Its members are IATA, Airline Regional Associations, International Air Carriers Association (IACA), Airports Council International (ACI), the International Federation of Airline Pilots Associations (IFALPA), International Transport Workers Federation (ITF) and Airbus, with Boeing, the International Civil Aviation Organisation (ICAO) and INTERPOL participating and providing input as observers.

The GASAG developed Positions on a variety of security topics have now been adopted as IATA Positions and are shown in Annex 2 to this Safety Report.

It should be noted that these positions are being continually updated by ongoing industry activity. The latest version may be obtained on request to the IATA Safety or Security Departments.

There are two areas of particular development since the GASAG paper was published last year. The first is concerned with the operational deployment of in-flight Security Personnel (Sky Marshals). Attachment A to the GASAG paper covers the operational protocols, mission, responsibilities, costs, authority, legal status and liability, personnel, flight selection, flight booking and seating, funding, deployment and logistics, and weapons. The second is in relation to cockpit doors.

CABIN SAFETY

The events of September 11th have had a great impact on Safety and Security in the cabin. A report on the work of the Cabin Safety Working Group is included at Annex 7 but in particular the issue of a new In-Flight Management Manual has helped significantly to propagate best practice in handling disruptive passengers and addressing the new locked cockpit door procedures.

REINFORCED FLIGHT DECK DOORS

As far as cockpit access is concerned IATA (and the GASAG) recommends that the cockpit door should be locked at all times as far as practicable. Whenever the door is locked proper communication procedures between the cockpit and the cabin must be established. Moreover, IATA (and the GASAG) supports the implementation of advanced cockpit door technology capable of securing the flight crew against attack and in the longer term, taking into account all practical problems, the installation of a surveillance system to allow the flight crew to monitor the entrance to the cockpit.

IATA supports the installation of reinforced cockpit doors and the FAA & JAA Door Security programme. Our member airlines have undertaken major efforts to meet the 9 April 2003 deadline although it is doubtful whether airline fleets will meet this deadline. For Cargo aircraft, IATA supports procedural changes as an alternative means to cockpit doors. **A PowerPoint Presentation providing more information on the Reinforced Flight Deck Door Status is provided on the enclosed CD-ROM.**

Wishing you Safe and Secure flying

4.5 CHAPTER 4 SUMMARY

- Amongst the Western-built fleet Technical (Engineering related) factors continue to be at least partly responsible for about a third of accidents. There is a range of specific airworthiness issues noted.
- Weather contributed to 22 accidents and when combined with Proficiency and Skill failure led to 16 accidents in the Western-built fleet.
- In about half of the 62 accidents involving Western-built aircraft organisational inadequacy was identified as a contributory factor.
- Skill failures have contributed to 26 of 62 Western-built Jet and Turboprop accidents of which 81% of the skill failures are associated with approach and landing accidents. A considerable range of training related issues noted. Threat and Error management training is proposed as a useful tool.
- The greatest number of fatal accidents, fatalities and hull losses result from accidents during approach but there were no fatal landing accidents.
- For the Western-built fleets there were 7 runway excursions and 8 accidents involving landing gear failure. The persistently high number of runway excursions during the past four years remains disturbing.
- The lack of experience amongst line pilots in-performing circling approaches is a concern.
- None of the aircraft involved in the 15 CFIT accidents of 2002 had Enhanced GPWS installed. The CWG believes that these accidents would have been prevented had these aircraft been fitted with EGPWS.
- Those airlines that have not adopted the CFIT/ALAR toolkit should do so as a matter of urgency.
- Need for pilots to regard TCAS RAs as real and to follow them promptly and accurately.
- ATC intervention with the prevention of accidents is regarded as a useful “safety net” enhancement.
- “Unaccommodated” airline fleet growth is a safety concern but regarded as part of the wider issue of matching task and resources and the management of change.
- An airline Safety Management System (SMS) must embrace a method for sharing safety data amongst operators and manufacturers, especially with regard to aircraft and equipment design.
- A safety incident reporting culture and the CEO’s role for safety accountability are vital components of that SMS.
- There is a need to exercise adequate safety oversight of contractors and other third parties involved in airline operations.
- There is particular concern about damage to aircraft caused by servicing vehicles and airside safety in general.
- Although no accident resulted from a runway incursion during 2002 a review of the near-miss incidents show that this threat remains very significant.
- To prevent accidents it is vital to focus on the precursers to accidents, rather in the way that the Safety Report 2002 has done.
- The Safety and Security message presented by IATA in the wake of September 11th remains highly pertinent both in terms of maintaining the safety focus while responding to vital operational security and cabin safety imperatives.

CHAPTER 5 — CONCLUSION AND RECOMMENDATIONS

CONCLUSIONS

Following its Introduction at Chapter 1 where IATA's safety programme is described, this report at Chapter 2 has taken a Historical Safety Overview, followed by Chapter 3 focussed on 2002, leading to a detailed Accident Analysis of 2002 in Chapter 4. Each Chapter of this Safety Report 2002 contains summary sections.

The report has exposed the full array of safety statistics, hazards, threats and concerns identified by IATA's Classification Working Group, the Human Factors Working Group, and the Safety Committee. Rather than confine itself to 2002, the report has looked back into history and across to the work of other safety organisations in an effort to benchmark aviation safety today. The result will rightly be challenged but that too is part of this Safety Report's process. At least the voice of experienced safety professionals will have been heard. With the publication of this report IATA updates the direction it is taking in safety. That direction has been honed by previous safety reports and already the message of Safety Report 2002 has been endorsed by IATA's Safety Committee and the Operations Committee.

In 2003 IATA aims to:

- Gain international recognition amongst airlines and regulatory authorities for the IATA Operational Safety Audits (IOSA) as a substitute for existing airline Alliance and Code-share safety audit programmes;
- Launch IOSA;
- Lead the IATA Multidivisional Safety Task Force (MSTF) to co-ordinate and integrate all corporate safety activities for the benefit of the industry and to help establish an IATA safety culture;
- Develop leadership programmes for the areas identified by MSTF;
- Establish IATA's Safety Management Support System, with STEADES as the core data analysis system, to implement Safety Strategy 2000+;
- Launch a Safety initiative in Africa together with SO&I regional office and other partners.

These objectives represent a great challenge for all of the people of IATA and to this end we look forward to working together with our colleagues in the airlines and our other partners.

RECOMMENDATIONS

The Recommendations of Safety Report 2002 are set out below. 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 the Supporting Documents Section of enclosed CD-ROM.

For the year 2002 it is recommended that:

IATA Regional Safety Initiatives

1. *IATA press regulators harder for improvements in safety regulation, compliance, and infrastructure in Africa and South America at the same time seeking ways of improving co-operation and support.*
2. *IATA expand the role of Regional Directors to include safety data capture, trend verification, and contributing factor comprehension.*
3. *IATA ATDI (Training Institute) to explore ways of improving operational training in Africa.*
4. *IATA continue ongoing expansion and support for these Regional Safety initiatives, in particular by launching a safety initiative in Africa together with the IATA regional office and other partners.*

Cargo Operations

5. *IATA undertake the task of establishing common standards for aircraft loading for adoption by manufacturers, airlines, and ground services providers.*
6. *IATA focus more on cargo operations, expanding from its existing strong Dangerous Goods and Airport Safety platform, with a view to providing better support in terms of best practice and procedures documentation, incident reporting/data analysis (STEADES), and airline auditing standards (IOSA).*

Ferry Flights

7. *IATA Flight Operations Committee reviews the standards and best practice for operation of ferry flights.*

Approach and Landing (ALA) Accidents

8. *In view of the clear message coming from this 2002 ALA analysis, that the approach and landing phases of flight present the highest threat, airlines are urged to incorporate the CFIT/ALAR Toolkit in their training programmes.*
9. *As both Airbus and Boeing have distributed training videos/CD-ROMs during 2002 covering various aspects of approach and landing technique, operators should obtain and incorporate this training material to improve crew proficiency.*
10. *IATA campaigns to highlight the value of the Video NZ60 which addresses the CFIT/ALAR hazard of erroneous glideslope indications and the Flight Safety Bulletin on the same subject.*

Go-around

11. *IATA campaigns for the adoption of a retribution free Go-around policy amongst its airlines, documenting that policy in the TOPM. Part of this policy should include guidelines to crews on the importance of conducting self-debriefs in regard to threats and errors that may have led to the Go-around. The policy should also set recurrent training requirements which encourage the desired Go-around behaviour.*

