focus

ON COMMERCIAL AVIATION SAFETY

AUTUMN 2003

ISSUE 52

THE OFFICIAL PUBLICATION OF THE
UNITED KINGDOM FLIGHT SAFETY COMMITTEE

ISSN 1355-1523

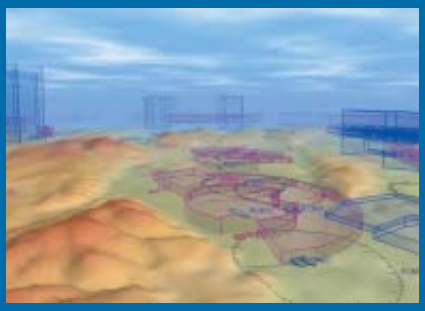
charting new courses.

Digital Charting Solutions

Jeppesen continues to set the standard for accurate and up-to-date flight information. We are leading the way with innovative digital charting solutions that can give your operation distinct advantages in **performance**, **safety**, **and overall effectiveness**.

Whether you use JeppView, JeppView FliteDeck, or our digital charts in an integrated avionics system, our goal is to provide you **the highest level** of convenience and capability now and in the future.

When it comes to **mission critical flight information**, it's nice to know you have Jeppesen OnBoard.



For more information about **Jeppesen digital charts** visit us on the internet at **www.jeppesen.com**

or call us:

1-800-621-5377
or 303-799-9090
(Western Hemisphere)

+49 6102 5070
(Eastern Hemisphere)

+61 3 9706 0022 (Australasia)

JEPPESEN®
Making Every Mission Possible

The Official Publication of
THE UNITED KINGDOM FLIGHT SAFETY COMMITTEE

ISSN: 1355-1523 **AUTUMN 2003** **ON COMMERCIAL AVIATION SAFETY**

focus

contents

Front Cover: C17 in RAF livery

Photo kindly supplied by Flight Images

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.*

Editorial Office:
Ed Paintin
The Graham Suite
Fairoaks Airport, Chobham, Woking,
Surrey. GU24 8HX
Tel: 01276-855193 Fax: 01276-855195
e-mail: admin@ukfsc.freeserve.co.uk
Web Site: www.ukfsc.co.uk
Office Hours: 0900-1630 Monday-Friday

Advertisement Sales Office:
UKFSC
The Graham Suite,
Fairoaks Airport, Chobham, Woking,
Surrey GU24 8HX
Tel: 01276-855193

Printed by:
Woking Print & Publicity Ltd
The Print Works, St.Johns Lye, St.Johns
Woking, Surrey GU21 1RS
Tel: 01483-884884 Fax: 01483-884880
ISDN: 01483-598501
e-mail: sales@wokingprint.com
Web: www.wokingprint.com

Changing the Law

For a number of years the Department of Transport (DfT previously the DTLR) has been holding twice yearly discussions with aviation industry representative bodies on disruptive passenger behaviour.

These meetings resulted in the introduction of a disruptive passenger report that is submitted to the Civil Aviation Authority (CAA) by aircrew following any disruptive passenger incident. The response from airlines and their aircrew to this initiative has been very good. These reports are categorised, collated and used to produce meaningful statistics to monitor and illustrate the scale of the problem. They are also used to indicate the trend of the incidents of disruptive passenger behaviour and to brief various government officials.

As a result of discussions at these meetings it was decided that the powers of the police were inadequate to deal effectively with such disruptive passengers. A proposal was made to change the law to increase the powers of the police attending to calls from aircrew who have experienced disruptive passenger incidents on their aircraft.

The proposed changes to the law were presented to Parliament in a Private Members Bill by Frank Roy MP for Motherwell and Wishaw. This Bill passed its second reading on the 7th February 2003 and became Law on the 9th July 2003.

The provision of the new Aviation Offences Act gives the police greater powers of arrest of suspected air rage offenders and will help the police prosecute anti social behaviour that sometimes occurs onboard aircraft. This behaviour can be frightening to both passengers and crew. Hopefully this change to the law will increase the success rate of the police in dealing with disruptive passengers and help to deter would be offenders.

Credit for these changes must go to Frank Roy MP but also those crew members who have diligently submitted the disruptive passenger reports that have enabled the number and type of incidents to be monitored. Without their coopertion there would have been no information for analysis.

It is hoped that following the small success aircrew will continue to submit the reports so that we can continue to monitor the situation. It will be interesting to see what effect the changes to the law has.

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.

Close Encounters

by John Dunne, Airclaims

Runway incursions have been with us for some time now. They are a very real threat to Flight Safety and are increasing in risk exposure as traffic continues to increase.

The CAA has recently requested the aviation industries participation in their "Runway Incursions – Research into Causes" initiative. This research is being conducted in parallel with similar initiatives from other regulators and flight safety bodies.

The UKFSC welcomes this and is fully endorsing and supporting it through our Operational Safety Committee. Most of our members will have received a copy of the CAA's questionnaire via e-mail and they are urged to ensure that their company responds.

Those involved in safety management systems continue to examine the difficulties of communication and company procedures with a view to preventing similar events. Perhaps it is appropriate for us to reflect where our organisations stand in relation to previous ground collisions: Chicago F27 and DC6, poor weather compounded by communication errors. Tenerife, 2 x B747s in poor visibility compounded by communication errors. Paris, MD80 and Shorts S360, at night with visual distractions compounded by communication errors and the Linate (Italy) accident, ground collision involving and MD80 and an executive jet have been made available and highlight poor communication as being a significant contributory factor in the final link of the accident chain.

A recent FAA report states that in the period between 1999 and 2002 there were in excess of 1,400 reported runway incursions in the USA. The majority of these incidents contained an element of communications error, more significant perhaps is that in each event no one individual involved appears to have had the total picture of the event that unfolded before them. Digging down a further layer on this element we can observe the classic HF issues of confusion and lack of complete communications – a situation where everyone has a clear picture of their version of the plan but not that of the other person and no one in that loop had the overall picture.

This maybe the time to stand back a little further from the coal face, reflect a little and consider the uncomfortable. We are all fallible; we all get it wrong sometimes. To paraphrase Lincoln: We can't all be right all of the time, but all of us can be right some of the time. The problem is when we get it wrong at the same instant as someone else who is operating somewhere in the same loop as ourselves. How do we realistically protect against human fallibility? Perhaps we need to consider developing a simple mechanical system on the established premise that humans do fail every now and then (usually at the most inconvenient time) and one that does not require judgemental or interpretation skills. Additionally such a system would need to meet the strict certification requirements on both sides of the Atlantic at a cost that is not prohibitive to smaller airports and is demonstrably reliable.

New ETOPS Regulations

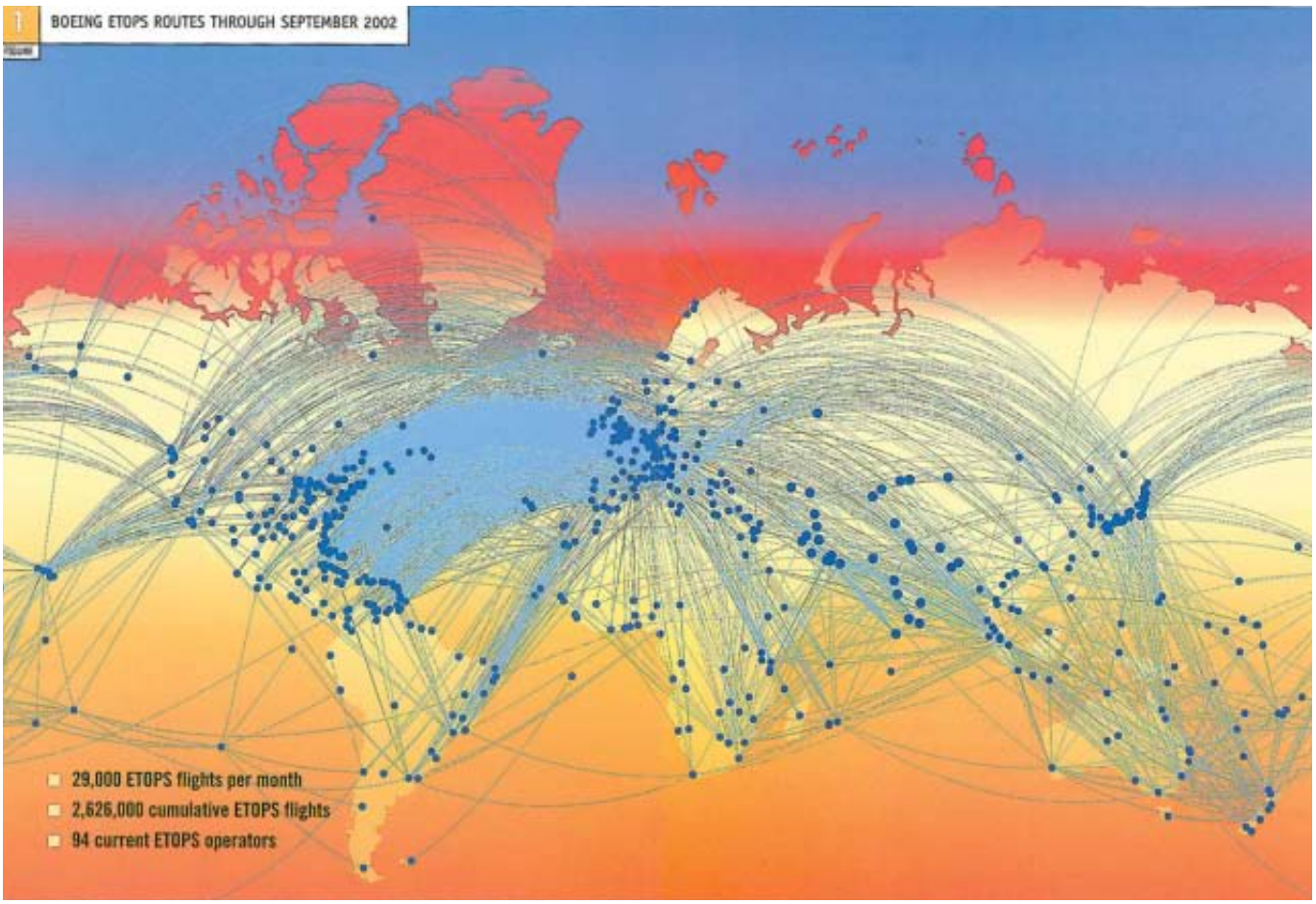
Extended-range operations with two-engine airplanes (ETOPS) rank among the safest and most reliable of all flight operations. Pending rulemaking by the U.S. Federal Avaition Administration may expand these reliability enhancements and operational protections to all extended-diversion-time operations (i.e., flying on routes with the potential for an extended diversion), not just those performed with two-engine airplanes.

