focus

ON COMMERCIAL AVIATION SAFETY

AUTUMN 2007

ISSUE 68

THE OFFICIAL PUBLICATION OF THE
UNITED KINGDOM FLIGHT SAFETY COMMITTEE

ISSN 1355-1523

National Aerospace FOD Prevention Inc and BAe Systems Present

THE 3RD INTERNATIONAL FOD PREVENTION CONFERENCE

FOD PREVETION CULTURE – THE HUMAN ELEMENT

www.nafpi.com

9-10 October 2007 at the Hilton Hotel, Blackpool, UK

Conference Description:

The 3rd International FOD Prevention conference objective is to make the wider aerospace industry aware of the need to prevent foreign object debris/ damage from our aircraft, airports, runways, manufacturing facilities, flight lines and all aspects of aerospace operations. The conference provides an effective forum for the exchange of ideas, solutions, expertise.

Who should Attend:

Anyone who has an interest in flight safety. This conference attracts major industry representatives from: Airlines, Airports, Cargo Haulers, Aircraft Manufacturing & Repair, Military, Space, Support Industries, and many others from Aviation organizations.

Who should Exhibit:

Anyone who's products or services increase flight safety & FOD prevention. Examples: borescopes, cameras, lights, tools, tool kits/ tool control, FOD detection systems, aircraft protective devices, personal protective equipment, wildlife control, runway sweepers, vacuums, etc... Companies also exhibit to showcase their FOD prevention programs, products and services.

Conference Program:

NAFPI and this year's co-host invite everyone to come to Blackpool and take part in the 3rd International Aerospace FOD Prevention Conference to see the latest FOD prevention techniques, equipment, and technological advancements used in the industry to prevent FOD, promote awareness, and combat a common enemy. Experience two days of facilitated panel discussions, keynote presentations and exhibits. Share proven methods and best practices of preventing FOD throughout the aviation/aerospace industry. FOD can come in many different forms, and produce disastrous effects if not identified and corrected.

Registration Fee = $350.00 per person Exhibit Registration Fee = $750.00 (Per Booth) **Rates increase after 15 Sep 2007**

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Hotel Reservations

It is your responsibility to make your own hotel reservations. Please quote NAFPI FOD Prevention Conference for special rate

Hilton Hotel

North Promenade, Blackpool, Lancashire FY1 2JQ
Tel : 01253 623434
Fax : 01253 294371

Room Cost - £90.00 per night

BAE SYSTEMS

The Official Publication of
THE UNITED KINGDOM FLIGHT SAFETY COMMITTEE

ISSN: 1355-1523 **AUTUMN 2007** **ON COMMERCIAL AVIATION SAFETY**

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contents

Front Cover Picture: A Boeing 757 in the livery of PrivatAir

FOCUS *is a quarterly subscription journal devoted to the promotion of best practises in aviation safety. It includes articles, either original or reprinted from other sources, related to safety issues throughout all areas of air transport operations. Besides providing information on safety related matters,* ***FOCUS*** *aims to promote debate and improve networking within the industry. It must be emphasised that* ***FOCUS*** *is not intended as a substitute for regulatory information or company publications and procedures.*

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Working Together

In early July NATS released their Strategic Plan for Safety 2007. The publication of this document clearly illustrates the commitment that NATS has towards safety. Not only have they shown a willingness to share their plan but they have also revised some of their targets set the previous year and set out how they intend to measure their performance over the next year.

Ensuring the safe operation of aircraft in the airspace requires close collaboration between pilots and air traffic controllers. One can only hope that operators have similarly formulated a Strategic Plan for Safety for their operation. For those airlines who have created such a plan one can only wonder if they have the same priority issues as those of NATS or how similar it is. If not then using the NATS Safety Plan as a guide should be a pretty good starting point.

Over the past twenty years many of the safety issues have been addressed by introducing technological solutions, VOR, ILS, TCAS, EGPWS to name but a few. The one area where the industry has not been successful is that of Human performance and in particular the role of the aircrew in monitoring the aircraft automation systems.

The importance of the monitoring function of the aircrew cannot be emphasised enough, as when automation goes wrong it may be difficult to notice and then even more difficult to analyse and rectify. In addition, the monitoring function is tedious and one for which the human mind is not particularly well suited.

A whole industry has sprung up around human factors and human performance but as yet there is no firm evidence that any of the human factors training has had a profound affect on the incident rates. CRM training was introduced into the annual training programme but unless this training is constantly revised and injected with new and stimulating material it becomes boring and little attention is paid to it. Some will tell you that it is a waste of time.

So, if CRM training is boring then just how much more boring is the in flight monitoring function that the aircrew have to perform. Is it therefore surprising that at times technical and human failures are not immediately picked up by the monitoring aircrew? For instance a turboprop aircraft was set up to cruise at FL170 on an airway, some time later the monitoring pilot noticed that the aircraft had climbed to FL190. His mind told him this was incorrect so he checked his pilots log. The cruising level should have been FL170. Nobody had noticed that the aircraft autopilot had not been engaged and none of the crew noticed the gradual climb to FL190. What were the crew doing and how well was the monitoring function being done?

Level busts occur for a number of reasons. The statistics tell us that the risk from level busts is not increasing but neither is it decreasing. NATS have introduced software that interrogates the aircraft transponder signal and provides ATCO with the actual altitude of the aircraft. In this way if the aircraft does not comply with the instructions, as the monitoring function fails, the ATCO will soon pick up the error.

The risk from airspace infringements is increasing with the increase in traffic levels. We need a better understanding of why these airspace infringements occur. NATS are working to resolve this by mapping infringement “hot spots” and providing Lower Airspace Radar Service to cover these hot spots. What is the pilot community doing to prevent infringements?

Runway incursions seem to be reducing thanks to the ongoing work being done (mainly by NATS) to create better situational awareness in pilots, controllers and drivers. This work needs to be continued in order to keep the number of runway incursions to the minimum. Better airfield design could assist in this area.

Incidents attributable to pilot performance make a significant contribution to risk in our airspace. Our open reporting system has enabled us to better understand what types of errors are being made. As a result operators have been able to make changes to their procedures to try to improve this area. However errors will always be made and so it is imperative to continue to work together to reduce these errors. There is no shame in making an error as we are all human. The shame comes from failing to investigate and take corrective action when an error is made.

Personal professional development is that aspect of ones life that has to be ongoing if we are to stay abreast of the development taking place in the aviation industry. Manufacturers are all trying to improve the equipment installed on modern aircraft to make it smarter so that less errors are likely to be made by the operators of such equipment. In order to understand these developments and their affect on today’s aircrew and engineers it is necessary to read avidly or to attend presentations or training courses where this knowledge can be easily absorbed.

Each year the United Kingdom Flight Safety Committee holds an Annual Seminar on a topic that the Committee feels is important to understand. The topic this year is on Technical Innovation and Human Error Reduction. In choosing this topic we hope to introduce many of the aspects that may cause uncertainty when operating modern aircraft and some of the aspects that could cause the operators of such equipment to make errors. If you are employed in the aviation industry then this is one Seminar that you should not miss.

Another Year, Another Chairman!

by Capt.Robin Berry, CTC Aviation Services Ltd

Taking the Chair of such an august body as the UKFSC is challenging in anyone's book but I seem to have inherited the post at a particularly difficult time. Not only are most of the Board new to post but we have lost our Chief Executive at the same time. I have already publicly expressed my sincere thanks to Ed Paintin for his hard work and dedication as Chief Executive. The post is vital to the success of the Committee as it is the CEO who has to action all the bright ideas that the rest of us come up with and keep us to the rational and sensible path. The challenge of finding a new CEO has had its problems with two false starts and the need to start all over again, but we continue to seek "the right stuff"!

There have been indications of a growing unrest with the current direction of the Committee and it is vital that we take note of these and develop a strategy to take it forward in a way that is meaningful to all of the members. That there is unrest is not surprising – we live in times when every penny has to be accounted for and Safety personnel are strictly limited in their time resource. Membership incurs a cost, albeit a modest one, and travelling to meetings takes up time, so those meetings must represent some value to the attendees. I for one do not wish to see our Committee just become an "old men's luncheon party"! It has a vital role to play in Flight Safety both at home and abroad.

One problem I had as an airline safety manager was the number of different "safety" forums that had to be attended – particularly difficult as I worked for a small company and therefore didn't have anyone else to send! I believe that some of these forums could be combined to everyone's benefit under the umbrella of the UKFSC. This will reduce the number of separate meetings to be attended while concentrating the expertise under one roof thus affording a great opportunity for working in a harmonised way to address the flight safety issues.

I am sure that you all have ideas of your own on how the UKFSC could be more useful to you. Pass those ideas on! When we have our new CEO in place I will ensure that we embark on a programme that takes all ideas into account.