Controlled Flight Into Terrain (CFIT)

12. *IATA should monitor industry compliance with EGPWS installation and campaign for all IATA aircraft to be upgraded at the earliest opportunity.*
13. *IATA arrange for IOSA to include specific confirmation that the CFIT/ALAR Toolkit has been adopted and implemented by airline training programmes.*
14. *IATA pursue with Jeppesen the need for side profile of terrain to be shown on approach charts and holding information to be entered in larger print.*

Air Traffic Control

15. *IATA ATC WG to address the following ATC issues and report back to SAC;*
    - *Use of English By Ground Emergency Services.*
    - *Guidelines to ATC controllers for dealing with aircraft in distress (UKFSC Document).*
    - *ATC Human Factors issues in light of the midair collision threat.*
    - *Reporting of runway condition (e.g. blocked storm drains). Ground controller intervention — ditch between aircraft and marshaller — no edge lighting — trap scenario. IATA to pursue runway condition reporting with ICAO.*
    - *Cockpit workload — impact of late runway changes for take-off and landing and the “both pilots head down threat” while taxiing, perhaps caused by late runway change.*
    - *TCAS — Commend Eurocontrol TCAS leaflet entitled “Follow the RA”.*
    - *Birds are getting heavier.*
    - *Harmonisation of Fire frequency on a world-wide basis in English.*
    - *IATA to take note of findings of ISASI ATS Working Group.*
    - *ATC (Eurocontrol or IFATCA) representative should be invited to attend the CWG.*

16. *IATA, through Eurocontrol and other ATC authorities, seek active participation of ATC groups and associations at local level with a view to bringing ATC more into the operating loop. Airline/ Airport ATC Authority safety meetings.*
17. *IATA promote UK Flight Safety Committee "Guidelines to ATC Controllers".*

Landing

18. *IATA campaign the use of flight data monitoring to detect those pilots who have a tendency to employ a hard nose wheel touchdown or a nose wheel first touchdown.*
19. *IATA campaign the hazards of compressive stress imparted to the landing gear associated with braking and turning the aircraft at high speed after landing and the tortional stress arising from slow tight turns during taxi.*

Loss of Control

20. *IATA STEADES continue to conduct research into the Flight Management (aircraft handling) and Flight Control incidents database to assist with minimising the Loss of Control threat.*

Human Factors and Mid-Air Collision Avoidance

21. *IATA campaigns for its pilots to regard TCAS RAs as real and follow them promptly and accurately This account in the Safety Report 2002 is regarded as the beginning of that campaign.*
22. *IATA investigate the feasibility of an ATC version of IOSA.*

Training

23. *IATA FOC and its working groups should address the following flying training proficiency, skill, and procedural related safety hazards/threats:*
    - *An inadequate or no response by flight crew to warning systems such as TCAS and GPWS. Greater exposure to these and other warnings such as configuration/take-off warning horns is necessary.*
    - *A lack of awareness among pilots of approach constraints and the possible consequences. Poor judgement in the holding pattern and a lack of experience of the decision making process continue to be apparent.*
    - *Training overload in an operational context where an artificially high workload is imposed within the flightdeck to the potential exclusion of vital procedures or actions. An actual operation must not be turned into a simulator session. On Training flights, emphasis must be on safety of flight, not on instructional value. Departure and Arrival are not good times for training instruction and so called "20 questions".*
    - *Inappropriate aircraft handling techniques in abnormal or demanding environmental conditions particularly with regard to weather cell penetration. "There is weather out there in which we should not be flying".*
    - *Many operators of modern aircraft now emphasise systems management and automation which is a potential threat to the maintenance of basic handling skills. A lack of systems status awareness is still a concern as is the a lack of exposure amongst pilots to flying autopilot in basic modes when needed in unusual situations.*
    - *Incestuous, authoritarian, ex-military culture is still apparent on some flight decks.*
    - *While some flight control failures will be beyond the capability of pilots most are not if properly handled. As already indicated under the Loss of Control paragraph, trim runaways, for example, should in most circumstances be manageable.*
    - *A psychological reluctance by flight crews to declare an emergency, possibly through fear of complicating the situation. Better threat assessment is needed.*
24. *IATA campaign the need for cockpit crews to be more comprehensively exposed in training to all the difference warning systems in the cockpit.*
25. *IATA promote and implement Threat and Error Management training*
26. *IATA ATDI (Training Institute) to promote safety training more actively in IATA; in particular, exploring the need for enhancement of its operational safety training in light of the proficiency and skill related concerns identified in the 2001 and 2002 Safety Reports.*

Engineering and Maintenance

27. *IATA follow-up on the following range of airworthiness concerns through its Maintenance WG:*
    - *Maintenance reporting and control of circuit breaker disablement is suspect.*
    - *There is evidence from at least four accidents of poor serviceability of Digital Flight Data Recorders and Cockpit Voice Recorders.*
    - *Failure of back-up systems when called upon e.g alternate landing gear deployment system*
    - *Electrical wiring repair techniques and adequacy of crimped connections*
    - *Review trim runaway occurrences and landing gear incidents using STEADES*
    - *Possible design "trap" exists with some Turboprop aircraft through the ability to select "ground fine (pitch)" in the air*
    - *Management of post inspection requirements following structural repairs to aircraft. Tailstrikes of the past may lead to structural failure type accidents in the future.*

Meteorology

28. *The IATA METWG pursue its support for the development of technological advances to provide flight crews with timely weather information.*
29. *In light of questionable aircraft handling methods and judgement noted by pilots encountering abnormal or demanding weather conditions, IATA to campaign the issue that "there is weather out there in which you should not be flying".*

Safety Incident Reporting Culture

30. *IATA maintain emphasis on the promotion of just, non-jeopardy, air and ground safety reporting and investigation systems calling for such reporting to be an essential part of an airline Safety Management System*

CEO's Role for Safety Accountability

31. *IATA calls for final input from airlines on the IATA paper included on the CD-ROM addressing the topic "A CEO's Responsibility For Safety".*

Safety Management Systems

32. *To counter the lack of quality oversight in airlines IATA should encourage Regulators to mandate the implementation of a Safety Management System with a fully documented exposition of the processes used by that system.*
33. *To support this initiative IATA should publish a pamphlet in which the best practice in Safety Management Systems can be communicated to airlines.*
34. *The key issue of Safety Practices of Contractors, sub-contractors and other Third Parties should be addressed in the SMS Safety Pamphlet and the new IATA Safety Manual.*

Runway Incursions

35. *IATA campaigns for operators to ensure that their Standard Operating Procedures adopt a "situational awareness" approach to manoeuvring between ramp and runway similar to that for the actual Flight phase.*

"Unaccommodated" Airline Fleet Growth

36. *IOSA and OQS to be developed to assess the risk not only of "unaccommodated" airline fleet growth but also the management of task and resources during times of change.*

Accident Prevention

37. *Participants in the SAC Incident Review Meeting be invited to brief the forum in terms of Accident precursers.*

ANNEX 1

THE POST SEPTEMBER 11th SAFETY & SECURITY MESSAGE

The events of September 11, 2001 remain very much in the mind of the aviation industry and society as a whole. In the eyes of the Public, the Media and Politicians, Safety and Security have now become indistinguishable and some of the consequences must be mentioned in this IATA Safety Report. The 2001 Safety Report carried a strong message to the aviation industry to maintain and improve safety in these financially troubled times following the September 11th.