As airplane range capabilities continue to increase, flights across remote regions of the world are becoming more common. The global aviation community - which collaboratively defined and proposed with U.S. rulemaking - believes that applying ETOPS rules to all extended-diversion-time operations will raise the industry to a higher and uniform standard.

On December 16, 2002, the Aviation Rulemaking Advisory Committee (ARAC) - an advisory committee of the U.S. Federal Aviation Administration (FAA) - presented to the FAA its findings and recommendations on extended operations (i.e., operations on routes with the potential for an extended-duration diversion). Initiated by the FAA tasking statement of June 14. 2000, this proposed U.S. rulemaking marks the culmination of more than two years of global collaboration to review current requirements for extended-range operations with two-engine airplanes (ETOPS) and proposes updated and standardized requirements that will embrace all extended-diversion-time operations, not just those performed with two-engine airplanes.

The ARAC ETOPS Working Group comprised expert representatives from many of the world's airlines, airframe and engine manufacturers, pilots' associations, regulatory authorities, and non-governmental organizations. In keeping with its proposal that the extended-operations protection be applied broadly to protect all airplanes, regardless of the number of engines, the ETOPS Working Group further recommended that the term ETOPS itself be redefined to simply mean extended operations. (See "ARAC ETOPS Working Group Participants").

The FAA will evaluate the proposed ARAC findings and recommendations, make whatever changes it deems appropriate, and publish the results in a Notice of Proposed Rulemaking (NPRM) for public



review and comment. Following comment resolution, the FAA is expected to enact new extended-operations rules, perhaps as soon as late 2004.

This article discusses the reasons behind this global activity and describes the specific regulatory changes that the ARAC has proposed.

THE ETOPS PARADIGM SHIFT

When the conservative ETOPS program began in 1985, its intent was to ensure that the safety of two-engine airplanes would match that of three- and four-engine airplanes on long-range transoceanic routes. Implicit in the ETOPS rules was the initial assumption that turbine-powered airplanes with two engines were inherently less safe than those with three or more engines. As a result a separate set of more stringent requirements was deemed necessary for operating two-engine airplanes on routes with the potential for an extended-duration diversion.

Since then, however, extensive ETOPS service experience has brought about a profound revision to that initial thinking. After nearly two decades of highly successful ETOPS around the world, the global aviation community today views ETOPS in a different light. Characterizing this profound data-driven paradigm shift are the present-day industry perceptions that

1. ETOPS is the state of the art in intercontinental air travel.

2. Engine reliability is no longer the single focus of safety concerns.

3. A uniform standard is desirable for all extended operations.

1. ETOPS IS THE STATE OF THE ART IN INTERCONTINENTAL AIR TRAVEL

ETOPS is the dominant mode of transatlantic flight operations today and accounts for a rapidly growing component of transpacific and other operations as well. Since 1985, more than 3 million ETOPS flights have been logged using the twinjets of several manufacturers. Today, about 125 operators worldwide log an additional 1,100 ETOPS flights each day. Of this industry total, Boeing twinjets alone have performed more than 2.6 million ETOPS flights, and 94 Boeing operators fly nearly 1,000 more each day (fig. 1)

This vast service experience reveals that ETOPS ranks among the safest and most reliable of all flight operations. This success results from the preclude and protect philosophy of ETOPS, which enhances flight operations in two ways:

- ETOPS-related design improvements and maintenance practices increase airplane systems and engine reliability making it less likely that an airplane will need to divert from its intended course and land at an alternate airport.

- ETOPS operational requirements introduce proactive measures that protect the airplane, passengers and crew should a diversion occur.

This philosophy has indirectly benefited the entire industry. All commercial operations today - including those performed with three- and four-engine airplanes - benefit from gains in the reliability and robustness of airplane engines and systems initially achieved through ETOPS programs.

Operators flying three- and four-engine airplanes are not currently required to meet the high ETOPS standard. Nevertheless, some operators already comply with key ETOPS safely enhancements on a voluntary basis. This elective application of ETOPS best practices suggests that the maintenance and operational benefits of ETOPS are well recognized by the global industry and that operators find them cost effective.

2. ENGINE RELIABILITY IS NO LONGER THE SINGLE FOCUS OF SAFETY CONCERNS

In the past, concerns about flight safety focused first and foremost on the reliability of propulsion systems. When ocean-spanning commercial flight operations began after World War II, that narrow focus was appropriate in light of the limited reliability of piston engines. During the 1940s and l950s, in fact, piston engine-related events were the predominant cause of airliner accidents and contributed to a worldwide fleet hull-loss accident rate that was some 60 times higher than today's.

The limited reliability of piston engines led to an operating restriction being placed on two-engine airplanes 50 years ago. The intent of the so-called 60-Minute Rule of 1953 (U .S. Federal Aviation Regulation [FAR] 121.161) was to bar two-engine propeller airplanes, such as the Douglas DC-3, from flying extended routes then more safely served by four-engine propeller types, such as the DC-4. That piston-era operating restriction remains in effect at the time of this writing.

During the late 1950s, however, the transition to turbine power brought about a quantum leap in propulsion system reliability. Engine reliability has continued to improve in the jet age, so much so that

today's high-bypass-ratio fan jet engines are at least 50 times more reliable than the large piston engines that inspired the 60-Minute Rule.

By the l970s,. advancing technology had set the stage for two-engine, turbine-powered airplanes to safely exceed the 60-min operating restriction. The result was ETOPS, which began in 1985 with 120-min diversion authority and the requirement for an average engine in-flight shutdown (IFSD) rate of just 0.05 per 1,000 engine-hours. With 180-min ETOPS authority, which followed in 1988, an even more stringent reliability target of just 0.02 IFSDs per 1,000 engine-hours was specified.

In this way, ETOPS drove manufacturers and operators alike to pursue dramatic gains in propulsion system reliability. The industry met this challenge and bettered it. During the past few years, in fact, the average IFSD rate of the worldwide 180-min ETOPS

So profound has this trend been that propulsion reliabilities unachievable just 15 years ago are today routine in the modern twinjet fleet.

fleet has typically been at or below 0.01 IFSDs per 1,000 engine-hours - twice the reliability required for such operations. So profound has this trend been that propulsion reliabilities unachievable just 15 years ago are today routine in the modern twinjet fleet.

In light of these advances, and because the safety and reliability of two-engine airplanes equal or exceed those of three- or four-engine airplanes, the industry no longer views propulsion system reliability as the primary safety and reliability concern in extended operations. Instead, current rulemaking recognizes that a variety of airplane systems and operational issues (e.g., cargo fire suppression capability, weather conditions and facilities at alternate airports) are relevant to overall safety and reliability on routes with the potential for an extended diversion.

3. A UNIFORM STANDARD IS DESIRABLE FOR ALL EXTENDED OPERATIONS

All airplanes flown on extended-diversion-time routes face similar operating challenges in terms of weather, terrain, and limitations in navigation and communications infrastructure. Given that the operating environment is common to all extended operations and that all categories of jetliner are safe, the global aviation community believes a uniform standard is desirable for extended operations. The global community further recognizes that applying ETOPS requirements to all airplanes - not just those with two engines - will raise the industry to a higher and uniform standard.

Although diversions are rare, any airplane might someday need to divert to an airport other than its intended destination for various reasons (e.g., passenger illness, smoke in the flight deck or cabin, turbulence, adverse winds, weather, fuel leak, cargo fire, in-flight engine failure or shutdown). Thus, the dual ETOPS philosophy of precluding diversions and protecting the passengers, crew, and airplane on those rare occasions when diversions do occur is applicable to all extended operations, not just those performed with two-engine airplanes.

As a result of ETOPS, the industry has achieved significant improvements in the reliability and robustness of airplane engines and systems. However, such efforts can never entirely prevent diversions because most are unrelated to the airplane, its systems, or its engines. In fact, fewer than 10 percent of all diversions during extended operations are airplane related, and fewer than 3 percent are the result of an in-flight engine failure or shutdown. In general, of course, engine failures tend to occur during takeoff and initial climb rather than during the cruise phase of flight where ETOPS is flown.

PROPOSED U.S. REGULATORY CHANGES

This paradigm shift created growing awareness around the world that the regulatory framework currently governing twinjet and other extended operations should be reviewed. Consequently, the FAA - which meets its responsibility to update regulations through the proven ARAC process - initiated the collaborative ARAC activity previously described.

The ARAC-proposed regulations (table 1) might change as a result of the current FAA review and pending NPRM comment processes. We at The Boeing Company are proud to have participated in this global ARAC effort, which will make flying even safer and more reliable in the coming years. Pages 8 through 10 detail the proposed changes.

ETOPS Authorization

The ARAC has recommended that FAR 121.161 (the 60-Minute Rule) and associated guidance and advisory material be revised to

- Establish the basis and requirements for operating twin-engine, turbine-powered airplanes beyond 60 min of flying time (at single-engine cruise speed with no wind and in standard conditions) of an adequate alternate airport.

- Apply this same regulatory framework to the operation of turbine-powered airplanes with more than two engines beyond 180 min (at one-engine-inoperative cruise speed with no wind and in standard conditions) of an adequate alternate airport and also make it applicable to all operations in polar areas (see Polar Operations. p. 10).

- Make the designed and certified operating capabilities of the airplane type the basis for determining the maximum diversion authority of that type.

- Define allowable diversion authorizations for different regions of the world based on the overall operational needs of each region.

- Apply current ETOPS best practices to all extended operations.