That the UK has a worldwide reputation for doing things right when it comes to flight safety is almost a given. Nevertheless, it never fails to amaze me just how "worldwide" that has gone. For my sins, I do a guest lecturer spot on the Cranfield University Flight Data Monitoring short course. This really is a good course as might be expected being jointly sponsored by Cranfield University and the CAA with just a little help from an enthusiastic AAIB agent! What impresses me every time is the number of overseas delegates on these courses – there are very few places that have not been represented at some time by delegates from either the airlines or the national regulator. There is even a growing and positive interest from international pilots' unions. The course dinner always provides good debating opportunities and my most recent experience found me in deep discussion with delegates from Portugal, Japan, Kazakhstan, USA, Canada and France. Networking has always been a valuable safety tool but one of the most common topics of conversation is the openness of flight safety in the UK – airlines, regulator and accident investigator actually sit round the same table and discuss rationally how to keep moving safety forward. Actual incidents are freely discussed and the safety lessons learnt are passed on for the benefit of all. Listening to some of the delegates from less enlightened parts of the world one would be forgiven for thinking that flight safety was all about suppression of information, political intrigue and "CYA"!

In our own regular forum, the Safety Information Exchange (SIE) has always been an important part of our business. But how far should we take this? All incidents have some interest to someone, but a long saga of minor mishaps with no real wide interest will soon lead to snores from the gallery! My view is a little more relaxed than my predecessor's on this – if you have something that could easily affect the operation of one of the other members, then let's hear about it. But if you genuinely have nothing, then don't feel bullied into submitting for submitting's sake. That part of our meetings can be as long or short as you like – but sharing experience is always good.

I apologise to our wider readership if my first "Chairman's Column" appears a little introspective, but I am a firm believer in getting one's own house in order before telling everyone else how to run theirs!

UK FLIGHT SAFETY COMMITTEE OBJECTIVES

- **To pursue the highest standards of aviation safety.**
- **To constitute a body of experienced aviation flight safety personnel available for consultation.**
- **To facilitate the free exchange of aviation safety data.**
- **To maintain an appropriate liaison with other bodies concerned with aviation safety.**
- **To provide assistance to operators establishing and maintaining a flight safety organisation.**

Developing Aeronautical Charts for the Future

by Russell Thorp

Brief History of the Organisation

European Aeronautical Group was formed in late 2002 when SAS Flight Support AB, a wholly owned subsidiary of Scandinavian Airlines, bought the Aeronautical Services Group - ASG - from Thales Avionics Ltd. After the acquisition, ASG was incorporated as European Aeronautical Group UK Ltd, a wholly owned subsidiary of European Aeronautical Group AB.

The two organisations have a long and proud history: Scandinavian Airlines was the first airline to operate commercial flights across the North Pole; specialized tools to support polar flights were developed by SAS Flight Support, then a department within the airline. One of the two main roots of ASG is Decca Marine Navigation, a company that was already producing moving maps for aircraft in the 50's, and which, as far as we have been able to ascertain, was the first organisation in the world to produce Navdata for commercial flights. Decca was subsequently bought by Racal Avionics.

The other main root is the well-known Aerad aeronautical charts brand, originally the Aerad Printing and Publishing Division of International Aeradio Ltd. The Aerad brand was bought by British Airways after the merger of BEA and BOAC. BA sold Aerad to Racal Avionics in 1997.

European Aeronautical Group was bought by Navtech Inc, a Canadian company, in November 2005. Navtech was established in Canada in 1985 as a company that developed and delivered leading edge planning applications for Flight Operations use.

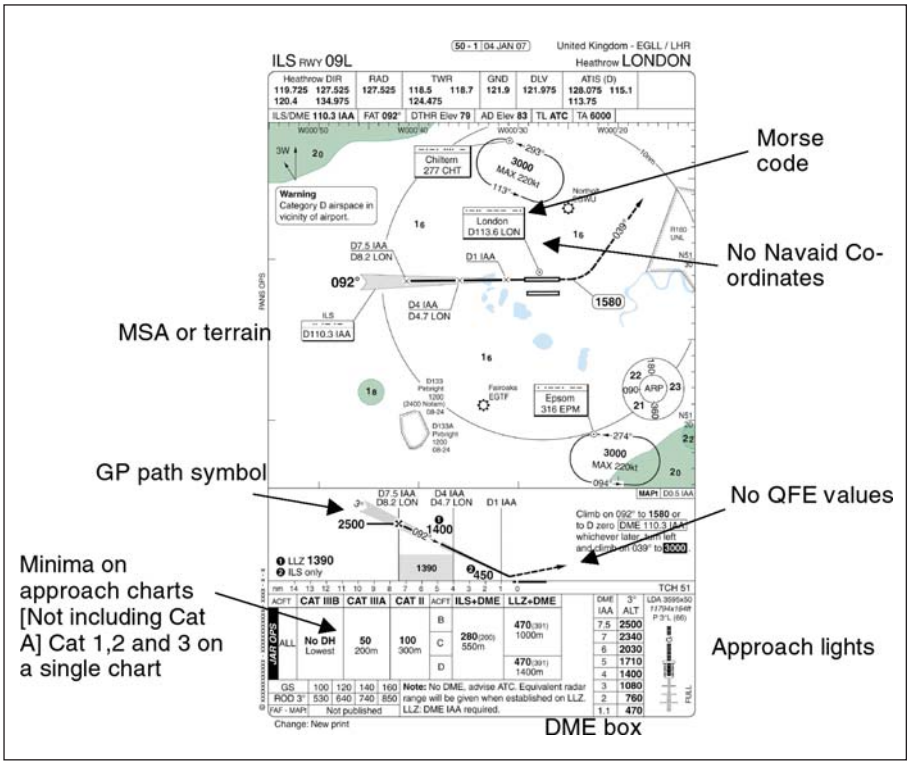
With close to 300 staff in the UK, Canada, and Sweden, Navtech/EAG provides a full portfolio of aeronautical products and services to more than 350 customers worldwide.

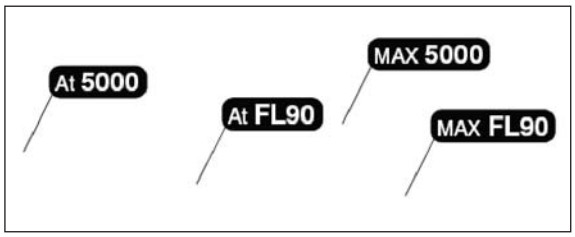
Specification Project

After establishing EAG in 2002 the company contained two charting agencies, Aerad and SAS Route Manual (RM). While AERAD provided charts primarily to a UK based airline industry, the SAS RM was aimed at Scandinavian operators. Each provided a set of charts to meet their own client base needs with separate working tools, practises, aerodrome portfolios and organisation. Duplicated charting facilities in the new EAG organisation created inefficiencies and waste. The new organisation provided over 800 aerodromes created in both specifications, together with separate coverage for many more that were not available for different customers. The acquisition by Navtech in 2005 created a need to consolidate and develop, and a new chart specification was envisaged to replace both the existing Aerad 1977 and 2000 specification charts, and the SAS Route Manual charts. All customers would be migrated to one product that would provide them with the key characteristics that have made both products popular and successful. One chart factory (at two sites) will provide a higher capacity with twice the experienced work force allowing 2-3 times the current coverage – 2000-2500 aerodromes. The increase in the size of the organisation will also allow for development efforts to be put into new chart products e.g. new EFB solutions etc.

Specification Characteristics

The new specification of the charts is aimed at taking the best characteristics of the two current products and creating a series of charts that are clear, accurate and unambiguous. The layout and organisation of the charts will remain similar to the current Aerad format, providing an easy migration to the new charts. The indexing of the charts will change but the sequence of charts will remain in the Aerad format: 10 Aerodrome / General / Ground; 20 Area / Radar; 30 SID / Departure routes; 40 STAR / Arrival routes; & 50 IAC. To accommodate an expanding market for our charts, aerodromes will use the ICAO recognised





names and will no longer use anglicized names. Aerodrome and ground charts will not differ significantly from the previous format but increased standardization of note layout will aid pilot identification of essential details of aerodrome information. The aerodrome chart will contain the takeoff minima, making it easier to access the values without turning pages during the busy time prior to departure. SID and STAR charts will all be drawn to scale to give greater clarity to pilot geographic awareness; however, in situations where long tracks are associated with the routing, a break-in-line symbol will be used. Communication frequencies will be added to all charts.

Crossing altitude restriction will also change to max/min/at. The presentation of bust heights as a different and clear symbol is another popular Aerad chart characteristic, and this style will continue to be represented, see below. A Bust altitude is the first "at" or "maximum" altitude or initial cleared altitude where the aircraft may be required to perform level flight. Altitudes defining the initial turn (e.g. Climb on 123° to 500 ...) do not usually represent a bust altitude.