If safety and security vigilance is relaxed, flight operations and the whole of the support infrastructure will become immediately vulnerable. Therefore it is imperative that we resist the natural temptation to diminish our safety vigilance, whilst addressing these other pressing priorities associated with Security. Nor should we expand security resources at the expense of safety resources. Both IATA, including the SAC and CWG, and the Flight Safety Foundation are concerned that fundamental and established safety processes are not sacrificed due to short-term imperatives. The ultimate challenge for the aviation industry is to maintain, let alone improve, safety in these financially troubled times, aggravated by low employee morale. To this end, the following comments are offered as guidance material and food for further thought:

- Senior Managers, throughout the aviation industry, must maintain and display courage and leadership as Safety advocates. It must not be assumed that we are safe enough. Emotion should be managed with facts, reason and sound logic. Remember that the safety priorities from September 11, 2001 are still present.
- Recognise that aviation is at greater risk, in present circumstances and therefore needs extra vigilance. The aviation industry has a responsibility to the Public to at least maintain and strive to improve upon current safety levels, regardless of other distractions.
- Safety is an investment in current and future prosperity for the aviation industry. Safety activities should not be seen as just another discretionary cost. Safety generates long-term efficiencies and will enhance public confidence.
- Present circumstances will magnify the impact of any accident upon the aviation industry. Experience shows that austere times generate additional risks. Any significant change process also increases risk. Therefore the industry cannot afford to defer, delay or stop Safety Management Processes at such times.
- Established Safety, Quality, and Risk Management principles and practices should be applied to Security. However, this objective will not be achieved easily. Changing an established security culture, attitudes and behaviours will need a concerted effort and take time before a new and more effective culture becomes established.
- The present operating environment places new responsibilities upon airline Managements and Governments to deliver and sustain safe and secure operations. Safety is the Operator's responsibility. Security is a Government responsibility. The security threat to airlines is but one of many means whereby States may be threatened. Security is of equal interest to the non-flying population as passengers and crewmembers. Governments, not airlines, should therefore shoulder the responsibility for funding the provision of aviation security. Comprehensive and harmonised Security Standards for civil operations, which meet or exceed ICAO Annex 17, must be implemented world wide.

The IATA Mission is to "represent and serve the airline industry", with Safety and Security as top corporate priorities. The Safety Strategy 2000+ Goal is to "Lead the global airline efforts to achieve a continuous improvement in safety". In accordance with this Mission and Goal, IATA established the Global Aviation Security Action Group (GASAG), to co-ordinate the global aviation industry's inputs to achieve an effective world-wide security system and to ensure public confidence in civil aviation. **The GASAG developed Positions on a variety of security topics have now been adopted as IATA Positions and are shown at Annex 2 to this Safety Report.**

ANNEX 2

GLOBAL AVIATION SECURITY ACTION GROUP (GASAG) INDUSTRY POSITIONS ON SECURITY ISSUES

GENERAL

RESPONSIBILITY FOR AVIATION SECURITY AND ITS FUNDING

GASAG believes that governments have direct responsibility for aviation security and its funding. This responsibility includes the protection of its citizens (in the air and on the ground) as the security threat against airlines is a manifestation of the threat against the State. The provision and cost of aviation security should be borne by the State from general revenues and not from taxes and user fees.

Harmonization of Aviation Security Standards

GASAG believes that States must work together in a co-operative manner, with input from the industry, to ensure the harmonized implementation of globally recognized standards based on ICAO Annex 17 — Security.

AIRPORT/BASELINE SECURITY

Ground Security

GASAG supports development of effective, efficient and operationally manageable ground security measures which meet or exceed the provisions of ICAO Annex 17, to be applied using a globally agreed Risk Management Matrix, on the basis of the level of risk as assessed by the appropriate national authority.

Enhanced Access Control to Airport Restricted Areas

GASAG supports the establishment and effective maintenance of a restricted zone at the airport including the development of effective, economical, enhanced perimeter security and access control systems that combine identification media with personal information.

Background Checks for Persons Having Unescorted Access to Airport Restricted Areas

GASAG supports increasing the stringency of background checks and recurring checks on existing employees, in accordance with national legislation, undertaken on persons seeking unescorted access to airport restricted areas. GASAG believes that governments must be responsible for undertaking and funding such checks.

New Technologies

GASAG believes that governments and industry should jointly consider the role of technology including biometrics, based on globally harmonized standards, to address the new security threats to civil aviation.

People identification requirements of various government agencies must be co-ordinated and based on a globally accepted standard using biometrics.

Passenger and Baggage Security Controls

GASAG supports the development of long term solutions to screen and reconcile passengers and their checked baggage through effective application of new technology and procedures, which do not impede the flow of traffic.

GASAG believes that governments must combine resources in a co-operative manner to share information and research and development costs for explosive detection technology and other technologies to enhance the current systems of screening passengers and baggage.

GASAG believes that airports, airlines and regulatory authorities should jointly develop measures that would improve the flow of passengers and their hand baggage through security checkpoints.

Cargo, Courier, Express Parcels and Mail Security Controls

GASAG believes that governments must combine resources in a co-operative manner to share information and research and develop harmonized measures to ensure the safe and secure carriage of cargo, courier, express parcels and mail world-wide without impeding the flow of traffic.

Risk Assessment

GASAG supports:

- Carefully defined individual passenger assessments, based on internationally accepted standards as incorporated into national legislation, as an element of risk analysis, to facilitate the identification of individuals who may pose a threat to safety and security of civil aviation.
- The development of programs designed to facilitate the movement of passengers who, through appropriate risk assessment, are deemed to pose no risk to safety and security and thus permit more effective targeting of resources. These programs must be designed in such a way that under normal circumstances, no more than 10 % of passengers are selected for additional enhanced security screening.
- Systems that are effectively designed in order to avoid the need for additional random checks of passengers.
- Carefully defined cargo assessments, using regulated agent/known shipper programs, based on internationally accepted standards as incorporated into national legislation, as an element of risk analysis, to facilitate the movement of cargo which does not pose a threat to safety and security of civil aviation.
- The exchange of relevant information between appropriate organizations to assist in performing passenger and cargo risk assessments to facilitate the movement of known passengers and cargo globally.

AIRCRAFT SECURITY & FLIGHT PROCEDURES

In-flight Security Personnel (Sky Marshals)

GASAG believes that acts of unlawful interference should be prevented on the ground. However, where the State mandates the use of armed in-flight security personnel, they should be provided by the State which must have responsibility for funding (including payment for travel), selection, training and tasking of such personnel. The selection, qualifications, training and control of in-flight security personnel must be of the highest standard. (See ***Attachment A*** for further details).

Transponders

GASAG is in support of any measures which serve to enhance the identification and tracking of aircraft in the event of unlawful interference.

Cockpit Access

GASAG recommends that the cockpit door should be locked at all times as far as practicable. Whenever the door is locked proper communication procedures between the cockpit and the cabin must be established.

Enhanced Flight Deck Security Options

GASAG supports:

- The implementation of advanced cockpit door technology capable of securing the flight crew against attack.
- In the longer term, taking into account all practical problems, the installation of a surveillance system to allow the flight crew to monitor the entrance to the cockpit.

Crew Procedures/Training

GASAG considers that there is an urgent need for a comprehensive review, by government and industry, of policies, procedures and training including non-lethal self-defence training, to address any on board disturbance especially in regard to the new threat of using an aircraft as a weapon.

Weaponry and Training

GASAG opposes arming flight crews and flight attendants with lethal weapons or requiring them to undergo training in the use of lethal force.

Protective Devices for Use by the Crew

GASAG believes that the potential measure of having non-lethal protective devices in the cabin area for use in emergencies (e.g. pepper spray, stun guns, etc.) should be further assessed in close consultation with the crew representatives.

Firearms and Other Weapons

GASAG is opposed to the carriage of ammunition, firearms and other weapons in aircraft, except as authorised.

Defensive Flight Manoeuvres and Depressurisation

GASAG supports research into the trained use of defensive flight manoeuvres only as a means of last resort to prevent the use of an aircraft as a weapon.

Need for Government Legislation to Deal with Unruly Passengers

GASAG urges governments to establish internationally co-ordinated legislation enabling the arrest and prosecution of unruly passengers as outlined in ICAO's document "Guidance Material on the Legal Aspects of Unruly/Disruptive Passengers".

Transportation of Deportees and Inadmissible Passengers

GASAG urges that in order to further minimize risks, governments must recognize their responsibility in co-ordinating their policies and regulations regarding deportees and inadmissibles transported on commercial airlines.

Improved Air/Ground Communications

GASAG believes that new means of improved air/ground communications, including a secure transponder, need to be further studied.

Security Prohibited Items

GASAG supports the development and implementation by appropriate parties of a standard list of items prohibited for carriage on board the aircraft.

Management of Response To Acts of Unlawful Interference

GASAG supports the strict implementation of ICAO Annex 17 Standards which require the appropriate authority to make every effort to prevent a hijacked aircraft from departing an airport unless the safety of the passengers or crew is at risk.

Man Portable Air Defence Systems (MANPADS) — Threat To Civil Aviation

GASAG considers that States have the responsibility for protection of the civil aircraft operating in or through airspace over the territory of that State. This includes protection against attack by MANPADS on civil aircraft operating at vulnerable altitudes, particularly during the Take-off and landing phases at airports in that State. When any State considers that there is a MANPADS threat to civil aircraft, when operating to or from another State, intelligence on the threat should be shared with the State where threat is considered to exist.