It should be noted that, although these proposed ETOPS requirements are consistent for all jetliners, the threshold varies at which they would take effect. For two-engine airplanes operating under FAR Part 121, ETOPS will be in effect - as is currently the case - on routes where the airplane is at some point more than 60 min flying time from an alternate airport. For FAR Part 121 operations by airplanes with three or more engines, these new ETOPS rules will apply on routes that are at some point more than 180 min from an alternate airport. They also will apply to all operations in the polar regions (i.e., the areas north of 78 oN latitude and south of 60oS latitude).

Definitions

The ARAC has proposed that ETOPS-applicable definitions be added to FAR Part 121. Many of the terms used in the new regulations and guidance material for ETOPS are unique to extended operations and demand precise definition to ensure common understanding and proper compliance.

To encompass all extended-diversion-time operations, not just those flown with two-engine airplanes, the term ETOPS would be redefined as extended operations (as used in this article) and shall no longer mean extended-range operations with two-engine airplanes. Another noteworthy change is the addition of the term ETOPS alternate, which is an airport that meets stated requirements for planned diversion use and at which the weather conditions are at or above the operating minimums specified for a safe landing. This new term would replace the current ETOPS term, suitable, which denotes an alternate airport that is both above required weather minimums and available for diversion use. Under the new rules, suitable would no longer have an ETOPS-specific meaning; where it appears in the new regulations and associated guidance material, therefore, it should be interpreted only according to its broadly accepted, everday definition.

It should be noted that long-range operations (LROPS) is not proposed as an ETOPS term. Although used by some segments of the global industry, LROPS currently does not appear or have legal standing in the FARs. The ARAC ETOPS Working Group did not propose adding LROPS because the term would be misleading - extended operations are defined by distance to an alternate airport, not by overall length of flight - and because it invites confusion with the similar but unrelated term ultra-long-range operations, which deals primarily with flight crew duty time, crew rest, and other human-factors issues.

Communications

Current regulations require reliable communications. Recognizing that advances in technology occur and that verbal communications can be particularly valuable, the proposed rule promotes the adoption of voice communications for extended operations.

This proposed rule states that the most reliable communications technology -

voice based or data link - shall be installed in all airplanes operating beyond 180 min from an alternate airport. Alternative means of communication must also be available in the event the most reliable means is not available for any reason (e.g., lack of satellite coverage). Examples of these communications technologies (e.g., SATCOM voice link, SATCOM data link, HF data link) are given in the associated guidance material.

The proposed rule is not intended to require operators to continually upgrade existing installations on an incremental basis. Rather, the rule is meant to further the adoption, as appropriate, of new technologies that significantly enhance the quality and reliability of communications. One example of such innovation is today's transition from HF radio to satellite-based technologies.

Dispatch

The ARAC has proposed a new regulation specifying airplane dispatch requirements for ETOPS alternate airports. The operator would have to select en route alternate airports that meet the weather requirements set forth in its operations specifications.
Because alternate airport weather is checked before airplane departure, and weather conditions can vary over time, the conservative weather minimums required for dispatch are higher than those that would be required to perform an instrument approach at that alternate airport. As proposed, this dispatch rule further requires the crew to verify the continuing availability of a valid alternate airport by means of en route weather updating at the beginning of the ETOPS phase of flight. For this en route updating, the crew would be required to ascertain only that the planned alternate is above normal landing minimums, not above the higher minimums applied before dispatch.

One of the distinguishing features of ETOPS is the identification of and reliance on alternate airports to which airplanes can divert should an unscheduled landing become desirable or necessary, Under this proposed regulation, operators flying three- and four-engine airplanes in extended operations would be required to designate ETOPS alternate airports within 240 min or if beyond 240 min, designate the nearest available ETOPS alternate.

Propulsion-Related Diversions

The ARAC has proposed no substantive change to the rule that governs diversion following an in-flight engine failure or shutdown. However, the committee did offer guidance to further clarify existing diversion requirements for two- engine airplanes in the event of engine failure or shutdown.

To aid flight crews, the proposed guidance lists factors (e.g., airplane condition and systems status, weather conditions en route, terrain and facilities at the alternate airport) that the pilot in command should consider when deciding which alternate airport to divert to. To ensure that safety always remain paramount the ARAC further identified factors that shall not be considered sufficient justification for flying beyond the nearest available alternate airport (e.g., additional range capability based on remaining fuel supply, passenger accommodations beyond basic safety, maintenance and repair facilities at the available alternate airports).

Fuel Reserve

The ARAC has proposed that all airplanes flown in extended operations shall carry an ETOPS fuel reserve to protect the passengers, crew, and airplane in the event of a cabin depressurization followed by a low-altitude diversion.

Cabin depressurization is a very rare event that can occur on any jetliner and is largely unrelated to the number of engines. If it does occur, the flight crew must immediately descend to an appropriate altitude, as defined by oxygen availability or oxygen systems capability. A diversion is then generally required because of the increased fuel consumption of turbine engines at low altitudes and the corresponding reduction in range.

This ETOPS fuel reserve requirement assumes that decompression would occur at the most critical point along the route in terms of total fuel consumption (a concurrent engine failure is further assumed if it would add to the total). The reserve thus calculated would ensure sufficient fuel for an extended low-altitude diversion followed by a descent to 1,500 ft at the alternate airport, a 15-min hold, and an approach and landing. Further allowance is made for possible airframe icing and wind forecasting error.

Following extensive review of data related to the accuracy of wind forecasting, as well as review of the icing scenario based on the Canadian Atlantic Storms Program (CASP II), the ARAC proposed revising the ETOPS fuel reserve requirement. Under this proposed rule, two-engine airplanes on extended operations would carry somewhat less reserve fuel than in the past. Airplanes with more than two engines would be required to carry an ETOPS fuel reserve for the first time, although many three- and four-engine operators do currently carry a depressurization fuel reserve as a matter of internal airline policy.

Maintenance

The ARAC has proposed making current twin-engine ETOPS maintenance standards applicable to all airplanes flown in extended operations. This would require three - and four - engine operators to also have an ETOPS maintenance program in place before flying routes with the potential for an extended diversion.

ETOPS maintenance requirements have significantly reduced the incidence of in-flight engine failures. Such events can be enormously costly and disruptive for airlines, which is why some operators of three- and four-engine airplanes have already voluntarily raised their maintenance standards to ETOPS levels.
Passenger Recovery Plan

The ARAC has proposed that all extended operators shall develop a plan to ensure the well-being of passengers and crewmembers at diversion airports. This plan should address their safety and comfort at that airport in terms of' the facilities and accommodations and their retrieval from that airport.

Currently, passenger recovery plans are required only for cross-polar operations. Because diversions can occur anywhere, however, the ARAC has proposed that every operator flying routes over remote areas of the world should anticipate the possibility of a diversion within those regions and devise a plan outlining how it would recover the passengers, crew, and airplane.

Cargo Fire Suppression

To further ensure safety, the ARAC has proposed that all time-critical systems aboard airplanes flown in extended operations shall have sufficient capability to protect the airplane throughout the longest potential diversion for that route. In particular, each flight shall have continuous fire suppression capability for a period equivalent to the maximum planned diversion time plus an additional 15 min to cover approach and landing at the alternate airport.

Two-engine airplanes flown in extended operations have met this requirement since 1985. In contrast, although all jets have fire suppression systems, those with more than two engines are not currently required to carry sufficient fire suppressant during extended operations to protect the airplane continuously throughout a maximum-duration diversion.

The ARAC has proposed that three- and four-engine airplane operators that do not currently comply with this requirement shall have six years after ETOPS regulations take effect to bring their existing fleets into compliance with this new rule.

Many airplane systems enhance safety during flight. Of these, cargo fire suppression is generally the most time-limited.

Applying ETOPS cargo fire suppression requirements to all extended operations can thus further protect passengers, crews, and airplanes on routes with extended diversion times.

Performance Data

The ARAC has proposed that existing regulations be modified to require that performance data be available to support all phases of extended operations. Flight crews and dispatchers must have data available that describe the specific performance of the airplane in normal and non-normal situations, including those that might be encountered during an extended diversion.

Polar Operations

The ARAC has recommended that the North Polar area (i.e., everything north of 78 oN latitude) shall be designated an area of ETOPS applicability. The same designation shall be applied to the South Pole and surrounding region (i.e., everything south of 6O˚S latitude).

Within these areas, ETOPS requirements shall apply to all airplanes, regardless of the number of engines or distance from an adequate airport. This proposed requirement recognizes the challenges associated with these areas and sets forth steps to protect diversion.

Polar operators require training and expertise to support airplane diversions and their subsequent recovery. These operators must consider requirements for en route alternate airports, a strategy for and monitoring of fuel freeze, a passenger recovery plan and reliable communications capability.

Rescue and Fire Fighting

The ARAC has proposed a rule specifying rescue and fire fighting (RFF) requirements at ETOPS en route alternate airports. If adopted, this rule will further ensure the safety of all airplanes when living extended operations, regardless of how many engines an airplane has.

Before dispatch, ETOPS operators have always had to designate alternate airports that are above ETOPS-specified weather minimums. In addition, these designated alternates must provide the necessary facilities and equipment to ensure the safety and well-being of the passengers

and crew through-out an extended diversion, after landing at the alternate airport and for as long as they remain at that airport before being retrieved. RFF capability is a key element of this protection.

During nearly two decades of ETOPS and more than three million ETOPS twinjet flights around the globe, there has not been a single landing accident following an extended diversion from the ETOPS phase of flight. The fact that RFF services have not been needed does not mean that such an event will never happen. Therefore, the ARAC finds it prudent to formalize RFF requirements for alternate airports in the regulations.

Other Proposed Changes

The proposed regulatory changes described above would affect FAR Part 121, the section of the FARs governing the operation of transport-category airplanes. In response to the FAA tasking statement, the ARAC ETOPS Working Group also has proposed changes to other parts of the FARs.

In particular, the ARAC has proposed changes to FAR Part 25 which governs the design and testing of transport-category airplanes and FAR Part 33, which governs engine design and testing. If adopted, these regulatory modifications will benefit the development of future transport airplanes - regardless of the number of engines - by formalizing ETOPS-inspired improvements that have been shown in service to further protect airplanes and reduce the likelihood that they will need to divert.