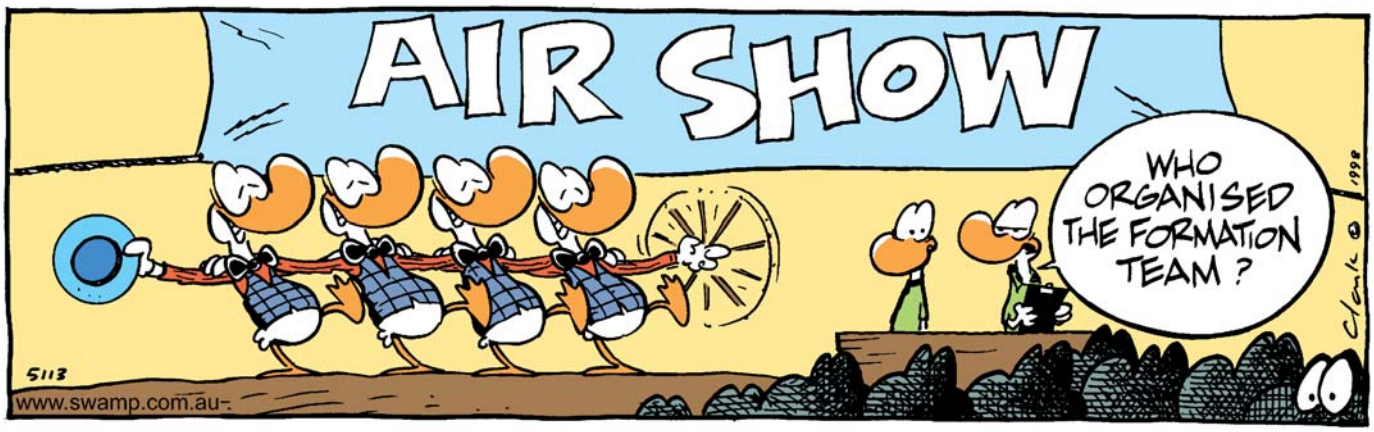
The new instrument approach chart will look very similar to the current Aerad specification with the new additions including: all minima on the chart, approach light symbols, glide paths etc.

New chart introduction

Key customers have been consulted about the new specification and are pleased with the developments. The new specification and product will be introduced during a launch presentation in the autumn of 2007. Converted aerodromes will begin being released late 2007 / early 2008. The primary destination aerodromes for our customers will be converted within a year. And the target for completion of the conversion of aerodromes and creating a larger portfolio is the end of 2009.

Are You Getting the Message?

by Karen Skinner, NATS



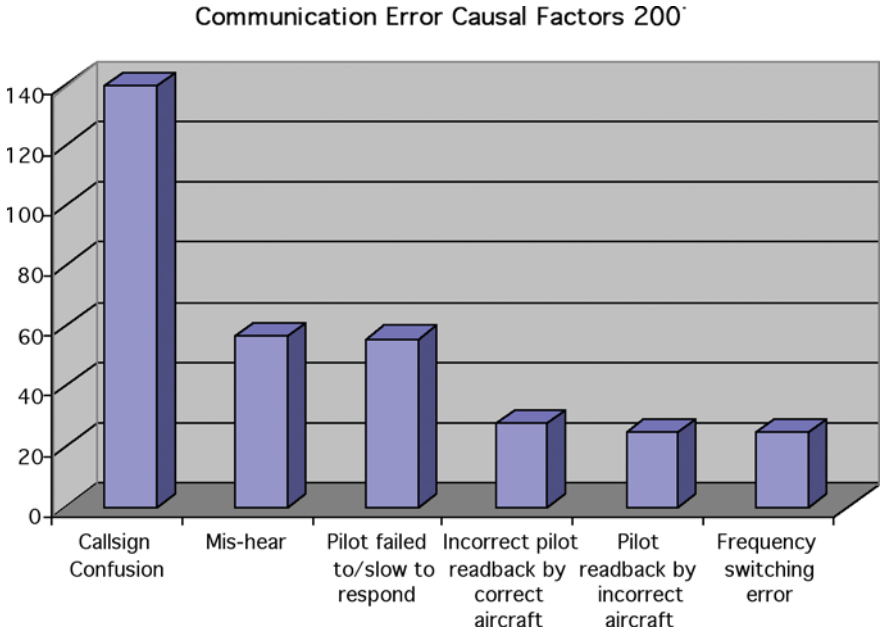
"Communication usually fails, except by accident" . At first glance this is just a humorous observation of the way in which people interact. Look a little closer, however, and you begin to realise how vulnerable we are to misunderstanding, ambiguity and confusion in the course of everyday conversation. The outcomes of which can be amusing, embarrassing or sometimes costly.

In communications without the visual cues and body language nuances that accompany face to face communication, the recipient loses up to 50% of the overall message that is being conveyed and the message becomes prone to communication error.

Successful communication is dependent on several factors, such as

- the clarity of the transmitted message,
- the level of attention of the recipient,
- the level of comprehension of the recipient,
- the level of acceptance of the message, and
- the effectiveness of the feedback from the recipient to the originator.

RTF sampling invariably reveals mistakes either in phraseology or understanding on the part of controller or pilot and 40% of runway incursions and 25% of level busts contain some form of communication error.



The crew of a Citation 550 misheard a descent clearance to 6000ft and thought they were cleared to 3000ft. Although they thought that it was an unusual clearance they read back 3000ft, but in what they thought was a questioning tone. This incorrect readback was not detected by ATC. The Citation then descended into conflict with a departing 737. The subsequent loss of separation was resolved by TCAS.

Established protocols and standard phraseology are designed to protect us from communication errors; nevertheless, it is clear that they continue to represent a major causal, aggravating or situational factor in many incidents.

Good RTF discipline is a significant factor in minimising errors in communication. Adherence to principles, which include

the correct use of full call-signs and complete read-backs between aircraft and ATC particularly regarding level change and heading instructions, can play a very important part in maintaining safe operations. In the air and on the ground, all RTF users must display a determination to use standard phraseology and take extra care with intonation and message content.

Reducing Communication Error

- If it gets busy do not speed up delivery (it does not help)
- Keep it standard
- If it's urgent – make it sound urgent (intonation)
- Do not attempt to read something back if you are unsure of the instruction. Ask the controller to "Say again"
- Always use your full callsign or accepted abbreviation

As our skies become ever more congested, a high standard of clear and unambiguous RTF is vital.

Communication error can play a significant role in many different types of incident, including runway incursions and level busts. We have to work together as a community to eradicate these errors and engage in a process of continual improvement in order to mitigate the effects of those that occur in future.

For further information on Communication Error, please visit www.customer.nats.co.uk

PrivatAir – Uniting exceptional customer service with safety

by Jan Peeters

757 and the BBJ fleet in GVA around the year 2000

PrivatAir is a leading international business aviation group with headquarters in Geneva, Switzerland, operating bases in Düsseldorf, Hamburg, Munich, Zurich and Amsterdam. The company has been in operation for 30 years and employs 540 people. PrivatAir Inc. is also a quite large subsidiary currently managing around 45 business aircraft such as Citations, Learjet, Challengers, Gulfstream, Falcon, to Global Express aircraft. Since these are not so relevant to the operations of most readers, we will limit our overview in this article to our European operations.

Geneva has been the home base for PrivatAir since 1977 when the company was formed as a private operator named Petrolair, operating the aircraft fleet owned by the Latsis Group (this fleet was made up of Cessna Citations, Gulfstream III and IV usually between 2 and 5 aircraft).

Since its inception, the purpose of the company was to provide comfortable, reliable and above all, safe and secure transport for the owner and his family. Throughout the company's existence it has always strived to operate to the highest standards in the aviation industry. To this end, great efforts were made to attract highly qualified staff from the major airlines and outsource heavy maintenance only to well known and respected maintenance organisations, usually to major airlines.

In 1995 Petrolair received its Swiss Airline Operators Certificate and since then operated as PrivatAir SA. Between1995-2000 PrivatAir operated a 737-200, a 757-200 and Gulfstream IV's, all in VIP configuration. PrivatAir was the first commercial operator to order the BBJ, which was brought into operation in May 2000, quickly followed by two more BBJ's.

A 767-300ER replaced the BBJ for VIP charter and is currently the only one available in the world for this kind of VIP charter operation. Introduced in June 2007 it appears, already, to be a much sought-after aircraft in this market.

Currently we use the 757 and 767 in VIP configuration, both with 50 seats, to serve a wide range of clients such as celebrities from the arts, sports and entertainment industries, successful businessmen, large corporations, royalty and government officials. PrivatAir has a longstanding experience of serving this type of demanding clients and is well recognized for delivering outstanding customer service.

767-300ER dining area mid cabin

Building on this customer service experience, the company has also successfully expanded into new business models: In June 2002, PrivatAir pioneered scheduled, business-class-only BBJ services on behalf of Lufthansa on North Atlantic routes. This is an ACMI arrangement and has been expanded to other clients such as Swiss and KLM. These operations are now performed with the A319 LR, BBJ I and BBJ II.

A319 LR 48 seats operating for LH
These services have proven to be very satisfactory for all involved, they offer a niche market solution for the airlines and consistently score very high in customer satisfaction surveys.