Following assessment of the threat, if there is a risk of MANPADS attack, countermeasures should be introduced to minimise the risk, in consultation with the State of registration of airlines as appropriate, as well as the airlines and airport(s) concerned. All States should have MANPADS threat response plans and these should include assignment of resources to implement these plans immediately, when a credible threat has been identified.

All airports and airlines should be advised of the existence of a MANPADS threat and the countermeasures initiated, so that they may take this risk into consideration in their operations including, in the case of airlines, the viability of continued operations to and from a particular airport.

Global Aviation Security Action Group (GASAG) — Attachment A

OPERATIONAL DEPLOYMENT OF IN-FLIGHT SECURITY PERSONNEL (SKY MARSHALS)

INTRODUCTION

1. The Aviation Industry has adopted several positions relevant to the operational deployment of In Flight Security Personnel (IFSP). The Global Aviation Security Action Group (GASAG) agreed the following:

   a) **Responsibility for Aviation Security and its Funding**

   GASAG believes that governments have direct responsibility for aviation security and its funding. This responsibility includes the protection of its citizens (in the air and on the ground). As the security threat against airlines is a manifestation of the threat against the State, the provision and cost of aviation security should be borne by the State from general revenues and not from taxes and user fees.

   b) **In-flight Security Personnel**

   GASAG believes that acts of unlawful interference should be prevented on the ground. However, where the State mandates the use of armed in-flight security personnel, they should be provided by the State which must have responsibility for funding (including payment for travel), selection, training and tasking of such personnel. The selection, qualifications, training and control of in-flight security personnel must be of the highest standard.

OPERATIONAL PROTOCOL

2. The GASAG agreed that a protocol should be drawn up for the principles and conditions to be applied to the operational deployment of IFSP. The protocol is intended to assist airlines to establish these conditions for the deployment of IFSP with their State of registration and operation as appropriate if their use is mandated by the State.
3. Use has been made of the experience gained by a number of airlines who have had IFSP introduced since the 11 September catastrophe in USA, as well as background knowledge from a number of airlines who have carried IFSP for many years.
4. The GASAG protocol for guidance to airlines for the deployment of armed IFSP is as follows:

1. MISSION

When In-Flight Security Personnel (IFSP) are deployed they must be able to prevent unlawful interference against civil aviation in general and against the specific carrier in particular.

2. RESPONSIBILITIES AND COSTS

The threat against airlines is a manifestation of the threat against the State. Governments have direct responsibility for aviation security which includes responsibility for the protection of its citizens in the air and on the ground.

The provision and cost of aviation security should be borne by the State from general revenues and not from taxes and user fees. This includes all aspects of funding the deployment of IFSP.

3. AUTHORITY, LEGAL STATUS AND LIABILITY

3.1 National Law

The legal status and authority of IFSP must be incorporated into a national law. Command and control responsibility must be clearly defined as well as relationships between IFSP, the Aircraft Commander, airports and airlines.

3.2 National Aviation Security Programme (NASP)

When a State mandates the use of IFSP specific reference must be included in the NASP, as well as support requirements from airports and airlines. These should be incorporated into relevant Airport and Airline Aviation Security Programmes.

3.3 Liability

Governments must accept liability for any action by IFSP, whether or not the safety and security of aircraft passengers and crew are involved. This will include the consequences of IFSP intervention to deal with any act of unlawful interference as well as any other situation involving IFSP when deployed.

4. PERSONNEL

4.1 Selection

Selection of IFSP is a State-responsibility according to a standard agreed between the State and the air carrier. Such standards include background checks, age limits, physical fitness, health, language and weapon handling.

4.2 Duties

IFSP are responsible for the protection of aircraft, passengers and crew against unlawful interference.

4.3 Training

IFSP should be trained in conflict resolution, using minimum force. If the use of weapons is necessary, IFSP should be trained to avoid risk to passengers, crew and aircraft. Training must also include airline specific issues including safety and emergency procedures. Refresher Training should be conducted on a regular basis to original training qualification standards. The State authorities must accept responsibility for ensuring that only dedicated and qualified IFSP are deployed on operational duty.

Any IFSP that is found not to meet the required standards must be withdrawn from service until such time as they are able to demonstrate that they meet the required standards.

4.4 Assignment

When allocated to full time in-flight security, the IFSP duty period should not exceed two months and should be separated by a two week rest and retraining period.

4.5 Command

When deployed on board an aircraft, IFSP are subordinate to the Aircraft Commander.

5. FLIGHT SELECTION

5.1 Threat Assessment

The assessment of threat in relation to the deployment of IFSP should be undertaken jointly between the appropriate authority and the airline concerned. This will recognise the knowledge and experience of the airline operating from the station/State concerned and will take into account the vulnerability of the operation and the risk involved.

5.2 Flight Selection

The selection of flights for the deployment of IFSP, which should be on a random basis, absent specific threat information, should be undertaken jointly by the appropriate authority and the airline concerned.

6. FLIGHT BOOKING AND SEATING

6.1 Travel Notification

To allow airline yield management to minimize potential revenue losses and avoid offloading of booked passengers, the airline and the Appropriate Authority must agree a schedule of booking times and notification for flights designated for IFSP deployment. This should not normally be less than 30 days for Scheduled flights and 60 days for Charter flights.

6.2 Seating

Seat allocation for IFSP must take account of a number of factors relating to their duties. These include aircraft type, seating configuration, cockpit door protection, communication between IFSP and communication with the Aircraft Commander.

7. FUNDING

7.1 Seat Costs

These costs must be borne by the State, including all government and airport taxes and charges. The Government must also pay for all cancelled operational deployments where the IFSP allocated seats cannot be sold, subject to a period to be agreed between the State and the airline, e.g. cancelled less than 30 days from the proposed deployment.

7.2 Denied Boarding Charges

If a booked revenue passenger has to be offloaded to accommodate IFSP who have been booked late, the State should meet the related denied boarding charges.

7.3 Route Costs

All costs associated with the operational deployment, in addition to seat costs, must be met by the State. This will include all hotel and transportation costs whether or not they are provided by the airline.

7.4 Support Equipment Costs

All costs associated with the purchase and/or installation of any support equipment, must be met by the State.

8. DEPLOYMENT AND LOGISTICS

8.1 Briefing with Flight Crew

The Aircraft Commander must be informed of the presence of IFSP and the IFSP team leader must identify himself and his seat position to the Aircraft Commander. It is up to the airline, in consultation with the Appropriate Authority, to determine whether all flight crew members should be briefed and to what extent. In those cases where all flight crew are briefed, additional training and procedures may be required to ensure that IFSP remain anonymous at all time including during an incident. The IFSP operational concept should take account of communications with the Aircraft Commander and between IFSP team members, as well as ground transportation and hotel accommodation. The IFSP team leader must brief the Aircraft Commander on these prior to push-back and include operational concept issues concerning the carriage of weapons by IFSP team members and incident response.

8.2 Notification of Other Armed Personnel

The same briefing procedure must be applied in regards to any other armed personnel on board the aircraft. It must, however, be left to the State concerned whether the IFSP is to be identified to the other armed personnel as an IFSP or whether their identity as an IFSP is kept confidential. In either case their seat location and the fact that they are armed must be briefed as indicated above.

9. WEAPONS

9.1 Compliance

Airlines should ensure that their State authorities are in compliance with ICAO Annex 17 (Amendment 10) para 4.6.5, which states:

Each Contracting State shall consider requests by any other State to allow the travel of armed personnel on board aircraft of operators of the requesting State. Only after agreement by all States involved shall such travel be allowed.

9.2 Handling

The handover, loading and unloading of weapons must not take place in the aircraft, aerobridge or at any time when passengers are present.

9.3 Procedures

Processes for the movement of weapons to and from the aircraft and safe custody arrangements must be developed and agreed between the State and the airline.