The ARAC has further recommended that operators must comply with all rules within FAR Parts 25 and 33 when considering the longest flight and longest diversion time for which approval is sought. The rigor of this practice will ensure that all airplanes designed to these requirements will have the necessary redundancy and reliability to ensure safe extended operations.

To further protect airplanes during extended operations, the ARAC has identified the factors that ensure high levels of safety on flights with the potential for a long diversion. In the case of two-engine airplanes, the most significant element is propulsion system reliability.

Using several methods to assess risk, the ARAC concluded that diversion time can be significantly increased without added risk if the IFSD rate is sufficiently low. An IFSD rate of 0.01 per 1,000 engine-hours - or twice the engine reliability level required for 180-min ETOPS - has been determined to allow unconstrained operations with two-engine airplanes. Currently, the world-fleet average IFSD rates for the 767 and 777, which together perform the majority of ETOPS, are both below this threshold.

Other key elements that support extended diversion times are proper testing and validation of an airplane type (i.e., airframe-engine combination (to ensure ETOPS safety at service entry. The Boeing 777 Early ETOPS program processes provided a successful template on which to base future such programs. Consequently, the design, analysis, and test features from the 777 Early ETOPS program are incorporated in the proposed ETOPS regulations.

OTHER INDUSTRY EFFORTS

In addition to this ETOPS-related ARAC-FAA rulemaking, the European Joint Aviation Authorities (JAA) are developing standards for extended operations. In light of the ARAC, JAA and other efforts taking place around the world, the International Civil Aviation Organization (ICAO) - a branch of the United Nations - is reviewing the current annexes and associated guidance materials and plans to propose changes as appropriate for all airplanes. The Boeing Company supports the harmonization of aviation standards among regulatory authorities worldwide and actively supports these JAA and ICAO efforts.

SUMMARY

As airplane range capabilities continue to increase, and flights become more common in remote regions of the world, expanding ETOPS to embrace all extended-diversion-time operations - not only those involving two-engine airplanes - will raise the industry to a higher and uniform standard.

The proposed U.S. ETOPS regulations reflect broad recognition within the global aviation community that ETOPS-related practices can further enhance the safety and reliability of all operations on routes with extended diversion times. The proposed rules recognize the high standard of safety that has been achieved during nearly two decades of highly successful twinjet operations worldwide and are the next logical step in enhancing aviation safety.

The FAA will evaluate these ARAC-proposed regulations, make whatever changes it deems appropriate, and publish the results in an NPRM for public review and comment. After comment resolution, the FAA is expected to enact the new TOPS rules, perhaps as soon as late 2004.

1 Proposed ARAC Rulemaking and Guidance

ETOPS authorisation Modify existing rule FAR 121.161 to codify ETOPS in the U.S. federal aviation regulations; describe the redefinition of ETOPS and the updated requirements being proposed for the authorisation of all extended operations.

Definitions Add a new rule, FAR 121.7, to add the definitions of ETOPS-applicable terms to ensure understanding of and compliance with the updated ETOPS requirements now being proposed.

Communications Add a new rule requiring voice communications, where available, and the most reliable communications technology, voice based or data link, for all extended operations beyond 180 min; require that another form of communications be available in case communication is not possible with the most reliable technology.

Dispatch Add a new rule specifying dispatch or flight-release requirements for weather at ETOPS alternative airports; further require that weather be updated at the start of the ETOPS phase of flight to verify the continuing availability of a valid ETOPS alternate.

Propulsion-related diversions Issue new guidance clarifying the requirements for twinjet diversion in the event of an in-flight engine failure or shutdown; specify what factors shall and shall not be considered sufficient justification for the crew to fly beyond the nearest suitable alternative airport.

Fuel reserve Add a new rule specifying the reserve fuel to be carried to protect the airplane in the event of a cabin depressurisation followed by an extended diversion at low altitude to an alternate airport.

Maintenance Add a new rule making ETOPS maintenance standards applicable to all airplanes flown in extended operations.

Passenger recovery plan Modify existing rules FARs 121.135 and 121.97 to require all extended operators to develop a plan that ensures the well-being of passengers at diversion airports and provides for their safe retrieval without undue delay.

Modify existing rule FAR 121.415 to require training for crew members and dispatchers in their roles and responsibilities in the operator's passenger recovery plan.

Cargo fire suppression Add a new rule requiring that ETOPS diversion times shall not exceed the time limit, minus 15 min. specified in the Airplane Flight Manual for that airplane's most time-limited system, which is typically cargo fire suppression.

Performance data Modify existing rule FAR 121.135 to require all ETOPS operators to have the applicable performance data available to support their extended operations.

Polar operations Modify existing rule FAR 121.161 to define polar-area zones of ETOPS applicability in which ETOPS requirements apply at all times. This requirement applies to all operations north of 78°N latitude (North Pole) and south of 60°S latitude (South Pole).

Rescue and fire fighting Modify existing rule FAR 121.106 to require rescue and fire-fighting equipment to be available at any airport designated as an ETOPS en route alternate.

Other proposed changes Modify the rules governing transport-category airplane and engine design to incorporate ETOPS enhancements that reduce the rate of airplane diversions and protect airplanes when they divert.

ARAC ETOPS Working Group Participants

Airlines

U.S.- American Airlines, American Trans Air, Continental Airlines, Delta Air Lines, Northwest Airlines, United Airlines, United Parcel Service and US Airways

Non-U.S.- All Nippon Airways, along with British Airways, KLM Royal Dutch Airlines, and Scandinavian Airlines System, representing the Association of European Airlines (AEA)

Industry Associations

European Association of Aerospace Industries (AECMA), General Aviation Manufacturers Association (GAMA), International Civil Aviation Organisation (ICAO), National Business Aviation Association (NBAA), Air Transport Association (ATA), National Air Transportation Association (NATA), National Air Carriers Association (NACA), and International Federation of Air Line Dispatchers' Associations (IFALDA)

Manufacturers

Airframe - Airbus Industrie, The Boeing Company, Bombardier, Cessna, and Gulfstream
Engine - GE Aircraft Engines, Pratt & Whitney, and Rolls-Royce

Pilots' Associations

Air Line Pilots Association (ALPA), Independent Association of Continental Pilots (recently merged with ALPA), Allied Pilots Association (APA), Coalition of Airline Pilots Associations (CAPA), International Federation of Air Line Pilots' Associations (IFALPA)

Regulators

U.S. Federal Aviation Administration (FAA), Transport Canada, Joint Aviation Authorities (JAA) of Europe as represented by the U.K. Civil Aviation Authority (CAA), Direction Générale de l'Aviation Civile (DGAC) France, and Civil Aviation Safety Authority (CASA) Australia

Other Parties

Air Crash Victims Families Association (ACVFA)

Reprinted from AERO magazine by permission of The Boeing Company

Members of
THE UNITED KINGDOM FLIGHT SAFETY COMMITTEE

Full members

Chairman
Airclaims
John Dunne

Vice-Chairman
flybe. british european
Stuart McKie-Smith

Treasurer
Air 2000
Capt. Martin Pitt

External Affairs Officer
RAeS
Peter Richards

Aegean Airlines
Capt. Dimitris Giannoulatos

Aer Lingus
Capt. Tom Curran

Aerostructures Hamble
Dr. Marvin Curtiss

AIG Aviation
Jonathan Woodrow

Air Contractors
Capt. Tony Barrett-Jolley

Air Mauritius
Capt. Francois Marion

Air Scandic
Jonathan Annet

Air Seychelles
Capt. Curtis Allcorn

ALAE
Dave Morrison

Astraeus Ltd
Capt. Nick Carter

BAA plc
Francis Richards

BAC Express
Capt. Steve Thursfield

BAE SYSTEMS Reg. A/C
Alistair Scott

BALPA
Carolyn Evans

bmi regional
Capt. Steve Saint

British Airways
Steve Hull

British Airways CitiExpress Ltd
Capt. Ed Pooley

British International
Capt. Terry Green

British Mediterranean Airways
Robin Berry

Buzz Stanstead Ltd
Peter Walton

CAA
Dave Lewis - MRPS
Chrys Hadjiantonis - Safety Data Dept.
Ed Bewley - Flight Operations
Alison Thomas - Intl. Services

Cardiff International Airport
Graeme Gamble

CargoLux
Capt. David Martin

Cathay Pacific
Capt. Richard Howell

Channel Express
Rob Trayhurn

CityJet
Capt. Mick O'Connor

DHL Air
Peter Naz

Dragonair
Alex Dawson

DUO Airways Ltd
Capt. Christopher Morley

Eastern Airways UK Ltd
Capt. Jacqueline Mills

easyJet

Emerald Airways
Capt. Roley Bevan

European Aviation Air Charter
Derek Cottrill

EVA Airways
Richard Lovegrove

Excel Airways
Peter Williams

FlightLine
Capt. Derek Murphy

FLS Aerospace (IRL)
Frank Buggie

Ford Flight Europe
Richard Newton

GATCO
Richard Dawson

Goodrich Actuation Ltd
Keith Joyner

Independent Pilots Association
Capt. Mike Nash

Irish Aviation Authority
Capt. Bob Tweedy

KLM UK Eng.
Andy Beale

LAD (Aviation) Ltd
Steve Flowers

Loganair
Doug Akhurst

London City Airport
Simon Butterworth

London-Manston Airport
Wally Walker

Manchester Airport plc
Peter Hampson

Monarch Airlines
Capt. Tony Wride

MyTravel
Phil Oakes

NATS
Paul Jones

PrivatAir
Capt. Boris Beuc

Ryanair
Capt. Gerry Conway

SBAC
Martyn Graham - Secretariat
Vic Lockwood - FR Aviation

Servisair
Eric Nobbs

Shell Aircraft
Cliff Edwards

South African Airways
Tshepo Peege

The Boeing Co.
Thor Johansen

Thomas Cook Airlines
Capt. Graham Clarke

Virgin Atlantic Airways
Capt. Jason Holt

Willis Aerospace
Ian Crowe

Group members

bmi
Capt. Ian Mattimoe

bmi Eng.
Peter Horner

Bristow Helicopters
Capt. Derek Whatling

Bristow Helicopters Eng.
Richard Tudge

Britannia Airways
Jez Last

Britannia Airways Eng.
Adrian Vaughan

CHC Scotia
Peter Cork

CHC Scotia Eng.
Colin Brown

Eurocypria
Capt. Constantinos Pitsillides

Cyprus Airways
Capt. Spyros Papouis

flybe. british european
Stuart McKie-Smith

flybe. british european eng.
Chris Clark

GB Airways
Capt. Aaron Cambridge

GB Airways Eng.
Terry Scott

Lufthansa Cargo AG
Bernd Pfeffer

Condor/Lufthansa & CityLine

MOD
DASC Col. Arthur Gibson
DASC Eng. Cdr. Ian Peck
HQ STC MOD - Sqn. Ldr. Paul Cox