Yet another type of service was born when, in October 2002, Airbus appointed PrivatAir to operate a corporate shuttle service for staff between its production sites in Toulouse, Finkenwerder (near Hamburg) and Filton. PrivatAir acquired two new Airbus A319s with 126 identical leather seats for this service, which started in May 2003 and features all-business-class service.

PrivatAir aims to take the best practices of the commercial airline industry, adding the flexibility of business aviation and add PrivatAir's exceptional standards of service. To ensure an equally high standard of safety we strive to meet or exceed best practices in the airline industry. This is reflected in the approvals and certifications we obtained:
e.g. ETOPS 180, RVSM, ISO 9001-2000, and in 2004 the first IOSA certificated business aviation company.

PrivatAir complied with today's strict security regulations even before they were required. We place special emphasis on passenger confidentiality, destinations and routes. All crew sign non-disclosure agreements. All PrivatAir personnel pass background checks and participate regularly in security refresher courses above and beyond JAR and TSA requirements.

To cover this large spectrum of operations PrivatAir attracts experienced professional flight and cabin crews from the main airlines, resulting in an outstanding team of flight and cabin crew with very high standards and excellent safety culture. PrivatAir pilots are all ATP-rated and type-rated in their respective aircraft and pass a comprehensive series of technical and psychological tests.

Flight crew, cabin crew as well as the engineers, are jointly trained in a 4-day annual recurrent CSP training session covering cabin safety procedures,

A319 LR 48 seats operating for LH

medical treatment, CRM, dangerous goods handling, security and people skills exceeding JAR requirements. The fact that they train together with the other groups, is perceived as an added value by the participants and helps CRM understanding of the different roles.

Where historically the philosophy was to ensure all elements of our operation were top-notch (new aircraft, highly qualified pilots and cabin crew and first rate maintenance) as a company we now also strive to meet and exceed industry standards in ensuring that the entire system safety is assured. So we have been further developing since 2 years the elements needed to obtain a functional Safety Management System. Most of its elements were already in place, such as:

- a regular Safety Steering Committee, which is held every quarter and attended by our operational managers, including the accountable manager who fully supports this essential tool for effective safety management.
- a monthly safety newsletter, it contains all ASR's reported the previous month, it is distributed on paper amongst our all flight and cabin crew, engineers, operations staff and managers (up to board level).
- The newsletter stimulates a healthy reporting culture; we encourage reports from all operational staff, flight crew of course, but also from Cabin crew, engineers and operations staff.
- the safety statement from our CEO, clearly indicating that safety is truly priority # 1 in our company and we expect safe behaviour and decisions from everybody.

We would like to further improve our risk management methods and make these a company wide tool to evaluate and improve operations. As a safety department we try to participate as much as possible in workshops and organisations such as the UKFSC, FSF and cooperate with Airbus to further expand our know-how in these areas.

NATS safety notice

Number 1/07

USE OF THE PHRASE "MAINTAIN"

A recent ATC incident occurred whereby the crew of a flight interpreted the phrase "Maintain FLXXX" as an instruction to descend, causing an Airprox.

An ATC error led to the wrong flight level being stated in the phrase. This was then mistakenly interpreted by the pilot, who believed he was getting a descent clearance.

1. The Incident

In this particular incident Aircraft A and Aircraft B were in close proximity and both routing via the same reporting point. Aircraft A was at FL80, under the control of an Approach Controller and Aircraft B was at FL70 under the control of a Sector Controller.

Aircraft A called on frequency. The Approach Controller instructed Aircraft A to "Maintain FL70", which Aircraft A readback correctly and initiated a descent. Aircraft A then called the Approach Controller and asked if there was traffic at FL70 to which the Approach Controller responded "Affirm maintain FL80 as you were instructed. Climb FL80". At the same time Short Term Conflict Alert activated. Aircraft A reported a TCAS climb RA.

Key Message - Controllers

- If an aircraft reports climbing or descending to a level on first contact, do not use the phrase "Maintain FLXXX".
- Use caution when using the word "Maintain" with a level.
- FAA trained aircrews can interpret "Maintain" as a climb/descent clearance and in this recent incident, the aircraft involved was a UK airline with a non UK pilot.
- The technique of reading the levels on the strips whilst listening to the readback has been shown elsewhere to help detect this type of human error.

Key Message - Pilots

- In the UK the phrase "Maintain" is used for level flight and is not used instead of 'Descend" or "Climb". If the phrase "Maintain FLXXX" is used for anything other than your current level, check it with the controller.

For further details please refer to Supplement to CAP 413 RADIOTELEPHONY MANUAL – A quick reference guide to UK phraseology:
http://www.caa.co.uk/docs/33/CAP413Supplement.pdf

Produced by Division of Safety **Effective date 18/05/07**
Contact: Karen Skinner Tel: 01489 444968

NATS safety notice
NATS safety notice

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Capt. Rob Alabaster

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Gary Clinton

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TBA

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Kwok Chan

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Peter Jackson

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Harry McCrink

Jet2.com
David Thombs

Libyan Airways
Engr. Tarek Derbassi

Limit Aviation
Jerry Flaxman

Loganair
Capt. Sarah Hendry

London City Airport
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Lufthansa Consulting GmbH
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Malaysia Airlines
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Manchester Airport plc
Simon Butterworth

Monarch Airlines
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MyTravel
Chris King

NATS
Richard Schofield

NetJets
Capt. Catherine Thompson

Panasonic Avionics
Stefan Suri

Penauille Servisair
Mike Cooper

PrivatAir
Jan Peeters

Qatar Airways
TBA

Rolls-Royce Plc
Phillip O'Dell

Ryanair
Capt. George Davis

SBAC
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Vic Lockwood - FR Aviation

ScotAirways
Nigel McClure

Shell Aircraft
Grant Campbell

Singapore Airlines
TBA

Smiths Aerospace
Nigel Moody

SR Technics Ireland Ltd
Frank Buggie

Superstructure Group
Eddie Rogan

TAG Aviation (UK) Ltd
Malcolm Rusby

TAM Brazilian Airlines
Capt. Marco Castro

Thomas Cook Airlines
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Maj. Mark Chivers

QinetiQ Eng.
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Royal Met. Society
Dr John Stewart

Overweight Landing? Fuel Jettison? What to Consider

By Rick Colella, Flight Operations Engineer

There are important issues when deciding to land overweight, burn off fuel, or jettison fuel

An overweight landing is defined as a landing made at a gross weight in excess of the maximum design (i.e., structural) landing weight for a particular model. A pilot may consider making an overweight landing when a situation arises that requires the airplane to return to the takeoff airport or divert to another airport soon after takeoff. In these cases, the airplane may arrive at the landing airport at a weight considerably above the maximum design landing weight. The pilot must then decide whether to reduce the weight prior to landing or land overweight. The weight can be reduced either by holding to burn off fuel or by jettisoning fuel. There are important issues to consider when a decision must be made to land overweight, burn off fuel or jettison fuel.