ANNEX 3 — SUMMARY OF ACCIDENTS

WESTERN-BUILT JETS

Figure 1

Western-built Jets Hull Losses					
Date 2002	**Aircraft Registration**	**State of Operator**	**IATA Region**	**State of Occurrence**	**IATA Region**
Passenger					
14/01/2002	PK-LID	Indonesia	FE	Indonesia	FE
16/01/2002	PK-GWA	Indonesia	FE	Indonesia	FE
28/01/2002	HC-BLF	Ecuador	SA	Colombia	SA
15/04/2002	B-2552	China	FE	Korea	FE
04/05/2002	5N-ESF	Nigeria	AF	Nigeria	AF
07/05/2002	SU-GBI	Egypt	AF	Tunisia	AF
25/05/2002	B-18255	Taiwan	FE	Taiwan	FE
30/08/2002	PT-MQH	Brazil	SA	Brazil	SA
31/10/2002	XA-AMF	Mexico	SA	Mexico	SA
Cargo					
28/02/2002	N1808E	USA	NA	Singapore	FE
18/03/2002	PP-VLV	Brazil	SA	Brazil	SA
26/04/2002	9Q-CKB	Congo (Zaire)	AF	Congo (Zaire)	AF
01/07/2002	A9C-DHL	Bahrain	NE	Germany	EU
04/07/2002	9XR-IS	Congo (Zaire)	AF	Central African Republic	AF
26/07/2002	N497FE	USA	NA	USA	NA

Figure 2

Western-built Jets Substantial Damage					
Date 2002	**Aircraft Registration**	**State of Operator**	**IATA Region**	**State of Occurrence**	**IATA Region**
Passenger					
06/01/2002	D-ALAH	Germany	EU	Spain	EU
06/01/2002	D-AHLJ	Germany	EU	Spain	EU
13/03/2002	VN-A346	Vietnam	FE	Vietnam	FE
22/05/2002	G-MONC	United Kingdom	EU	Gibraltar	EU
02/06/2002	N849AS	USA	NA	USA	NA
03/06/2002	N8986E	USA	NA	USA	NA
17/06/2002	F-HCAT	France	EU	France	EU
06/07/2002	F-GFKS	France	EU	France	EU
27/07/2002	SX-BLB	Greece	EU	Greece	EU
09/08/2002	F-GLGM	France	EU	Portugal	EU
16/08/2002	B-2521	China	FE	China	FE
28/08/2002	N635AW	USA	NA	USA	NA
30/08/2002	PT-MRL	Brazil	SA	Brazil	SA
14/09/2002	TF-ATH	Spain	EU	Spain	EU
24/10/2002	N681BR	USA	NA	USA	NA
Cargo					
13/12/2002	N1804	USA	NA	Singapore	FE

EASTERN-BUILT JETS

Figure 3

Eastern-built Jet Hull Losses					
DATE	**REG**	**State of Op.**	**IATA Region**	**State of Occ.**	**IATA Region**
12/02/2002	EP-MBS	Iran	NE	Iran	NE
21/04/2002	ES-NOP	Estonia	EU	Indonesia	EU
01/07/2002	RA-85816	Russia	EU	Germany	EU
28/07/2002	RA-86060	Russia	EU	Russia	EU
23/10/2002	RA-86452	Russia	EU	Kyrgyzstan	EU
Eastern-built Jet Substantial Damage					
18/02/2002	EP-LBX	Iran	NE	Iran	NE

Figure 4

Eastern-built Jets, 1993-2003 — Fatal Accidents vs Loss of Life							
Year	**Fatal Accidents**	**Passenger Fatalities**	**Crew Fatalities**	**Passengers On Board**	**Crew On Board**	**% Pax Fatalities**	**% Crew Fatalities**
93	3	304	26	308	26	99	100
94	6	319	35	341	41	94	85
95	3	156	10	240	20	65	50
96	7	179	47	223	53	80	89
97	4	199	23	219	29	91	79
98	3	61	29	79	29	77	100
99	3	68	17	95	21	72	81
2000	1	4	5	4	5	100	100
2001	4	227	36	227	36	100	100
2002	3	165	36	165	37	100	97
Total	**37**	**1682**	**264**	**1901**	**297**	**88**	**89**

WESTERN-BUILT TURBOPROPS

Figure 5

Western-built Turboprop Hull Losses					
DATE	REG	State of Operator	IATA Region	State of Occurrence	IATA Region
Passenger					
17/01/2002	HC-AYM	Ecuador	SA	Ecuador	SA
16/04/2002	ZS-OLE	South Africa	AF	South Africa	AF
15/06/2002	N677SP	Bahamas	SA	USA	NA
10/07/2002	HB-IZY	Switzerland	EU	Germany	EU
17/07/2002	9N-AGF	Nepal	FE	Nepal	FE
22/08/2002	9N-AFR	Nepal	FE	Nepal	FE
30/08/2002	PT-WRQ	Brazil	SA	Brazil	SA
05/09/2002	RP-C2788	Philippines	FE	Philippines	FE
07/09/2002	C6-SAW	Bahamas	SA	Bahamas	SA
29/09/2002	N343AE	USA	NA	USA	NA
02/11/2002	G-ECAT	United Kingdom	EU	Ireland	EU
06/11/2002	LX-LGB	Luxembourg	EU	Luxembourg	EU
11/11/2002	RP-C6888	Philippines	FE	Philippines	FE
06/12/2002	CU-T1110	Cuba	SA	Cuba	SA
Cargo					
14/01/2002	EC-GTJ	Spain	EU	Spain	EU
17/02/2002	9Q-CTS	Congo (Zaire)	AF	Congo (Zaire)	AF
12/04/2002	EC-GKR	Spain	EU	Spain	EU
25/05/2002	PK-YPZ	Indonesia	FE	Indonesia	FE
01/06/2002	ZS-OJU	South Africa	AF	South Africa	AF
03/09/2002	PK-YPQ	Indonesia	FE	Indonesia	FE
14/09/2002	PT-MTS	Brazil	SA	Brazil	SA
21/12/2002	B-22708	Taiwan	FE	Taiwan	FE
24/12/2002	OY-BPH	Denmark	EU	United Kingdom	EU

Figure 6

Western-built Turboprop Substantial Damage					
DATE	**REG**	**State of Operator**	**IATA Region**	**State of Occurrence**	**IATA Region**
Passenger					
12/01/2002	VP-BVE	Colombia	SA	Colombia	SA
02/02/2002	HR-ASR	Honduras	SA	Honduras	SA
09/06/2002	C-FTQR	Canada	NA	Canada	NA
12/06/2002	RP-C5000	Philippines	FE	Philippines	FE
22/06/2002	HS-PGA	Thailand	FE	Thailand	FE
13/08/2002	PT-WGE	Brazil	SA	Brazil	SA
10/10/2002	XA-SJJ	Mexico	SA	Mexico	SA
Cargo					
03/03/2002	C-FITW	Canada	NA	Canada	NA

EASTERN-BUILT TURBOPROPS

Figure 7

Eastern-built Turboprop Hull Losses					
Date	**Registration**	**State of Operator**	**IATA Region**	**State of Occurrence**	**IATA Region**
Passenger					
15/02/2002	RDPL-34118	Laos	FE	Laos	FE
27/02/2002	ST-MGL	Sudan	AF	Sudan	AF
17/03/2002	J2-KBC	Djibouti	AF	Djibouti	AF
17/04/2002	5Y-UAS	Kenya	AF	Kenya	AF
19/04/2002	HK-4171X	Colombia	SA	Colombia	SA
21/05/2002	9Q-CEX	Nigeria	AF	Nigeria	AF
29/08/2002	RA-28932	Russia	EU	Russia	EU
09/11/2002	RA-26012	Russia	EU	Turkey	EU
28/11/2002	5Y-ONT	Kenya	AF	Kenya	AF
23/12/2002	UR-14003	Ukraine	EU	Iran	NE
27/12/2002	9XR-RB	Comoros	AF	Comoros	AF
Cargo					
07/02/2002	UR-LIP	Ukraine	EU	Morocco	AF
15/02/2002	ER-ADL	Moldova	EU	Liberia	AF
02/04/2002	ER-AEQ	Moldova	EU	Angola	AF
26/07/2002	9Q-CMC	Congo (Zaire)	AF	Congo (Zaire)	AF
06/11/2002	4K-AZ21	Azerbaijan	EU	Chad	AF
Substantial Damage					
Passenger					
Cargo					
30/04/2002	ST-AQP	Sudan	AF	Sudan	AF

ANNEX 4

SAFETY UPDATE 2002 — MAJOR REGIONAL SAFETY ISSUES

EUROPE — BRUSSELS

1. **ATS incident data collection for the European region, analysis, identification of safety problems and preparations of yearly incident reports**

   The European office collects and reports the ATC incident data for the European region.