RAeS
Peter Richards

RAeS Eng.
Jack Carter

Co-opted Advisers

AAIB
Capt. Margaret Dean

CHIRP
Peter Tait

GASCo
John Campbell

Royal Met. Society
Dr John Stewart

DVT - What is all the fuss about? Part II or, Are airliners flying surgeries?

by Simon Phippard - Barlow Lyde & Gilbert

Since our report in the Spring 2003 issue of FOCUS the lawyers have been busy with the passengers' attempt to appeal against the High Court judgment in the English DVT (Deep Vein Thrombosis) group litigation. This was unsuccessful, although a further bid is in hand to petition the House of Lords for leave to appeal to our highest Court. In Australia, we await the outcome of the 28 July appeal hearing in the Povey case, on which we also reported six months ago, which was interpreted by some as reaching the opposite conclusion from the English group litigation decision.

Airline management should be pleased to note that the English Court of Appeal was clear in its conclusions that the law largely protects the airlines. The three judges were unanimous in the result and the Master of the Rolls, Lord Phillips, our most senior civil judge, conceded that he was so clear in his conclusions that he was tempted to dismiss the appeal in a single sentence, as did a bench of the Ontario Court of Appeal in a recent decision.

Perhaps because of general disquiet about the case, or because of loyalty to a constituent, the Welsh Labour MP John Smith, who has been outspoken on the DVT issue, introduced a Private Member's Bill in Parliament entitled 'The Aviation Health Bill' in early July 2003. In fact it received its first reading the day before the Court of Appeal delivered its judgment. The bill, if it became law, would radically alter the relationship between airlines and passengers and impose significant burdens on the industry.

The bill would impose a primary obligation upon certain airlines to "protect and promote the health, welfare and well-being of their passengers". That general responsibility would include specific responsibilities:

(a) to seek to prevent the occurrence or aggravation of any injury, illness or disease;

(b) for the mental and psychological health, welfare and well-being of passengers;

(c) for the provision and maintenance of equipment that is, so far as is reasonably practicable, safe and without risks to the health, welfare and well-being of passengers;

(d) for the provision of such information, instruction, training and supervision of staff as is necessary to protect and promote the health, welfare and well-being of passengers; and

(e) for the provision of such information and instruction to passengers as is necessary to protect and promote their health, welfare and well-being."

The Secretary of State must issue codes of practice defining compliance.

The bill is curiously drafted in its application insofar as it is expressed to apply to carriers to whom Warsaw/Hague or certain of the Application of Provisions Orders apply. Leaving aside the omission of carriage subject to other permutations of the Warsaw system, it is misconceived insofar as the Convention applies by reference not to the carrier, but to the carriage. The bill would apply to functions or activities performed or carried out in the UK or on a UK-registered aircraft. Such activities would include the manner of operation of an aircraft which may be said to have contributed to a health problem. It would therefore pose particular jurisdictional issues in relation to international carriage: many overseas aircraft spend the majority of their time outside the UK, but the activities and functions likely to be in issue may be performed both within and without the UK. One assumes that the political intent

is to assume jurisdiction over all carriers operating to the UK.

There is express provision for an airline to be liable in damages for negligent non-compliance. If that responsibility conflicts with the existing provisions of the Warsaw regime, the proposed Act would take precedence and a carrier would be unable to limit its liability under Art. 22 in any claim for breach of this Act. To that extent, if the bill as presently drafted became law, it would put the UK in conflict with its treaty obligations to other contracting States to the Warsaw system.

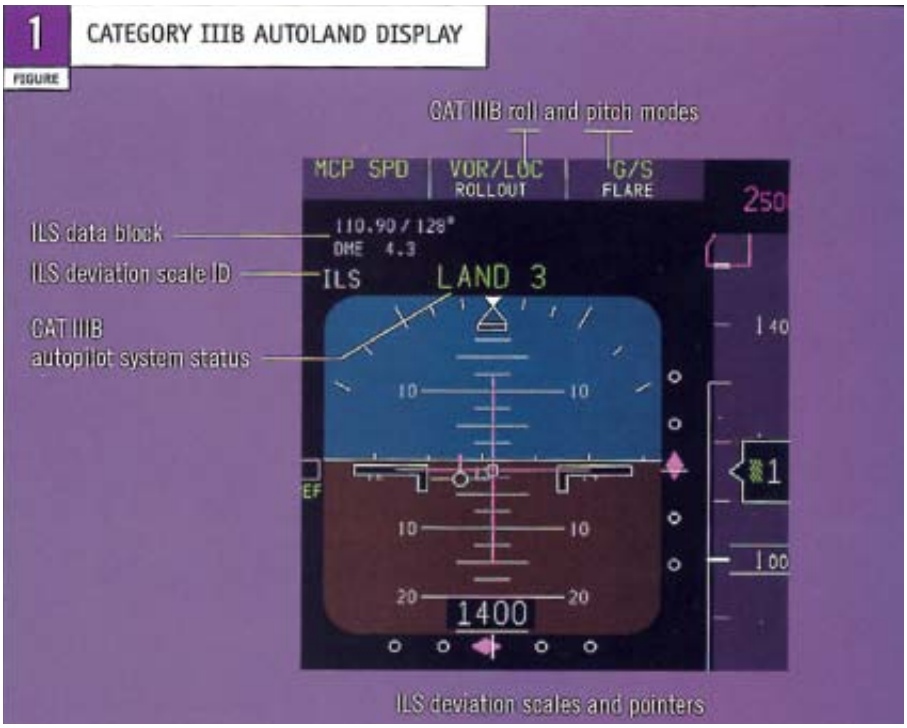
Taken at its most extreme it is plain that if such a bill were to become law the impact on airlines would be colossal. It is already recognised that not every passenger is truly "fit to fly" in the current cabin environment and many take little or no effective steps to minimise the risks inherent in lengthy or frequent exposure to the cabin environment, limited as they are. The bill is not limited to the health issues associated with air travel: airlines would have to train their staff "as is necessary to protect the health of their passengers" – thus imposing obligations regardless of the condition of a passenger before boarding. Dealing with mental health would be enormously difficult: if there is a responsibility for the mere psychological well-being of passengers, is every passenger who suffers slightly from fear of flying entitled to one-to-one counselling? Or need only trained psychologists apply to become cabin attendants?

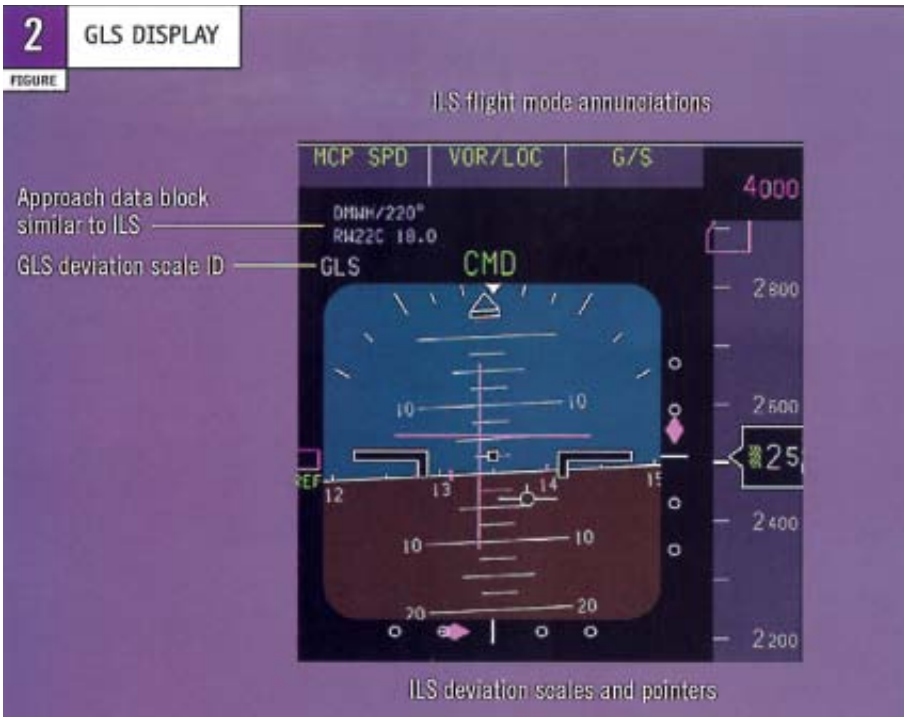
One should not be deceived by the suggestion in some parts of the bill that measures need only be "reasonably practicable". This does not apply in relation to all aspects but more significantly compliance is very difficult to gauge. Airlines generally now provide guidance on self-help in magazines and in-flight videos: one finds it hard to believe that a Secretary of State would be able to resist the temptation to make such action mandatory and to increase those steps steadily. Even if the codes of practice were drafted in such a way as to limit the specific steps an airline must take there would in any event be litigation from disgruntled passengers or those on the make. The training for all manner of health prevention issues would no doubt act as a significant distraction from flight crews' primary responsibility for safety of passengers.

The bill does not, however, have Government support and is therefore likely to struggle to secure Parliamentary time. It is listed for a further reading in mid-November, but it is thought unlikely to proceed at that stage or indeed soon thereafter. Nevertheless, readers should note that Gwyneth Dunwoody, the Transport Select Committee chairman, has put her name to the bill. It is, therefore, unlikely simply to disappear quietly.