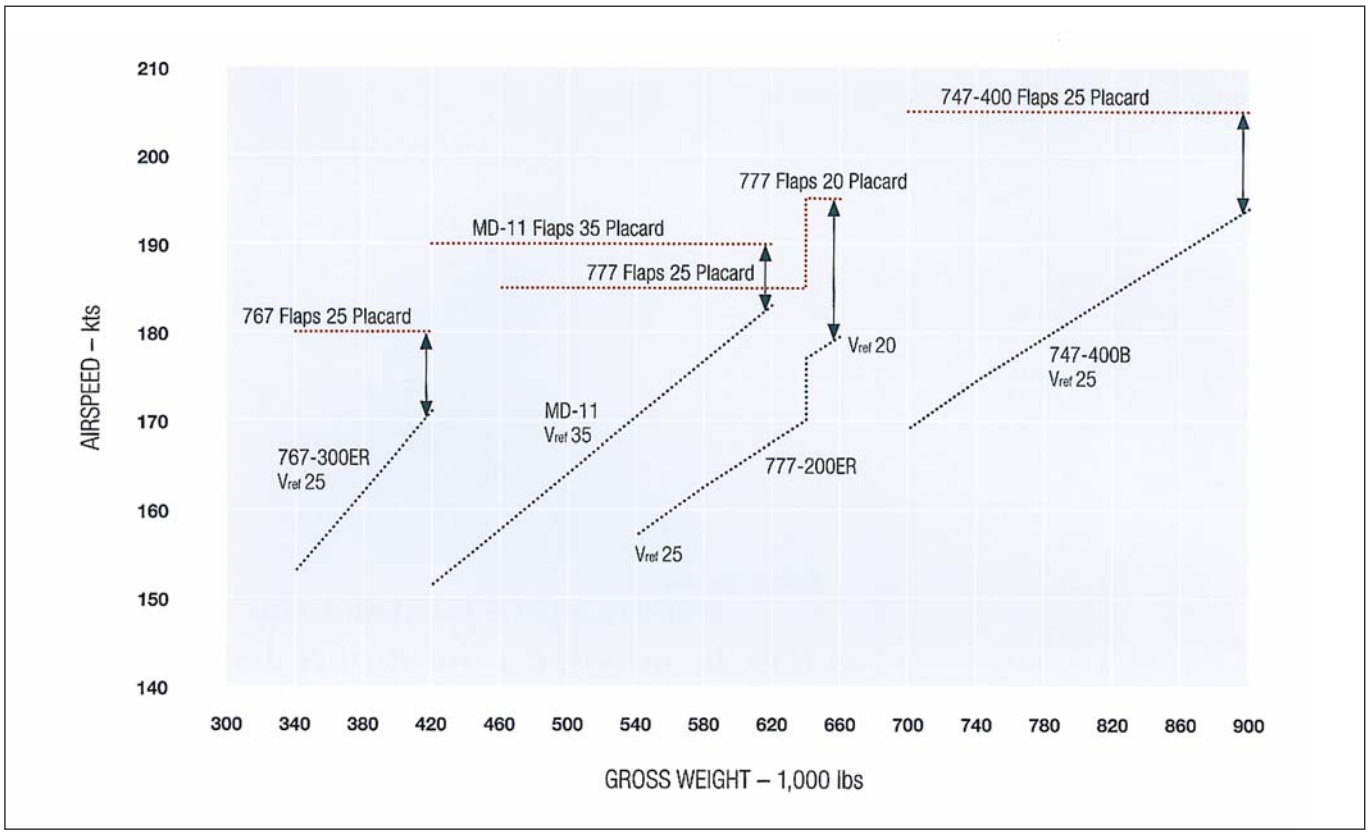

Figure 1. Flap placard speed margins at weights up to maximum takeoff weight

Due to continuing increases in the cost of fuel, airlines want help deciding whether to land overweight, burn off fuel, or jettison fuel. Each choice has its own set of factors to consider. Holding to burn off fuel or jettisoning fuel prior to landing will result in increased fuel cost and timerelated operational costs. Landing overweight requires an overweight landing inspection with its associated cost. Many airlines provide their flight crews with guidelines to enable the pilot to make an intelligent decision to burn off fuel, jettison fuel, or land overweight considering all relevant factors of any given situation.

This article provides general information and technical data on the structural and performance aspects of an overweight landing to assist airlines in determining which option is best suited to their operation and to a given situation. The article covers these facets of overweight landings and fuel jettisoning:

- Regulatory aspects.
- Safety and ecological aspects.
- Airplane structural capability.
- Airplane performance capability.
- Automatic landings.
- Overweight landing inspection requirements.

Regulatory Aspects

The primary Federal Aviation Administration (FAA) regulations involved in landing overweight and fuel jettison are:

- Federal Aviation Regulation (FAR) 25.1519 - Requires the maximum landing weight to be an operating limitation.
- FAR 91.9 - Requires compliance with operating limitations.
- FAR 121.557 and FAR 121.559 - Allow the pilot in command to deviate from prescribed procedures as required in an emergency situation in the interest of safety. In June 1972, the FAA issued Air Carrier Operations Bulletin No. 72-11 giving three examples of situations the FAA considered typical of those under which pilots may be expected to use their emergency authority in electing to land overweight:
  - Any malfunction that would render the airplane unairworthy.

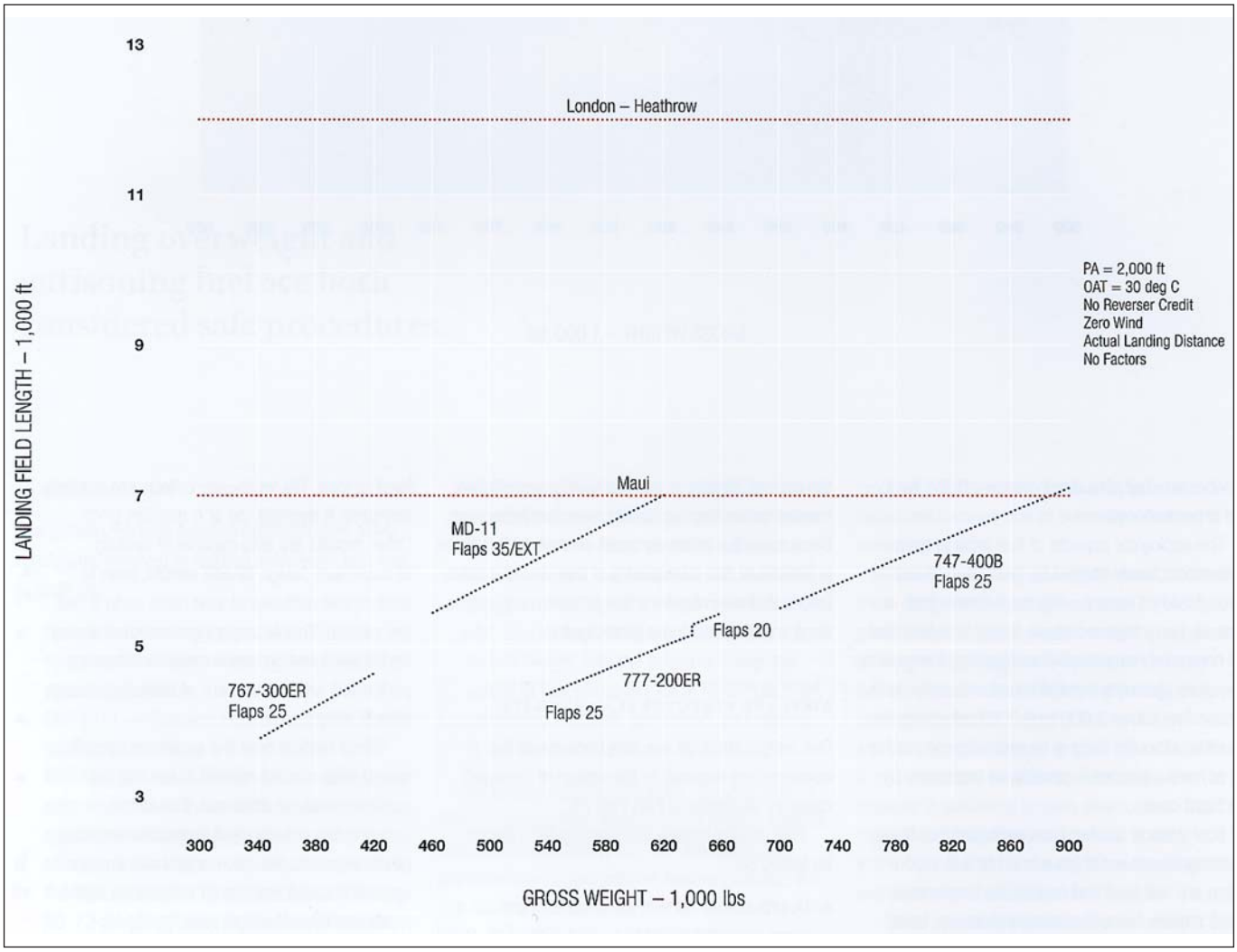

Figure 2. Landing field length margin at weights up to maximum takeoff weight

- Any condition or combination, thereof, mechanical or otherwise, in which an expeditious landing would reduce the exposure to the potential of additional problems which would result in a derogation or compromise of safety.

- Serious illness of crew or passengers which would require immediate medical attention.

■ FAR 25.1001 - Requires a fuel jettison system unless it can be shown that the airplane meets the climb requirements of FAR 25.119 and 25.121 (d) at maximum takeoff weight, less the actual or computed weight of fuel necessary for a 15-minute flight comprising a takeoff, go-around, and landing at the airport of departure.

To comply with FAR 24.1001, the 747 and MD-11, for example, require a fuel jettison system. Some models, such as the 777 and some 767 airplanes have a fuel jettison system installed, but it is not required by FAR. Other models such as the DC-9, 717, 737, 757, and MD-80/90 do not require, or do not have, a fuel jettison system based on compliance with FAR Part 25.119 and 25.121 (d).

Safety and Ecological Aspects

Landing overweight and fuel jettisoning are both considered safe procedures: There are no accidents on record attributed to either cause. In the preamble to Amendment 25-18 to FAR Part 25, relative to fuel jettison, the FAA stated, "There has been no adverse service experience with airplanes certificated under Part 25 involved in overweight landings." Furthermore, service experience indicates that damage due to overweight landing is extremely rare.