2. **Establishment of the IATA EUR ATM Safety Group**

   EUR RTC/7 meeting agreed to establish IATA ATM Safety Group to deal with the European ATM safety problems.

3. **Establishment of the Operations and Safety Group Moscow-Sheremetyevo airport and visit to Moscow**

   In July 2002, a Moscow-Sheremetyevo/IATA operations and safety group was established. The group deals with the Moscow ATM related operational and safety problems in TMA, APP, TWR and APRON. The group will meet twice a year.

4. **Establishment of the Operations and Safety Group Madrid and visit to Madrid**

   In October 2002 together with the airlines and AENA (Spanish ATS provider), a Madrid Operations and Safety Group was established. This group is dealing with the ATM operations and safety improvements in Madrid ACC/TMA, Approach, Tower and APRON. This group will meet at least twice a year.

5. **Airport safety activities related to CDG, MXP, LIN, FCO, NCE**

   EUR SO&I is in permanent contact with the mentioned airports working together to increase safety and improve operations.

6. **Cooperation with EUROCONTROL on data collection, analysis and use of TOKAI (Tool Kit for ATM Occurrence Investigation)**

   Investigation of a possible interface between EUROCONTROL TOKAI (Tool Kit for ATM Occurrence Investigation) and BASIS (British Airways Safety Information System) is underway. Positive results would enable IATA SO&I Europe to adopt automated ATM incident data collection and analysis and enable airlines, which use BASIS, to submit ATM incident reports directly to the states.

7. **Initiation of closer IATA/EUROCONTROL safety cooperation**

   It is planned to cooperate on the following subjects: ATC incident data exchange, Assessment of the Safety Occurrences in ATM, Technical and Software support for the ATC incident data exchange (TOKAI), Improvement of the taxonomy, Occurrence Severity assessment criteria, Provision and update of the list of safety Regulators and Managers, ACAS, RWY Incursion, Level Bust, CFIT, Dissemination of Lessons learned etc. Depending on the overall safety developments the list will be complemented by additional subjects.

8. **Participation in EUROCONTROL safety activities**

   Through EUROCONTROL, the EUR SO&I office participates and initiates activities related to the improvement of ATM safety in Europe. The main activities are within the Safety Regulation Commission (SRC), the Safety Group (SG), the Safety Improvement Sub Group (SISG), Level Bust workshops, Runway Incursion workshops and the High Level European Action Group for ATM Safety (AGAS).

9. **Participation in GAIN (Global Aviation Information Network) group E**

   Activities related to the ATC controller-pilot collaborative initiatives were done through the GAIN Group E. GAIN is an industry-led international coalition of airlines, manufacturers, governments and other aviation organizations dedicated to promoting the voluntary collection and sharing of safety information among users in the international aviation community.

LATIN AMERICA AND CARIBBEAN (LATAM/CAR) — MIAMI

1. **Promoted regional adoption of STEADES.**

   The LATAM/CAR office continues to make ongoing efforts to promote STEADES to the airlines within the region.

2. **Plans to introduce the Runway Prevention Incursion Program (RIPP) to States and Airlines.**

   Twenty-five percent of Mexican ATC Controllers have received RIPP training. The DGAC has made RIPP part of its training curriculum. RIPP has been distributed to more than 961 industry people.

3. **Reduction of ATC incidents through collection and analysis of data, and resulting in identification of safety problems.**

   Fifteen ATC incident reports were received from the airlines and incorporated in the LATAM/CAR Regional Incident Database. Three CAAs have investigated and taken corrected action. These reports have been submitted to ATS authorities seeking an investigation.

4. **Continued leadership and further safety development of the Pan American Aviation Safety Team (PAAST).**

   PAAST/5 reviewed current projects and the regional safety program, ALAR & RIPP progress.

AFRICA (AFI) — NAIROBI

1. **Support IATA ATS Incident Analysis identification Working Group in identification of causes and promotion of specific corrective action in the provision of ATS in the Region. Encouraged airlines to report ATS incidents.**

   The NBO office collates and reports the ATC incident data for the NBO region. The sixth meeting of the IATA ATS Incident Analysis Working Group has been scheduled to analyse all reported ATS incidents in the region in 2002 and define remedial action to be taken directly with the States.

2. **Supported OQS audits in African region.**

   The AFI office has participated in OQS audits in Kenya, Algeria and Senegal and will support forthcoming audits in Kenya.

3. **Made plans to convene two CFIT/ALAR Workshops in West AFI, including one in francophone Africa.**

   The AFI office has scheduled these workshops in cooperation with ASCENA and FSF in order to address the major causal factor in Hull Losses in the AFI region.

4. **Actively participated in the ICAO Bird hazard control activities and where appropriate, intervened directly with States.**

   The NBO office gave high priority to Bird hazard control activities. The office worked directly with the airport providers concerned and though ICAO at locations where the problem is acute.

5. **Pursued enforcement of Regional Supports Concerning ACAS and SSR equipage. Follow up with ICAO with a view to achieving full compliance.**

   The NBO office drafted legislation that was provided to all DGCAs through APIRG ACAS Task Force. Publication and enforcement is being monitored by ICAO R.Os. All DGCAs were urged to enforce the new Annex 6 requirements for carriage of SSR transponder by all aircraft.

6. **Continued supporting efficient establishment of Airport and ATS autonomous bodies with a clear separation between provision of service, safety oversight and economic regulation.**

   Continued works on project on autonomous bodies with most AFI Airport and ATS Providers already corporatised. Autonomous Kenya CAA established in November 2002.

7. **Took initiatives to lead industry stakeholders in the launch of an AFI Safety Enhancement Team and establish a practical work programme aimed at education of hull loss rates in the region.**

   Analysis of AFI Hull Loss data 1980-2002 was completed in preparation for the first meeting of the AFI Safety Enhancement Team. Industry Stakeholders were invited to a preliminary meeting of the AFI Safety Enhancement Team.

MIDDLE EAST (MID) — AMMAN

1. **ATS incident data collection for the Middle Eastern region, analysis, identification of safety problems and preparations of early incident reports.**

   The MID office collects and reports the ATC incident data for the Middle Eastern region.

2. **Agreed to convene one Safety and ALAR/CFIT Workshop.**

   Workshop to be held in Iran with YMQ coordination.

3. **Initiated process of securing Safety agreement with AACO on Safety related activities.**

   The MID office presented the concept of the RTL to the AACO Secretary General. The AACO Executive Committee approved to launch RTL at its last AGM Meeting.

4. **Continuous promotion to Regional Airlines for the adoption of STEADES.**

   The MID office promoted and presented STEADES in the MID region to the MID RTC/RCG. Favourable replies were received from three member airlines. A goal has been set to secure subscription from three MID Operators.

5. **Promotion of IOSA concept within MID Operators and authorities.**

   The MID office has made plans to present the concept to four MID Operators and States.

ASIA PACIFIC (ASPAC) — SINGAPORE

1. **ATS incident data collection for the SIN regional, analysis, identification of safety problems and preparations of yearly incident reports.**

   The Singapore office collections and reports the ATC incident data for the Asia/Pacific region.

2. **Configure New Bangkok International Airport (NBIA).**

   The ASPAC office is supporting efforts to configure the New Bangkok International Airport (NBIA) in accordance with next generation heavy aircraft that is pending deliveries to airlines. One runway to be 4000M.

3. **Worked with the ICAO Co-operative Development of Operational Safety and Continuing Airworthiness Programme (COSCAP) to improve the safety standards of the South.**

   The South and Southeast Asia Regional Aviation Safety Teams (SARAST/SEARAST) were developed and established from initial Governmental Co-operative Development of Operational Safety and Continuing Airworthiness Programmes (COSCAP) with support from the SIN office.

4. **Promoted Flight Safety and Quality Standards**

   Ongoing efforts have been made to promote Flight Safety and Quality Standards to the Airlines within the region by encouraging compliance with Annex 2, promotion of OQS audits, implementation of follow-up programmes and the distribution of the ALAR Toolkit.

NORTH ATLANTIC/NORTH AMERICA (NAT/NAM) — BRUSSELS

1. Operational Safety Monitoring

Undertake scrutiny and follow-up of all reported incidents in the NAT & NAM region with view to the development of remedial pilot, controller or system processes.

Includes providing assistance to airlines in the investigations, follow-up and facilitating contacts with service providers and regulatory authorities.