The reason given by the Master of the Rolls for not dismissing the DVT appeal in a single sentence is perhaps informative. He had sympathy for the passengers and believed they deserved a full explanation of why the appeal failed. But he went on to observe that the result might be a blessing in disguise insofar as it would spare many DVT claimants from pursuing cases "involving difficult issues of causation which would have been very costly to resolve". The sympathy felt by John Smith MP is an overreaction: not only does it pander to a nanny state approach but there must be a high likelihood of raising all manner of expectations. Passengers may be encouraged to regard a health problem occurring shortly after a flight as grounds for compensation. This may prove just as difficult to resolve, and costly for both passengers and airlines to deal with, as the issues associated with DVT. Better, surely, to put the emphasis on passengers' own responsibility for their own health.

737-600/-700/-800/-900 Approach Navigation Options





Boeing will soon offer a suite of new integrated flight deck navigation options that enhance the proven approach capability of 737-600/-700/-800/-900 airplanes. Available in 2003, these options enable pilots to fly precise three-dimensional paths that smoothly intercept a variety of final approach legs. The Category IIIB Autoland, Global Navigation Satellite System Landing System, Integrated Approach Navigation, and Navigation Performance Scales options work together or separately to improve safety and performance while decreasing operating costs.

Operators will be able to enhance the approach capability of their 737-600/-7O0/-800/-9O0 airplanes this year with a suite of new flight deck navigation options: Category IIIB Autoland, the Global Navigation Satellite System (GNSS) Landing System, Integrated Approach Navigation, and Navigation Performance Scales.

Together with the excellent existing approach capabilities of the 737, these options offer a flexible navigation solution for airlines that want to increase their competitive advantage by improving airplane safety and performance, decreasing operating costs, and reducing flight crew training requirements through advanced technology.

The new navigation options work together or separately to enable pilots to fly safe, stable, and precise three-dimensional paths that smoothly intercept a variety of final approach legs.

The options improve landing capability in adverse weather conditions, in areas of difficult terrain, and on existing difficult approach paths. In addition, they will allow crews to take advantage of emerging air traffic control technologies designed to improve airport operations.

To help operators understand these navigation options and their features, this article describes

1. Category IIIB Autoland.
2. GNSS Landing System.
3. Integrated Approach Navigation.
4. Navigation Performance Scales.

The article also discusses how the options and procedures are compatible with current and emerging approach navigation technologies such as the Instrument

Landing System, mixed-mode, and constant-angle nonprecision approaches.

1. Category IIIB Autoland

The new 737-700/-800/-900 Category IIIB Autoland option (fig. 1) provides the same all-weather, precision approach autopilot guidance currently available on other Boeing airplane models.

This option, which is in flight test, will be offered with the 737-700/-800/-900 over-under engine format. The over-under format provides the display space necessary for Category IIIB Autoland system messages. (The 737-600 is not currently being certified for Category IIIB operation.)

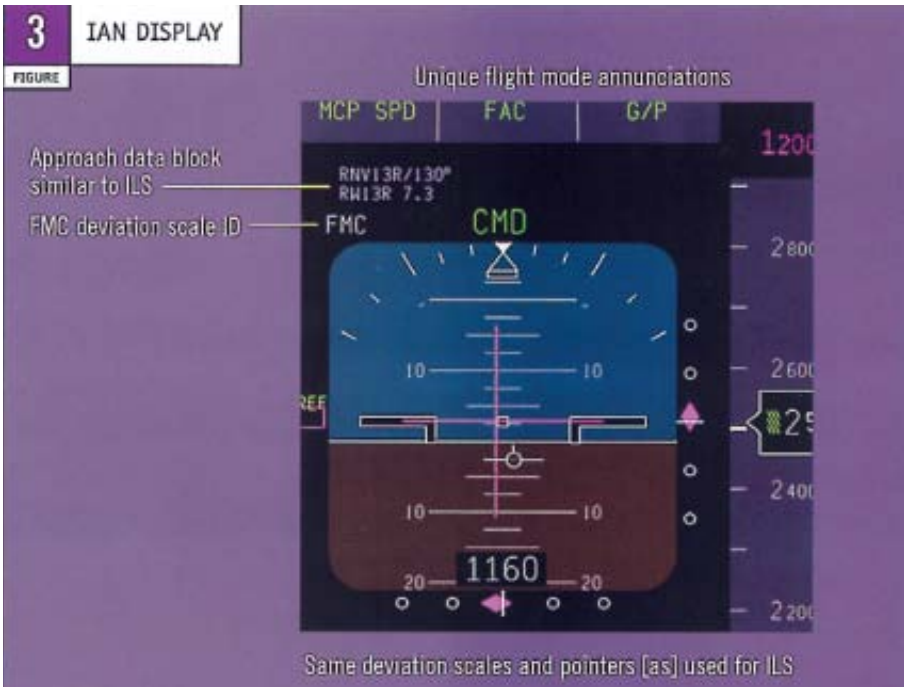
2. GNSS Landing System

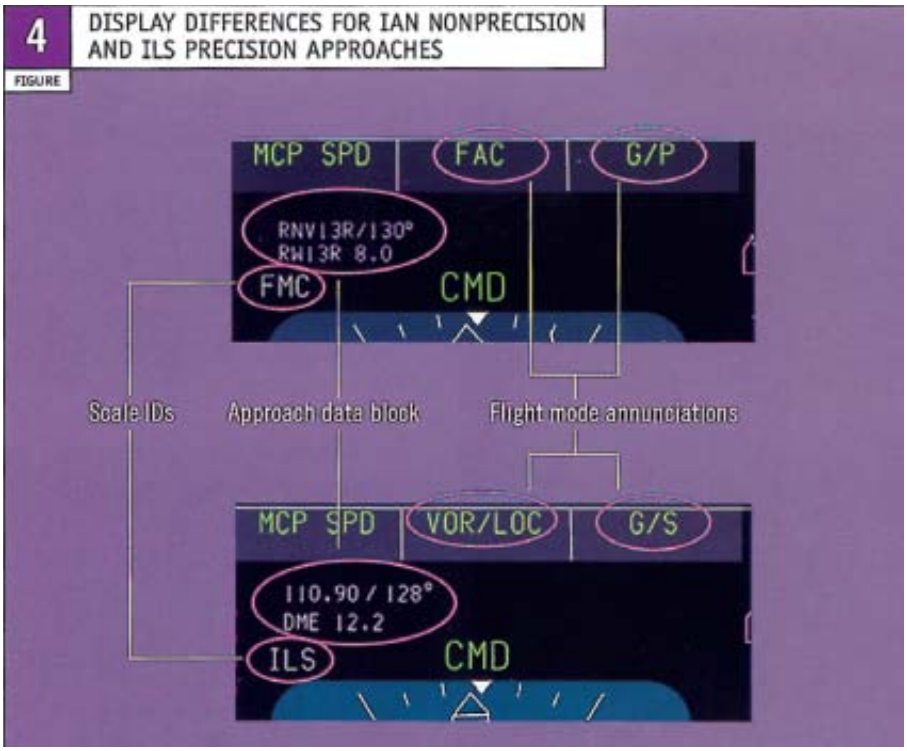
The 737-600/-700/-800/-900 GNSS Landing System (GLS) option uses Global Positioning System navigation satellites and a Ground-Based Augmentation System (GBAS) to provide signals similar to Instrument Landing System (ILS) signals (fig. 2). Ultimately, the GLS could replace the ILS as the primary means for guiding airplanes to the runway in low visibility. The GLS also might be expanded to support curved approaches. (See "Global Navigation Satellite System Landing System," Aero no. 21. January 2003.)

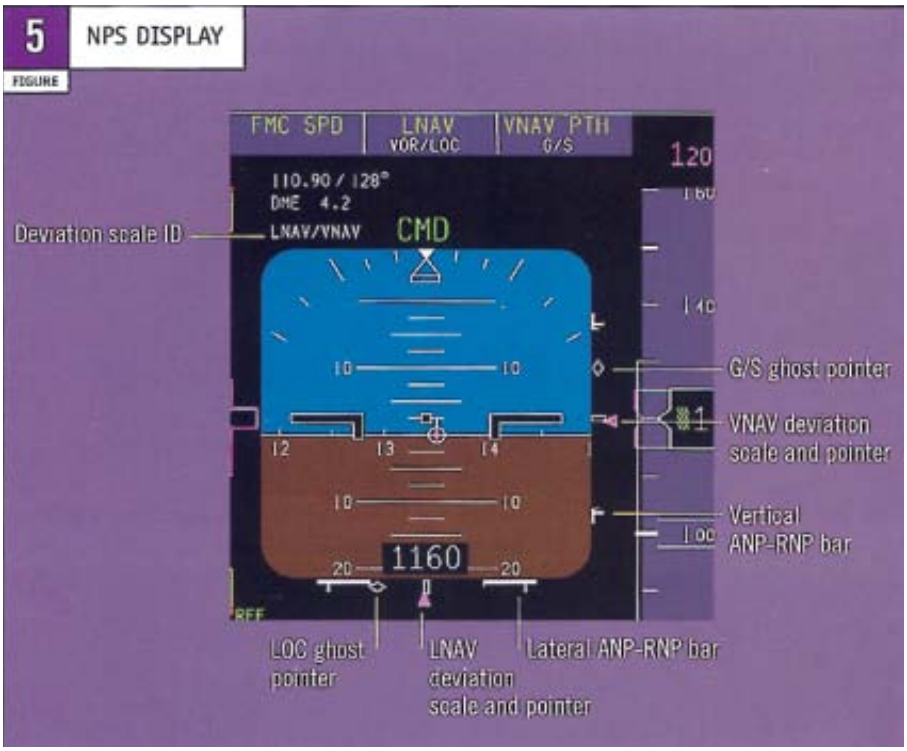
The initial 737-600/-700/-800/-900 GLS option supports a Category I instrument approach capability and the ability to complete the approach with an automatic landing. This system is being expanded to support full Category IIIB Autoland operations.

Retrofit for the 737-600/-700/-800/-900 GLS requires new multimode receiver (MMR) hardware and software, a navigation control panel with GLS capability, hardware and software upgrades for the enhanced ground proximity warning system (EGPWS), flight management computer (FMC) UI0.5 software, and common display system (CDS) Block Point 2002 software. A future curved GLS approach capability might require autopilot and CDS software changes.