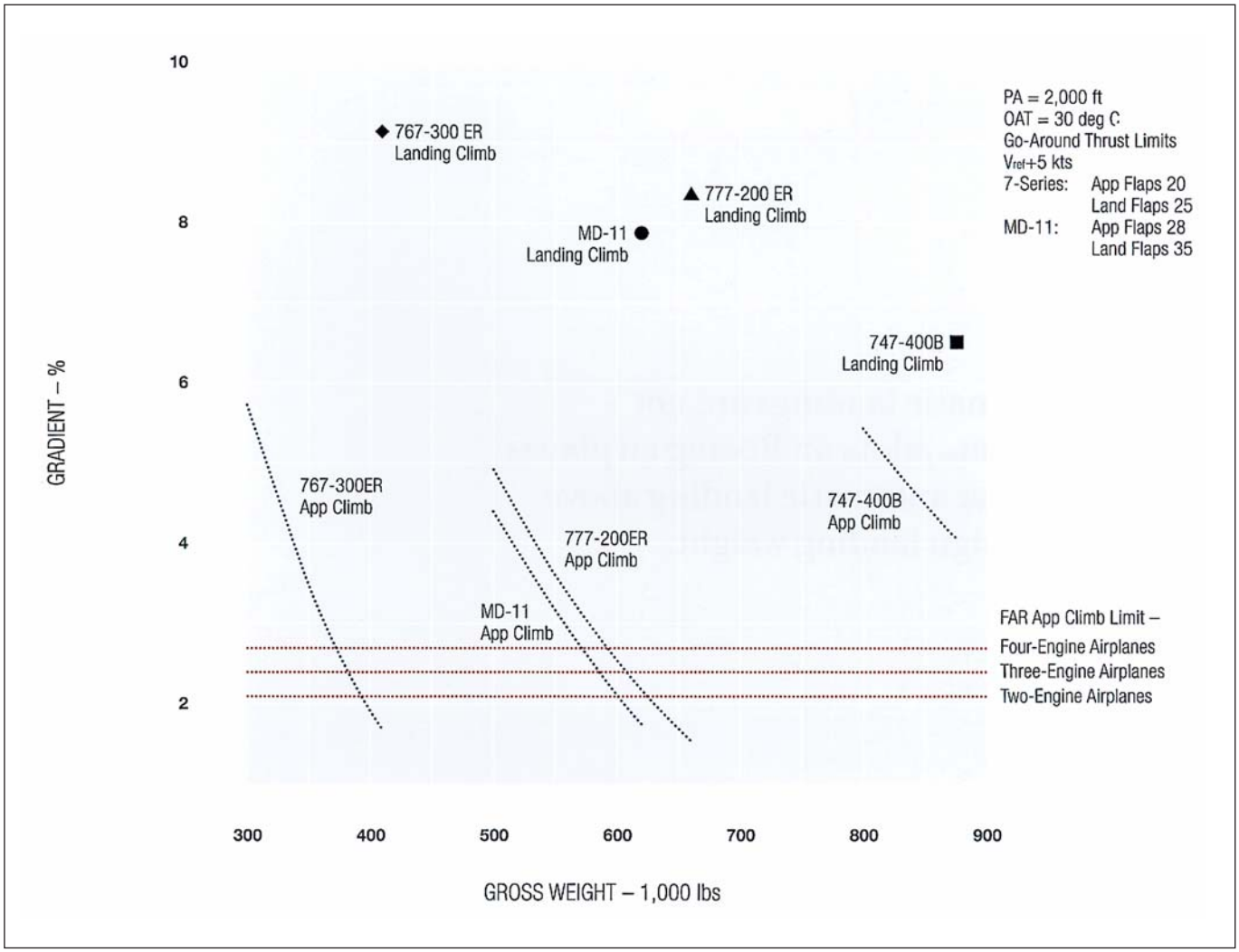

Figure 3. Climb performance margins at weights up to maximum takeoff weight

Obviously, landing at weights above the maximum design landing weight reduces the normal performance margins. An overweight landing with an engine inoperative or a system failure may be less desirable than landing below maximum landing weight. Yet, delaying the landing with a malfunctioning system or engine failure in order to reduce weight or jettison fuel may expose the airplane to additional system deterioration that can make the situation worse. The pilot in command is in the best position to assess all relevant factors and determine the best course of action.

Some operators have questioned whether fuel jettison is permissible when an engine or airframe fire exists. There is no restriction on fuel jettison during an in-flight fire, whether inside or outside the airplane. During airplane certification, Boeing demonstrates to the FAA in a variety of flight conditions that jettisoned fuel does not impinge or reattach to airplane surfaces. As fuel is jettisoned, it is rapidly broken up into small droplets, which then vaporize. Boeing does not recommend operator-improvised fuel jettison procedures, such as jettisoning fuel from only one side during an engine fire. Such procedures are not only unnecessary but also can increase jettison time and crew workload.

The ecological aspects of fuel jettison have been most closely studied by the United States Air Force (USAF). These studies have shown that, in general, fuel jettisoned above 5,000 to 6,000 feet will completely vaporize before reaching the ground. Therefore, Boeing's general recommendation is to jettison fuel above 5,000 to 6,000 feet whenever possible, although there is no restriction on jettisoning at lower altitudes if considered necessary by the flight crew.

Fuel jettison studies have indicated that the most significant variables related to fuel vaporization are fuel type and outside air temperature. Some studies found that temperature can have a very significant effect on the altitude needed to completely vaporize fuel. For example, one USAF study found that a 36-degree Fahrenheit (20-degree Celsius) reduction in temperature can change the amount of liquid fuel reaching the ground by as much as a factor of 10. Other factors such as fuel jettison nozzle dispersion characteristics, airplane wake, and other atmospheric conditions can affect the amount of fuel that reaches the ground.

Even though fuel is vaporized, it is still suspended in the atmosphere. The odor can be pronounced, and the fuel will eventually reach the ground. Boeing is not aware of any ecological interest promoting a prohibition on fuel jettisoning. Because of the relatively small amount of fuel that is jettisoned, the infrequency of use, and the safety issues that may require a fuel jettison, such regulations are not likely to be promulgated.

Airplane Structural Capability

Overweight landings are safe because of the conservatism required in the design of transport category airplanes by FAR Part 25.

FAR criteria require that landing gear design be based on:

- A sink rate of 10 feet per second at the maximum design landing weight; and
- A sink rate of 6 feet per second at the maximum design takeoff weight.

Overweight automatic landings are not recommended. Autopilots on Boeing airplanes are not certified for automatic landing above the maximum design landing weight.

Typical sink rates at touchdown are on the order of 2 to 3 feet per second, and even a "hard" landing rarely exceeds 6 feet per second. Additionally, the landing loads are based on the worst possible landing attitudes resulting in high loading on individual gear. The 747-400 provides an excellent example. The 747-400 body gear, which are the most aft main gear, are designed to a 12-degree nose-up body attitude condition. In essence, the body gear can absorb the entire landing load. The wing gear criteria are similarly stringent: 8 degrees roll at 0 degrees pitch. Other models are also capable of landing at maximum design takeoff weight, even in unfavorable attitudes at sink rates up to 6 feet per second. This is amply demonstrated during certification testing, when many landings are performed within 1 percent of maximum design takeoff weight.

When landing near the maximum takeoff weight, flap placard speeds at landing flap positions must be observed. Due to the conservative criteria used in establishing flap placard speeds, Boeing models have ample approach speed margins at weights up to the maximum takeoff weight (see fig. 1).

Landing overweight and jettisoning fuel are both considered safe procedures.

In addition to specifying a maximum landing weight, the FAA-approved airplane flight manual (AFM) for some 747-400 and MD-11 airplanes includes a limitation on the maximum in-flight weight with landing flaps. This weight is conservatively established to comply with FAR 25.345, flaps down maneuvering to a load factor of 2.0. Compliance with FAR 25.345 is shown at a weight sufficiently above the maximum design landing weight to allow for flap extension and maneuvering prior to landing. Because the loads developed on the flaps are primarily a function of airspeed and are virtually independent of weight, the flaps will not be overstressed as long as airspeed does not exceed the flap placard speed.

If the maximum in-flight weight with landing flaps is exceeded, no special structural inspection is required unless the flap placard speed or the maximum landing weight is also exceeded. Generally, if the maximum in-flight weight with landing flaps is exceeded, the maximum design landing weight will also be exceeded and, by definition, an overweight landing inspection will be required.

Loading on the basic wing structure due to increased landing weight can be controlled by limiting the bank angle. To maintain reasonable structural margins, Boeing recommends that operating load factors be limited to those corresponding to a stabilized 30-degree banked turn.

All Boeing airplanes have adequate strength margins during overweight landings when normal operating procedures are used, bank angle does not exceed 30 degrees, and flap placard speeds are not exceeded.

Airplane Performance Capability

Increased gross weight can have a significant effect on airplane performance. Whenever possible, it is strongly recommended that normal FAR landing performance margins be maintained even during overweight landing. The AFM typically provides landing performance data at weights significantly above the maximum design landing weight and can be used in conjunction with landing analysis programs to calculate landing performance.

The landing field length capability of Boeing airplanes is such that, even ignoring reverse thrust, excess stopping margin is available at weights well above the maximum design landing weight (see fig. 2). The data in figure 2 are based on a dry runway with maximum manual braking. Wet and slippery runway field-length requirements, as well as autobrake performance, should be verified from the landing distance information in the performance section of the flight crew operations manual (FCOM) or quick reference handbook (QRH).