2. RVSM MASPS and Risk Assessment

Through various ICAO Regional groups & sub-working groups, encourage proper inclusion in the Vertical Collison Risk Model risk-assessment of an appropriate allowance for the MASPS requirement to carry two independent altimetry systems.

3. Lateral Offsets

Working with various regional ICAO groups to ensure the proper application and use of Lateral Offsets in the NAT. An approved risk-mitigation strategy as a safeguard against operational and technical height keeping errors but could also be used for wake separation and severe weather avoidance.

4. Intervention with ATSP's

Intervene directly with ATSP's to resolve safety issues

Identify and follow-up on TCAS related event patterns identifiable with specific airports, differences in airspace classifications in the US and non-standard air traffic management procedures (e.g. LAHSO in US).

5. Scrutiny Groups

Participation in the Scrutiny Group who with the Mathematicians Working Group conduct annual reviews to estimate system risk to establish causes and appropriate corrective procedures.

6. Planning and Separation minima-working towards future improvements

Ongoing participation in the Mathematicians Implementation Group (MIG) safety risk analysis work programme as the basis of approval for any future improvements to regional procedures or separation minima in the NAT.

7. IOSA, STEADES Awareness

Promote awareness of IOSA & STEADES within the Regional Coordinating Group and to encourage further exchange of safety information with IATA.

8. PRIOR

The FAA has accepted IATA's international role in developing and promoting its Programme for International Operator Readiness (PRIOR) in major US airports to increase foreign operator awareness about airspace complexities, traffic procedures, controller practices and procedures and relative pilot unfamiliarity. A significant enhancement to system safety is thereby expected.

ANNEX 5

DANGEROUS GOODS

The IATA Dangerous Goods Board (DGB) is composed of 12 airline voting members. It generally meets biennially to coordinate the content of the annually published Dangerous Goods Regulations, and to develop a consistent and effective industry position on dangerous goods issues being considered by ICAO and national competent authorities. Board meetings are frequently held in conjunction with small seminars on dangerous goods designed to increase communication between compliance authorities, regulatory bodies, carriers, forwarders and shippers.

The Board's objective is: "The adoption, promulgation, and enforcement of harmonized worldwide standards for the carriage of dangerous goods which will ensure effective, efficient and safe transportation." In support of this goal, IATA's Cargo Safety and Dangerous Goods section has developed and continues to support and enhance two key activities. First is the IATA Dangerous Goods Regulations, which has grown from an annual distribution in 1992 of 45,000 copies to a peak in 2002 of 118,000 copies, in 5 languages; English, French, German, Japanese and Spanish. Most of this growth in the airline customer area where shippers are now using the same standards and procedures as IATA members. The implications for safety enhancement are clear.

In order to ensure that the Dangerous Goods regulations are effectively applied in the field, the DGB initiated the development and active promulgation of a minimum standard for dangerous goods training. A comprehensive series of training books provide shippers, forwarders and carriers with the basic tools for ensuring their personnel understand and can apply the Dangerous Goods Regulations. In 1991, IATA-Cargo initiated specific programme aimed establishing a network of organizations capable of providing quality dangerous goods training meeting the IATA standard, defined and administered by a sub-group of the DGB. The IATA endorsed school programme grew from 3 schools in 1991 to over 80 in 27 countries in 2002, training upwards of 5,000 personnel annually, mainly shippers and manufacturers. A proven commercial success, this programme is now administered within IATA by the ATDI Cargo Training section.

In support of the IATA Dangerous Goods objective, IATA continues to maintain a comprehensive series of outreach activities, directly or in support of other agencies. In 2002, IATA held its 12th annual dangerous goods conference in Paris. In the post 9-11 environment, this conference and exhibition attracted a wide audience of government, shippers, forwarders and member airlines numbering over 220. Industry uncertainty and cost considerations required that plans for seminars in Brazil and India were postponed. None-the-less, IATA supported seminars offered by Airbus in Beihai, China and World Courier in Singapore.

New ICAO regulations came into force at the end of 2002 which require all cargo acceptance personnel to have, as a minimum, awareness level training of dangerous goods, whether or not, the company officially accepts dangerous goods. Recognizing that carriers, forwarders would have difficulty in identifying exactly what level of training would be necessary, IATA developed and published an additional dangerous goods training standard to meet this need. This publication was available some three months before companies were legally required to comply.

The revised ICAO regulations came into force 1 January 2003. Although, they were only officially available from December 15th, but IATA was able to develop and publish the concurrent IATA Dangerous Goods Regulations in accordance with its normal schedule in mid October 2002 thus ensuring members and industry received accurate and timely information.

Two governments had identified that the IATA Dangerous Goods training standard is an effective quality assurance programme for ensuring carriers are in compliance with national requirements. In support of this, IATA developed a peer-review process to enable members to assess, document and maintain their dangerous goods training programmes. This was initiated 4th quarter and will be further enhanced in the 2003 work programme.

ANNEX 6

IATA AIRSIDE SAFETY GROUP (ASG)

The Airside Safety Group is comprised of IATA Member Airlines, Members of the IATA Ground Handling Council (IGHC) and members of the IATA Partnership Programme. The group's mission is to enhance airside safety performance by reducing injuries to personnel and passengers as well as damage to aircraft, facilities and ground support equipment. The airside safety group meetings serve as a platform for Safety Specialists to exchange views and information on Airside Safety issues and to bring together the expertise of the safety professionals from all around world.

The work produced by the Airside safety group is submitted annually to the IATA Ground Handling Council for endorsement. Following the IGHC endorsement, the Airport Services Committee (ASC) votes and approves its publication in the ***Airport Handling Manual.***

IATA Airside Safety Group (ASG) is actively re-engineering its strategies and goals for the coming years to meet the industry needs. Resources are being cross-utilized to obtain the desired results. With the start of a New Year, ASG has directed its expertise on new initiatives:

1. **Compile statistics provided by the members on Ramp incident/accident and personal injuries for 2002.**

   With the collaboration of Senior undergraduate students of the Industry Engineering Department of Florida International University, a database will be created to sort the information provided by the members to identify common areas in which incidents/accidents and injuries are mostly experienced. The database will be kept completely de-identified. The results will assist the group in focusing on the improvement of standardized procedures.

2. **Provide Guidance and Endorsement to the IATA AHM604 Programme or Airside Safety Certification.**

   IATA's Airport Services Department is currently working on a new initiative to assist members achieve an optimal level of ground safety. The airport services team will be conducting airside safety certification based on auditing and assessment of current safety practices.

3. **Provide Input to IATA's Operational Safety Audit (IOSA) on standards for the management and control of ground handling activities.**

   The ASG is currently providing input to IOSA's Standards Manual, specifically sections on Airplane Ground Handling: Organization and Management, Manuals and Documentation, Quality Assurance and Ground Support Equipment.

4. **Provide Feedback and Update IATA's Airside Safety Training courses.**

   The group is closely monitoring the contents of IATA's ATDI airside safety related courses and provides recommendations to maintain the courses' content up to date.

5. **Produce New training material for airside safety.**

   The ASG is looking into creating new products, i.e. Computer Based Training for Airside Safety, and is currently studying the opportunity to create a join venture with a CBT company.

6. **Enhance the Airside Safety Management Programme.**

   The ASG has focused on the management aspect of ground safety. It has therefore produced a Safety Management Programme with guidelines for organizations to create their own.

7. **Further Research Human Factor in Airside Safety.**

   The first phase of the HF in Airside Safety project has been completed; as a result an incident report form has been produced focusing on HF elements. In addition, a flow chart depicting the incident investigation process has been updated to reflect human factors considerations. A three-year plan will be drafted and the appropriate steps to complete the project will be outlined at the next meeting.

8. Develop a training programme focused on Human Factors.

The ASG will be studying the feasibility to produce a training programme that is oriented to increase awareness of human factor elements in airside operations.

9. Standardize the use of wireless communication (mobile phones) in the ramp.

A proposal has been submitted from a steering group of the ASG outlining the standards that should be followed when using mobile phones in airside operations. Research has been conducted to include facts on the risks of using mobile phones when performing fueling operations.

10. Create a Risk Assessment Programme.

As a new initiate, the ASG will start creating a Risk Assessment Programme that will assist organization with the guidelines to create their own.

11. Safety Newsletter: Safety Alert

Quarterly production of a safety newsletter that highlights ramp incidents by providing a brief description of the incidents and the investigation results.