The U.S. Federal Aviation Administration (FAA) plans to deploy GLS ground stations in Memphis, Chicago O'Hare, Juneau Alaska, Seattle. Phoenix, and Houston to support operational evaluation







testing. The program calls for the purchase and deployment of as many as 40 ground stations per year after the initial phase. The FAA projects a total of 160 GBAS ground stations are needed in the United States. Europe also plans to develop and install GBAS ground stations.

3. Integrated Approach Navigation

Integrated Approach Navigation (IAN) is an approach option designed for airlines that want to use ILS-like pilot procedures, display features, and autopilot control laws for nonprecision (Category I) approaches. This option does not require additional ground facility support.
The FMC transmits IAN deviations to the autopilot and display system. The pilot procedures for IAN are derived from current ILS pilot procedures and are consistent for all approach types:
Select the approach on the FMC control display unit, tune the appropriate station, and arm the autopilot approach mode.
The IAN function supports the ILS for glideslope inoperative,localizer only, and backcourse approach types.

The IAN function will alert the crew to approach selection or tuning inconsistencies. For example, if an ILS station is tuned and an area navigation (RNAV) approach also is selected on the FMC, the flight crew will be alerted and the ILS approach mode will take precedence automatically, with the appropriate display format.

While the IAN display (fig. 3) is similar to an ILS display, there are sufficient visual differences to ensure that the crew does not confuse a nonprecision IAN approach for a precision ILS or GLS approach (fig. 4). As on all nonprecision approaches, the altimeter is the primary method of ensuring that altitude constraints are honored.

Retrofit of this option involves software updates for the FMC, CDS, flight control computer, and digital flight data acquisition unit (DFDAU) and hardware and software updates for the EGPWS.

4. Navigation Performance Scales

Navigation Performance Scales (NPS) is a new display feature that integrates the current lateral navigation (LNAV) and vertical navigation (VNAV) with actual navigation performance (ANP) and required navigation performance (RNP). The primary display format of the NPS (fig. 5) can be interpreted easily, thereby allowing the crew to monitor flight path performance relative to flight phase requirements and airplane system navigation performance.

NPS can be especially valuable for approaches with tight airspace restrictions because of terrain, traffic, or restricted areas. LNAV and VNAV with NPS supports Category I approaches down to 0.l0-nmi RNP. NPS also is designed to smoothly transition to an ILS, GLS or IAN approach. (For a detailed description of NPS, see “Lateral and Vertical Navigation Deviation Displays,” Aero no. 16. Oct. 2001.) Retrofit of this option involves software updates for the FMC, CDS, and DFDAU.

Summary

This year, operators will be able to enhance the approach capability of their 737-600/-700/-800/-900 airplanes through a suite of new flight deck navigation options: Category IIIB Autoland, GLS, IAN, and NPS. These options enable pilots to fly paths that smoothly intercept various final approach legs. This integrated, flexible approach navigation solution improves safety and performance and decreases operating costs. The options are designed to meet the current and future approach requirements of Boeing customers worldwide.

Reprinted from AERO magazine by permission of The Boeing Company

Managing Maintenance Error - A Practical Guide

by James Reason and Alan Hobbs *ISBN 0-7546-1591-X*

This book is targeted at all those engineers with a responsibility for the task of managing, supervising or undertaking maintenance activities. Indeed, in this age of increasing maintenance related errors in the aviation industry and greater emphasis on corporate responsibility it should also be read in the boardroom.

The authors, Professor James Reason and Alan Hobbs, are both well respected specialists in the field of Human Factors and they have produced an easily read and down-to-earth practical guide to managing mainenance errors. Whilst they draw on examples from a variety of industries the resulting guide is particularly relevant to aviation maintenance.

The first part of the book gives the reader a sound understanding of the fundamentals of Human Performance, error categories and the local factors that are known to increase the frequency of maintenance errors. This is then well illustrated by examples of maintenance involved accidents from 3 different industries - aviation, rail and oil. The remainder of the book then comprehensively examines the building blocks that contribute to a management of maintenance error. The concluding chapter recognises the human fallibility of the Manager and provides a message on the management of Error Management.

The book is a stimulating read for all professional maintenance practitioners and will provide a useful basis for the establishment of an essential management tool - Error Management.

Reviewed by:
Jack Carter C Eng, BSc(Eng), MRAeS

Letter to the Editor

The Chairman's column reminds us that accidents still occur from adverse pitch-up trim on take-off.

At the onset of such an occurrence, whether arising from aerodynamic mistrim, misrigging or excessively aft balance of the load, isn't there an immediate remedy in the hands of the pilot?

If one sets up bank, with aileron and rudder, it is likely that sufficient pitch-down moment may be generated by the fin in the vertical plane to counter the pitch-up moment from fault trim or balance. Once the aircraft has settled in a controlled turn the crew have time to assess the situation.

Climb rate would be reduced, in the interests of keeping the margin of speed over the stall in a turn. Obstacle clearance issues may arise too, that could dictate the direction of turn. But in such an emergency the priority must surely be to buy time and keep the aircraft flying.

Is this simple technique taught in early flying training?

Sincerely,
Captain Harry Hopkins

Air Safety Report Administration made Easier

by Simon Earthrowl

I recently had the opportunity to look in detail at a new software product that makes the submission and administration of safety reports so easy that I am surprised nobody had thought to produce such a product sooner.

We are all aware of the importance of safety in airlines. The ongoing quest by management to reduce the operating costs, whilst increasing productivity and commercial flexibility creates a complex environment in which to work.

Operational costs reduction has been achieved by reducing turn around times, improving staff work practices, and streamlining administration. This may result in greater stress for staff as their jobs change.

Flight Safety Officers (FSO) are not immune to these pressures as they too are expected to be more efficient. Many advise that they do not seem to have enough time to do everything required of them. The completion and analysis Air Safety Reports are one of the time consuming areas of the Flight Safety Officers job and a tool that would help to create, edit, track and monitor these reports would greatly enhance the efficiency of the FSO. Currently they have to transfer hand written and faxed reports into digital format for onward transmission to other departments and organisations. They have to chase staff to check that indecipherable words are corrected and that the report is written in an accurate and coherent way so that the event may be understood by all the readers. This can at times be very time consuming if the crew are flying or have gone on leave, or are just not contactable. It is sometimes just not possibly to complete the reporting process within the time specified.

With all the tasks that need to be done few Flight Safety Officers have enough time to spend on thorough investigation and analysis of incidents. Maintaining an audit trail of incident management and analysis becomes almost impossible.

The requirement to show that a report has been correctly managed, and that all responsible personnel have been informed, as well as showing that all the necessary actions have been taken is putting a strain on safety departments. Additionally, audits of this process are becoming more common. Questions such as: How do you know that the ABC manager was informed of this incident? What did XYZ do about this incident when they were informed? Why did it take so long? can sometimes be very difficult to answer and more difficult to prove. With our society becoming every more litigious this aspect of the job could become much more important.

It is this whole area that the First Launch's Safety Report System (SRS) is addressing.

The system is simple to use, intuitive and very time saving. Once correctly configured it will prevent many of the errors that Flight Safety Officers spend many hours checking and conforming.

The system has been purposefully designed for aircrew, ground crew, and staff who are not skilled typists or necessarily computer literate. It has been made friendly and intuitive, with help prompts to assist the individual completing the report. Pull down selections help remove typographical errors as well as acting as a memory aid, pre-filling entries that are common to an aircraft, and providing a spell checker all save time.

Having assisted the crew or staff with completing the report, a local copy of the report is printed for their personal record. The completed report is now, at the touch of a button, emailed to all the responsible managers. For example, an ASR report would be sent to the safety office, duty operations manager and engineering. An audit record is kept to show when the report was filed, and to whom the report was sent.

Following the ASR example, engineering will carry out an investigation if necessary, and can add additional comments to the report, as well as identifying any replacement part fitted. The updated report would not be sent to the safety officer and the duty operations manager. The engineer would also get a printed copy for their records.

The report being emailed is viewed and printed in the airline's approved format. All fields on the report are now typed, and can be viewed with Microsoft Word. The safety officer can review the report and decide what the appropriate priority of the report should be and what action should be taken. The report once checked can be sent to airline management, and if necessary to the CAA as an Mandatory Occurrence Report.

In the same way, voyage reports can be sent directly to the commercial department, and other reports can be tailored to the airline's requirement.

MOR reports are identified where they have been raised, and have not been sent to the CAA within the prescribed time. The administrator is alerted if there are any unsent MORs, and additionally if there are any MORs that have to be sent to the CAA before start of work the next day. All Air Safety Reports (and optionally Ground Occurrence Reports) can be easily exported into the airlines trending and risk management software packages (e.g. British Airways WinBASIS).

Having had the opportunity to see the software in operation there is no doubt in my mind that it would save many hours of tedious work for the pilots, engineers and the Flight Safety Officer, freeing up time to do the more important functions of their jobs. The acquisition of such a system is certainly worth consideration.

Human Factors and Occurrence Reporting Systems From a Maintenance Organisation's Perspective

by C R Clark, Head of Quality and Training flybe. Aviation Services

The recent Amendment 5 to JAR 145 mandated changes to a maintenance organisation's responsibilities with regard to human factors and occurrence reporting. Both these important areas have long been part of the regulation but now clear criteria for inclusion in the organisation's procedures, processes and culture have been established.

For many small to medium sized organisations compliance with these requirements can seem a daunting task. Investment in the resource needed to provide effective systems is difficult to justify when benefits are initially theoretical. Additionally, available statistics to support the requirement tend to be global and senior managers view 'accidents' rather than in-house incidents as their guide to an organisation's health check.

However, systems that meet JAR 145 requirements can be introduced which are both cost effective and simple. More importantly, they greatly enhance safety with the added bonus of giving transparency to an organisation's failures across the spectrum of minor to very serious. At flybe. Aviation Services, a medium to large organisation spread across the United Kingdom and parts of Europe, the Quality Assurance Department were tasked with introducing a system to satisfy the requirements and benefit the organisation.

The main objectives:

1. Enhance safety.
2. Effect positive awareness.
3. Create an open reporting culture.
4. Cost reductions from identified errors.