Climb performance exceeds the FAA landing climb gradient requirements (3.2 percent gradient with all engines operating, landing flaps and gear down), even at the maximum design takeoff weight as shown by the Landing Climb symbols in figure 3. Climb performance generally meets the FAA approach gradient requirements (one engine inoperative with approach flaps and gear up) at weights well above maximum design landing weight as shown by the App Climb curves in figure 3, and a positive approach climb gradient is available with one engine inoperative even at the maximum design takeoff weight.

Normally, landing brake energy is not a problem for an overweight landing because the brakes are sized to handle a rejected takeoff at maximum takeoff weight. When using normal landing flaps, brake energy limits will not be exceeded at all gross weights. When landing at speeds associated with non-normal procedures with nonstandard flap settings, maximum effort stops may exceed the brake energy limits. In these cases, Boeing recommends maximizing use of the available runway for stopping. For Boeing 7-series models other than the 717, techniques for accomplishing this are provided in the overweight landing discussion in the “Landing” chapter of the Boeing flight crew training manuals (FCTM).

The stability and control aspects of overweight landings have been reviewed and found to be satisfactory. Stabilizer trim requirements during approach are unchanged provided normal V_{ref} speeds are flown. Speed stability, the control column force required to vary airspeed from the trimmed airspeed, is slightly improved. Pitch and roll response are unchanged or slightly improved as the increased airspeed more than compensates for increased mass and inertia effects.

Additional information on overweight landing techniques for Boeing 7-series models other than the 717 can be found in the “Landing” chapter of the FCTM.

Automatic Landings

Overweight automatic landings are not recommended. Autopilots on Boeing airplanes are not certified for automatic landing above the maximum design landing weight. At higher-than-normal

speeds and weights, the performance of these systems may not be satisfactory and has not been thoroughly tested. An automatic approach may be attempted; however, the pilot should disengage the autopilot prior to flare height and accomplish a manual landing.

In an emergency, should the pilot determine that an overweight autoland is the safest course of action, the approach and landing should be closely monitored by the pilot and the following factors considered:

- Touchdown may be beyond the normal touchdown zone; allow for additional landing distance.
- Touchdown at higher-than-normal sink rates may result in exceeding structural limits.
- Plan for a go-around or manual landing if autoland performance is unsatisfactory; automatic go-around can be initiated until just prior to touchdown and can be continued even if the airplane touches down after initiation of the go-around.

Overweight Landing Inspection Requirements

The Boeing airplane maintenance manual (AMM) provides a special inspection that is required any time an overweight landing occurs, regardless of how smooth the landing. The AMM inspection is provided in two parts. The Phase I (or A-check) conditional inspection looks for obvious signs of structural distress, such as wrinkled skin, popped fasteners, or bent components in areas which are readily accessible. If definite signs of overstressing are found, the Phase II (or B-check) inspection must be performed. This is a much more detailed inspection and requires opening access panels to examine critical structural components. The Phase I or A-check conditional inspection can typically be accomplished in two to four labor hours. This kind of inspection is generally not a problem because an airplane that has returned or diverted typically has a problem that takes longer to clear than the inspection itself.

Summary

When circumstances force a pilot to choose between an overweight landing or jettisoning fuel, a number of factors must be considered. The information in this article is designed to facilitate these decisions. For more information, please contact Boeing Flight Operations Engineering at FlightOps.Engineeringboeing.com.

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Perception, Attention and Safety Management Training

by Nick Carpenter MRAeS

How often do you drive the same route to work? Twice a day five times a week on average? How many stop signs do you pass? How many of the cars you pass do you see regularly on your route? They are difficult questions because our five senses are daily bombarded with stimuli. How difficult it must be for our brain to take stock of all these inputs competing for our attention, because it is only when we attend to things that we become truly aware of them, or is it? When engrossed in conversation it is possible to become aware of other people discussing another topic of interest to you, yet you were attending fully to the earlier task. Seeing, perceiving and attention are therefore all different levels of our brain's processing of the environment about us.

How then does the human brain manage to cope with this sensory overload? If we accept that information is taken in by our five senses and transferred to the brain by a series of complex neural pathways we have to decide whether the information that reaches the brain is raw, i.e. as seen, or if it is in some way modified by our outlook on the world. Figure 1 shows an image with which we are all familiar. Two dice. However what is perceived depends on life experience. A child may see building blocks, an adolescent may see the beginning of a game and a gambler may see an all consuming addiction.[i] The information that has been transmitted by your eye to the occipital lobe of your brain has been enhanced. It may be a difficult concept to grasp, but what our senses detect is not necessarily what our brain perceives. Figure 2 shows a series of black and white dots[ii]. If given context, 'Moo!' some might perceive that the series of black and white dots is actually a picture of an animal. Once seen it is difficult not to perceive the bovine animal staring out at one[iii]. So our senses have been tricked but our perception has been 'trained'.

Figure 1

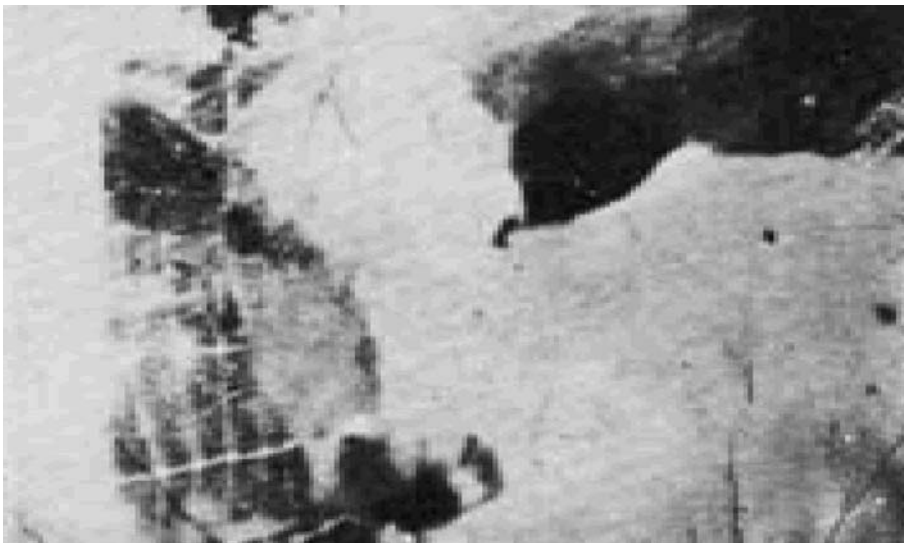


Figure 2

The idea of information arriving at the brain 'raw' would require an enormous amount of processing power but evolution has given us a brain that is modular allowing it to simplify this awesome task.[iv] Of all the tasks that we have to confront on a daily basis, the most taxing is social interaction.[v] In our evolutionary past it was necessary for us to deal with other members of our group in order to survive and procreate, these complex interactions have been eased by the development of neural circuits that are specialised in solving, amongst other things, social problems.

In the 1920s, Professor Frederick Bartlett became interested in how humans perceived their social world. Using foreign folk stories he tested undergraduates' recall of stories he read to them.[vi] He discovered that they invariably changed these stories to fit with their culture and life experience. He described the formation of mental structures about our own cultural world as schema into which we try to fit new experience. The suggestion is that in order to make sense of the social world, we use our previous experience to build stereotypes. This enables us to limit the processing capacity required to draw conclusions about our social world, we could be described as cognitive misers[vii]!

An elegant example of the human use of schemata was displayed by the Guardian newspaper. In their television advertisement

Figure 3

Figure 4

Figure 5

a skinhead was seen running along a road towards a businessman with a briefcase (figure 3) who reacted defensively before being hurled into a shop front (figure 4). It is only at this stage that we see a load of bricks falling from above (figure 5) which would have hit him if the skinhead had not bundled him out of the way. Perhaps not surprisingly, given our 'knowledge' of skinheads, we believe that the businessman is about to be attacked. It is only with the final picture that we realise he is in fact being saved. Our stereotype of skinheads as violent has in this case misled us, but in the main our schemata allow us to efficiently make use of our senses to quickly understand our social world.

The Guardian advertisement provides an interesting insight into human perception of the social world and their place in it. Humans need to ascribe reasons for

others' behaviour. In our example of the skinhead we could have thought that he was running as a result of being late for an appointment. However studies have shown that humans are prone to 'attribution bias'; that is they tend to hold others 'internally' responsible for the predicaments that they find themselves in while blaming external factors for any personal predicament affecting them. In addition, Lau and Russell in 1980[viii] studied sports reports in America that showed that we not only attribute failings to individuals themselves but we put personal success down to our own hard work and personal failure down to external events.

There is another interesting bias that affects us, the optimistic bias. The optimistic bias allows us to smoke, in spite of the overwhelming evidence that suggests we may be doing ourselves harm. This may be as a result of the way we interpret information presented to us. For example; when asked is murder or suicide the more likely manner of death in the US? Most answer murder, in spite of the fact that statistically suicide is more prevalent.[ix] Perhaps media reports of violent murders keep them current in our minds or we compare ourselves with others at higher risk. Smokers, when presented with evidence of the risks, possibly compare themselves with heavier smokers to provide some defence against anxiety; an evolutionary defence.