The 2002-2003 work programme of the Airside Work Group is expected to result in milestone year as the group plays a major role in ensuing industry safety needs are met.

ASG continues to develop and publish in the IATA Airport Handling Manual, those safety practices and processes supporting safe airside operations, Furthermore, collaborative programmes are currently being studied with other like-minded industry groups including: IATA Aviation Fuel Working Group, ATA, AAAGSC, ACI, EAGOSH, Flight Safety Foundation and SO&I’s Operational Safety Audit. As a result of this, 2003 is anticipated to result in one of the most productive years for the industry from a safety perspective.

The IATA Airside Safety Group will be holding two meetings in 2003, the first one in Miami in February and the second in Geneva in September.

ANNEX 7

CABIN SAFETY WORKING GROUP
REPORT ON ACTIVITIES — 2002

The IATA Cabin Safety Working Group addressed the following safety issues post 11 September 2001:

- Identification of potentially dangerous items in the Cabin;
- Handling of prohibited articles, which are found on board in-flight;
- Flight Crew/Cabin Crew communications — This will include Human Factors and Crew Resource Management on board;
- Composition of Cabin Crew;
- Incapacitated Cockpit crew;
- Silent Review procedures;
- Turbulence;
- Slide Evacuation with Children;
- Hijacking;
- Cabin Crew Name Badges.

The groups recommendations on the last 6 topics above are reflected in ***Attachment "A"*** which advises of the proposed Amendments to the IATA In-Flight Management Manual, Section II Cabin Safety and Security and Section III Passenger interference.

Other Issues

Carriage of Infants Seat Belt Policy:

The use of child/infant restraint devices, and the failure to reach agreement on a world-wide standard, continued to cause problems. Both the European JAA and the US FAA have working groups on the issue. There are conflicting research studies and fundamental differences of opinion regarding the most effective child restraint systems — the FAA banning the use of the loop belt in the US, and the JAA recommending its use. The use of car seats is preferred by many airlines, but the definition of an acceptable car seat has not yet been agreed and raises many questions related to seat measurement, pitch, seat model, and aircraft type. The Group was waiting for news of progress from the next joint JAA/FAA meeting scheduled for February 2002. The Chairman of the Group reported that there was still no common agreement. The group agreed that in the interests of Safety, every passenger including small children and infants should have a seat. However, as there had been no reported incidents of an accident on board involving the use of infant seat belts, the group decided to wait until more research was available before making any formal recommendations on this subject.

Passenger Safety Briefing Cards

A joint session of the Cabin Safety Working Group members with the main aircraft manufacturers was held to discuss the development of a model Passenger Safety Briefing Cards containing the particular safety features for each type/model of aircraft. It was agreed that it would be preferable if aircraft manufacturers could work with IATA to develop a "boiler plate" for a safety-briefing card, containing mandatory information pertaining to the specificity of each type of aircraft. Airlines could then use this as a basis to produce their own cards adapted to their individual cabin operations and safety equipment on board. The group agreed during the discussions that a standard format should be followed and that wherever possible common symbols and colours should also be used.

Disruptive Passengers

The Cabin Safety Working Group has developed a survey in order to obtain reliable and up to date global industry statistics on disruptive passenger incidents on board. This survey was distributed on 29 January 2002 to all Members of IATA with a request to provide data for 2000 and 2001. The group reviewed the collected data and further recommended that a new form should be designed in order to collect specific individual data rather than combine issues such as alcohol and drugs/ PED's and mobile telephones. The purpose would be to compare like-for-like specific incidents, as combined data would be inconclusive. It was also evident from the data collected that some airlines only report level 3 incidents and this would be reflected in the amended collection form. The Secretary will liaise with STEADES to ensure that there is no duplication of data being collected.

Membership of the Cabin Safety Working Group

As agreed at the annual Inflight Council meeting held in Vancouver on 30 September 2002 this group would benefit from fixed membership of up to 20 members. Nominations are being sought from IATA Members with the aim of having a good geographical cross sectional representation from the three areas. It has also been agreed that this group will meet regularly twice a year.

A new IATA Cabin Safety Forum is being organised in Hong Kong on 25-26 September 2003 hosted by Cathay Pacific at their facility in Cathay City.

Attachment A

PROPOSED AMENDMENTS TO SECTION 2 & 3 OF THE INFLIGHT MANAGEMENT MANUAL

2.13.1 Evacuation

2.13.1.1 Slide Evacuation with Infants and Young Children

In a prepared Emergency evacuation the Parent/Guardian should be briefed to hug the child to them so that they can evacuate down the slide.

2.13.5 Unlawful Seizure (Hijacking) to be added as an extra bullet point

In a hijacking situation it is recommended that Cabin Crew take all possible action for the hijackers not to gain access to the Flight Deck

2.11 DURING THE FLIGHT

INCAPACITATED FLIGHT DECK CREW

CREW INCAPACITATION

In case of incapacitation of a Flight Deck Crew Member, the remaining crew member shall as soon as practicable call Cabin Crew by using the simplest and most effective way of communication to summon help.

The SCCM or any other crew member must proceed to the Flight Deck immediately. Should locked door policies be in place ensuring that procedures are followed before entering the Flight Deck.

The Cabin Crew member/s must carry out the following actions:

- Tighten and manually lock the shoulder harness of the incapacitated crew member
- Push the seat full aft
- Recline the seatback
- Liaise with the other crew member on further action and consider;
- First Aid
- Removal of the Incapacitated crew member from the Flight Deck
- Call for Medical assistance
- Consider the implication of removal from the flight deck e.g. Injury to the Incapacitated crew member
- Damage/interference to flight deck controls.

If the decision is made to leave the incapacitated crew member on the Flight Deck a member of Cabin Crew must stay with them until the aircraft has landed safely.

Consideration could be given to seek the assistance of a type qualified company pilot on board to replace the incapacitated crew member.

Silent Review

The objective of Silent Review is to mentally prepare Cabin Crew for any eventualities that may occur during take of and landing so that they are well prepared and have taken into account all conditions.

Cabin Crew Name Badges

This subject was reviewed and it was agreed that the recommended best practices as outlined in *See Section 8 — 8.10* of the Inflight Management Manual cover this topic.

2.10 PRE-TAKE OFF AND LANDING PREPARATIONS

Cabin Service on the Ground

It is recommended that whenever Cabin Service is carried out on the ground during normal or delay situations that no trolleys be used for this service.

2.12.2 Turbulence

In the event of Clear Air Turbulence, or Anticipated Turbulence, two-way communication between the Flight Crew and Cabin Crew is essential.

ANNEX 8

IATA EMERGENCY RESPONSE REPORT

1. **ERPWG Terms of Reference.** The TORs for the ERPWG require revision to properly reflect the scope of activities and to incorporate the rules of procedure. The ERPWG has drafted new TORs which have been approved by SAC.

2. **Positioning of the ERPWG.** It had become evident that members wished to review the scope and activities of the ERPWG. It has been agreed by SAC that the ERPWG should be recognised as the world leader in aviation emergency response. Accordingly and to further this view, several initiatives are currently under review including:

   a. Closer relations with ICAO;

   b. Closer relations with regional aviation groups;

   c. Positioning of the ERPWG with aviation authorities.

3. **Emergency Response Guidelines and Recommended Practices.** Following the direction from SAC 13, the ERPWG has now formalised the process for researching and promoting best practice guidelines. The Group has determined a prioritised list of 'bite-sized' topics (ie contents of a 'Go' pack, training programmes for station managers etc.). Three topics will be pre-assigned to breakout groups who will work on the topics during one full day of each ERPWG meeting. The aim will be to package three topics per meeting sufficient to promote to all IATA carriers as required. ERPWG meetings will be extended to 3 days to allow for this activity. The development of such guidelines was generally considered to represent tangible evidence of the role and importance of the ERPWG and will be the principal work programme item for the medium term. This topic will be the principal work-programme item for the ERPWG at least until the end of 2004. It was also agreed that a progress report on this item would be given at each SAC meeting.

4. **Crisis Management Conference 2002.** The IATA Crisis Management Conference in Vancouver, 12-13 November 2002 was a great success and very well attended by crisis and emergency managers.

5. **Crisis Management Conference 2003.** The 2003 conference will be held in Vienna, 4-5 November 2003. The main theme will be the development of family assistance legislation or recommended practices within the European Community and how IATA can influence such development.