These objectives are supported by:

1. Total and ongoing support from senior management.
2. Positive reporting processes.
3. Feedback to all employees.
4. Effective investigations.
5. Employee involvement with corrective measures.
6. Analysis of all occurrence reports.
7. Training programmes tailored to the organisation.

To ensure consistency, the well published principles associated with human factors and maintenance error management form the basis of the initiative as well as those elements of safety management system processes that suit our organisation's requirements.

The reporting elements of our system consist of Mandatory Occurrence Reports (MORs) - otherwise referred to as Air Safety Reports (ASRs), Engineering Occurrence Reports (EORs) and Error Avoidance Programme (EAP) reports.

MORs/ASRs meet the CAA requirements, with all technically related reports being investigated and subsequently reviewed by both the Authority and our airline's Flight Safety Committee. EORs are internal reports raised by any employee on company related occurrences. They do not replace the MOR process but record issues of a non-mandatory nature. Finally, EAP reports relate to our confidential error reporting process and are an integral part of the Human Factor initiative.

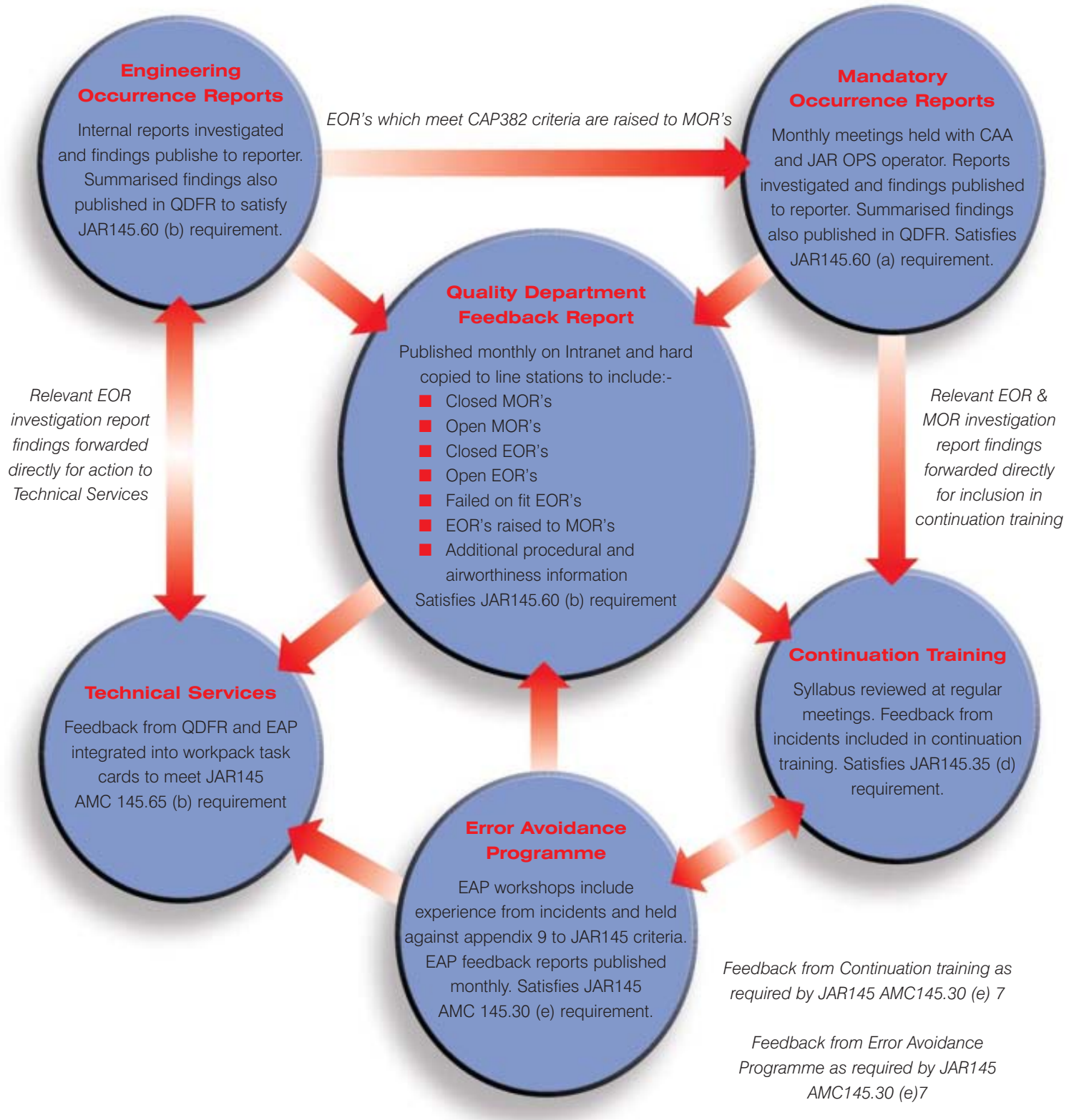
All reports are logged, investigated, reviewed and recommendations raised. Follow up verification is a vital part of the process to ensure corrective actions have been effective. Allied to this investigatory process is the Quality Management Review (QMR) meeting chaired by the Engineering Director, held on a monthly basis, where issues raised by the reporting process are discussed by the senior management team.

To ensure full employee awareness a monthly Quality Department Feedback Report (QDFR) is issued both on the company Intranet and by hard copy giving visibility to the investigation process and resultant corrective actions. In order to get a measure of the success of the processes that make up our system, all information is stored on a central Quality Activity Summary database and then analysed to determine rates, trends, repeat hot spots and improvements. Cost analysis is carried out at the investigation stage of each report. An annual review is also carried out at the beginning of each year and forms part of the QMR agenda.

This may seem a labour intensive system but in reality, as long as each department plays its part fully, and simple but effective processes are maintained, it is remarkably easy to administer. Two key company requirements must be present. Firstly, senior management have to take the lead and be seen to take the lead if the initiative is to succeed. Secondly, a disciplined approach is essential i.e. time scales must be met and all meetings must happen as planned.

Finally, review the processes regularly, learn from mistakes, listen to employees and keep them informed at all times. The ever increasing Human Factor element associated with occurrence reporting will be discussed in a future article.

Human Factors and Occurrence Reporting Systems



S McNair, Quality Manager
fly**be.** Aviation Services

UK FLIGHT SAFETY COMMITTEE

ANNUAL SEMINAR 2003

AVIATION SAFETY - THE BALANCE BETWEEN COST AND VALUE

29th/30th September 2003

The Radisson Edwardian Hotel Heathrow

Seminar Objective

Safety Management can be seen as expensive for all forms of Industry. Regulatory obligations notwithstanding, there are many choices that could be made. This Seminar will examine how value judgements are made and attempt to demonstrate how 'Best Practice' need not be 'Cost Prohibitive'.

Programme

29TH SEPTEMBER 2003

1530 – 1700 Registration
This will take place in the Hotel Foyer

2000hrs Seminar Dinner
After Dinner Speaker - **Andre Clerc - Willis Aerospace**

30TH SEPTEMBER 2003

0800 – 0900	Registration	1210 - 1240	Discussion
Session Chairman - **Ian Crowe, Willis**		1245 – 1400	*Lunch*
0900 – 0910	Welcoming Introduction **John Dunne, Chairman UKFSC**	1400 – 1430	A Manufacturer's View **Thor Johansen - Boeing**
0910 – 0940	Keynote Speech **Mike Hirst - Loughborough University**	1430 –1500	Economic Considerations in Designing for Safety **Kwok Chan/Mike Carver** **Airbus S.A.S**
0940 – 1020	Regulatory Minima **Dave Chapman/Dave Wright - CAA**	1500 –1530	Development & Use of Non-Mandatory Safety Tools & the Benefits **John Savage - BA**
1020 – 1050	Board Decisions Cost v Benefits **Dave Henry - Consultant**		
1050 – 1110	*Refreshment Break*	1530 -1550	Discussion & Summary **Simon Phippard** **Barlow Lyde & Gilbert**
1110 – 1140	Development of an Affordable System **Mike Wood - flybe. british european**		
1140 – 1210	Examples from the Space Industry **Philip Smaje - InSpace**	1550 -1600	Closing Remarks **John Dunne, Chairman UKFSC**

SEMINAR INFORMATION

- **Hotel Accommodation**

  Hotel Accommodation is not included in the Seminar Registration Fee. If you require accommodation please contact the hotel directly on Tel:(+44 (0) 20 8759 6311) and quote Block Booking Code 0929 UKF when making your reservation.

- **Seminar Dinner**

  Dress for Dinner – Black Tie

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 one registration form per person (photocopies accepted).

REGISTRATION INFORMATION

(Please print clearly)

First Name: _____ Surname: _____

Company: _____ Job Title: _____

Address: _____

_____

Tel No: _____ Fax No: _____ e-mail: _____

PAYMENT INFORMATION

Seminar Fee: ☐ £150 UKFSC Member ☐ £200 Non-UKFSC Member

This includes the Seminar Dinner on the evening 29th September, lunch, refreshments and car parking. This does not include hotel accommodation – **please see 'Seminar Information' above.**

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 handling 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 29th September? 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 No: +44 (0) 1276 855193 Fax No: +44 (0) 1276 855195 e-mail: ukfsc@freezone.co.uk

Confirmation will be faxed to you on receipt of your Registration Form and payment.

WOKING PRINT & PUBLICITY

are proud to be producers of Focus Magazine

we provide quality:

- design & artwork
- scanning
- imaging
- pre-press
- web design
- litho printing
- digital printing
- print finishing
- promotional gifts

For 25 years Woking Print & Publicity has provided an exceptional Print and Design service to our many clients. To arrange for one of our professionals to visit you call:

01483 884884 or email: **sales@wokingprint.com**

innovative design ▷ quality print ▷ exceptional value

Woking Print & Publicity Ltd
The Print Works • St Johns Lye • St Johns • Woking • Surrey • GU21 8RS
Telephone: 01483 884884 • Fax: 01483 884880 • ISDN: 01483 598501
Email: sales@wokingprint.com • Web: www.wokingprint.com

WOKING PRINT & PUBLICITY