With our knowledge of how we perceive our social world it is now interesting to look briefly at memory. How we encode, store and recover information is an interesting study in itself. For the moment we will concentrate on information recovery and some studies that show how flawed our recall can be. We have already met Professor Bartlett and his social schema. His work shows that the accuracy of our memory can be affected by our past experience. Elizabeth Loftus has taken this further proving that false memories can be triggered in up to 25 percent of individuals merely by suggestion, and that memory can be interfered with and altered by simply giving incorrect post-event information. Her seminal work involved showing individuals a video clip of a car accident. Simply by changing the severity of the verb describing the impact she was able to affect participants recollection of the event.[x]

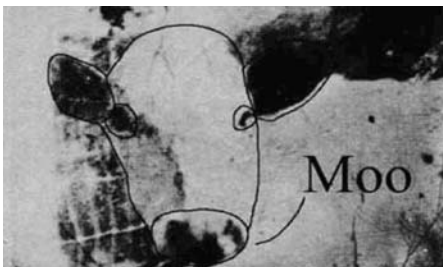
Knowing that humans are biased in their view of the world, struggle with memory and are easily misled it is interesting to consider the role of the safety manager in a modern technical enterprise. As if trying to uncover latent error doesn't provide enough of a challenge, the very raw material that requires to be worked with (people) may unwittingly be presenting half truths! In spite of this, safety managers with minimal training and commendable professionalism have to discover what is going on in order to be able to reduce risk. How this can be achieved without any kind of training is an interesting conundrum. Bearing in mind the training and experience required to become a manager in any other aviation field, it is interesting that the safety role, required by JAR-OPS 1.037, has no such requirement. While the Australians are working towards legislation to ensure that their future aviation safety managers will have training commensurate with their responsibility[xi] and the European Regions Airline Association has produced STAR 005 (FSO Training) the agencies responsible for enacting this legislation worldwide have been less than forward thinking in their approach to this legislation. As a direct result, at present very few courses are available to train would be safety managers; the UKFSC and the Australian Transport Safety Bureau being two of very few.

Perhaps the time is nigh when the role of safety within airline management should be reviewed and safety managers should be given the opportunity to expand their knowledge by the provision of a course that gives them some insight into the variability of human performance within an effective Safety Management System.

[i] Phenomenological approach to perception, Edgar, G (2002) 'Perception and attention', in Miell, D.,Phoenix, A. and Thomas, K. (eds) Mapping Psychology, Milton Keynes, The Open University

[i] After Dallenbach, K. (1951)

[ii]



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[v] Winston, R.(2003) 'the human mind' Bantam books, The Random House Group Ltd.

[vi] Sir Frederick Bartlett 'The War of the Ghosts' http://www.bbc.co.uk/radio4/science/mindchangers3.shtml

[vii] Edgar, G (2002) 'Perception and attention', in Miell, D.,Phoenix, A. and Thomas, K. (eds) Mapping Psychology, Milton Keynes, The Open University

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[ix] http://engram-backtalk.blogspot.com/2007/04/guns-and-murder-in-america.html

[x] Loftus, E. http://faculty.washington.edu/eloftus/

[xi] Advisory Circular 119-165 Safety Management Training

UK FLIGHT SAFETY COMMITTEE

TECHNICAL INNOVATION AND HUMAN ERROR REDUCTION

Annual Seminar 2007

1st/2nd October 2007
The Radisson Edwardian Hotel Heathrow

SEMINAR OBJECTIVE

The continuing growth in technical innovation has without doubt helped to reduce the number of accidents. However, some of these developments have introduced unexpected challenges for the operators. The formulation of good procedures helps to mitigate these challenges, but there is a consensus within the industry that major difficulties still exist. This Seminar will highlight the problems encountered and propose strategies for the future.

PROGRAMME

1st October 2007

2000hrs Seminar Dinner

After Dinner Speaker - Simon Phippard - Rolls Royce

2nd October 2007

0800 - 0900	Registration
Session Chairman - Capt. Tony Wride - Monarch Airlines	
0900 - 0910	Welcoming Introduction **- Capt. Robin Berry – Chairman - UKFSC**
0910 - 0945	Keynote Speech - **Dr Kathy Abbott – FAA**
0945 - 1020	Future ATM/Single European Sky - **Mark Green – GATCO**
1020 - 1040	*Refreshment Break*
1040 - 1115	R-NAV, B-RNAV, P-RNAV - **Andy Shand – NATS**
1115 - 1150	Passenger Entertainment in the 21st Century - **Stuart Seeney – Panasonic Avionics Corp.**
1150 - 1225	Flying the Emb195 - **Capt. Bob Horton – flybe.**
1225 - 1255	*Questions*
1255 - 1400	Lunch
1400 - 1435	The Complexity of Unmanned Aerial Vehicles (UAVs) - **Cdr Paul Brundle, RN Defence Aviation Safety Centre**
1435 - 1450	*Comfort Break*
1450 - 1525	Airbus - The Way Forward - **Peter Potaki - Airbus**
1525 - 1600	Maintenance Human Factors - **Howard Leach - RAeS**
1600 - 1630	Questions
1630 - 1645	Closing Speech - **Capt. Robin Berry – Chairman - UKFSC**

SEMINAR INFORMATION

- **Hotel Accommodation**

  Hotel accommodation is not included in the Seminar Registration Fee. A rate of £147 (including breakfast & VAT) has been negotiated with the Radisson Edwardian Hotel (valid only until 30th August). If you require accommodation please contact the hotel directly on Tel. +44 (0) 20 8759 6311 and quote Block Booking Code 1001 UKF when making your reservation.

- **Seminar Dinner**

  Dress for Dinner – Black Tie/Lounge Suit

- **Cancellations/Refunds**

  Cancellations received prior to 25th August 2007 will be refunded 50% of registration fee. Refunds after this date will not be given.

If you are unable to attend why not nominate a colleague to take your place.
If so, please advise the UKFSC Fairoaks office of any changes prior to the Seminar.

SEMINAR REGISTRATION FORM

Please complete in full one registration form per person. (Photocopies accepted)

(Please print clearly)

First Name:	Surname:
Company:	Job Title:
Address:	
Tel No:	Fax No:
e-mail:	

PAYMENT INFORMATION

Seminar Fee: UKFSC Member £200 ☐ Non-UKFSC Member £250 ☐

This includes the Seminar Dinner on the evening of 1st October, lunch, refreshments and car parking.
This does not include hotel accommodation - please see 'Seminar Information'.

Payment is by Sterling cheque only. No credit cards are accepted. Bank transfer is available, details on request (please note an additional cost of £6 will be added to cover handing charges). The UKFSC is not VAT Registered.

Sterling cheques should be made payable to UK Flight Safety Committee.

☐ Do you plan to attend the Seminar Dinner on Monday 1st October? ☐ Yes ☐ No

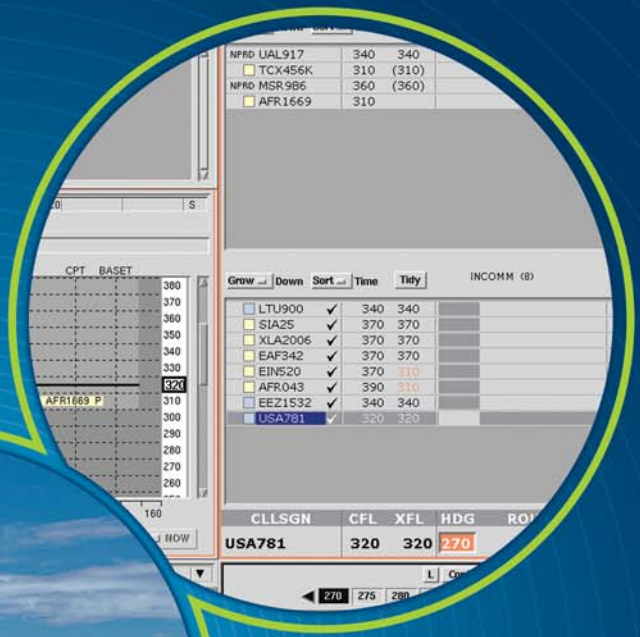
☐ Do you require a Vegetarian alternative? ☐ Yes ☐ No

Please send your completed registration form with your cheque to: UK Flight Safety Committee, Graham Suite, Fairoaks Airport, Chobham, Woking, Surrey GU24 8HX
Tel: +44 (0)1276 855193 Fax: +44 (0)1276 855195 email: admin@ukfsc.co.uk
Confirmation will be sent to you on receipt of your Registration Form and payment.

UK FLIGHT SAFETY COMMITTEE

TECHNICAL INNOVATION AND HUMAN ERROR REDUCTION

Annual Seminar 2007



1st/2nd October

The Radisson Edwardian Hotel
Heathrow