focus

ON COMMERCIAL AVIATION SAFETY

SPRING 2003

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UNITED KINGDOM FLIGHT SAFETY COMMITTEE

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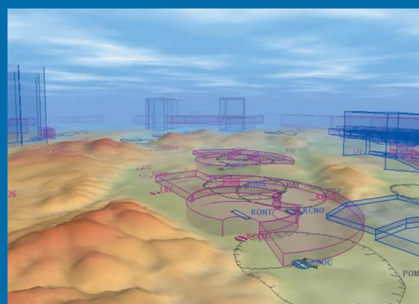

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THE UNITED KINGDOM FLIGHT SAFETY COMMITTEE

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ON COMMERCIAL AVIATION SAFETY

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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Front Cover: B737-300 in the colours of Jet 2 the low cost operation of Channel Express that started operations from Leeds Bradford to destinations in Europe on 12th February 2003.

Disruptive Passengers

Three years ago the United Kingdom Flight Safety Committee set up a Working Group to look into the cause of the increasing number of disruptive passenger reports. Following this initial report it was decided that the Working Group should produce a universal guidance document that airlines could use as a model to improve the way they were handling disruptive passengers.

At about the same time the Department for Transport (then the DTLR) formed a Working Group to discuss this issue and to look at what the government could do to try to:

(a) prevent disruptive passenger behaviour and

(b) to ensure that adequate regulation existed to control and prosecute offenders where necessary.

The Civil Aviation Authority was tasked to collect and categorise the disruptive passenger reports submitted by the airlines. These were presented to the Department for Transport Working Group so that any trends in the number of reports could be monitored and the scale of the issue known.

Resulting from the work done by the Department for Transport Working Group a proposal was made to increase the powers of the police attending to calls from the aircraft captains for assistance with disruptive passengers.

This change in the law is currently being processed in Parliament as a Private Members Bill, by Frank Roy MP for Motherwell and Wishaw. The second reading of this Private Members Bill was made on the 7th February 2003. Members of the Department for Transport Working Group are hopeful that the Bill will become law later in the year.

Recently it has been noted that there has been a decline in the number of disruptive passenger reports being submitted to the CAA for inclusion in the disruptive passenger database. Some airlines show a small increase in the number of reports submitted but in general the number is down on the same period last year. Common belief is that there is an increase in the number of disruptive passenger incidents but that cabin crews are failing to submit reports.

To some extent this is understandable as cabin crew are expected to submit these reports following a long hard days work. Usually this is done in the crew room prior to departing for home. The most important thing on the mind of most crews at this stage of the duty is getting home and having a bath and some sleep.

I would therefore like to appeal to cabin crew to please remember to submit the disruptive passenger reports at the end of each duty. By helping us they will be helping themselves. Without this information we will not be able to monitor the situation properly or bring about changes to the laws in order to afford aircrew greater protection.

It takes time to bring about change, particularly when trying to change the law and sometimes it appears that nothing is being done. The result is that people feel that their efforts are a waste of time. Let me assure you that this is not the case. There are groups of dedicated and motivated people trying to ensure that your tasks can be carried out in a safe environment.

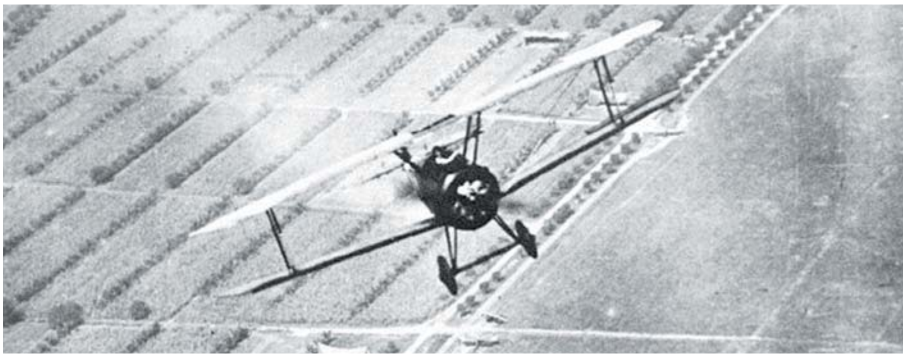
The easiest way to ensure that nothing gets done or changed is to stop submitting the disruptive passenger reports, so please continue to submit your reports.

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.

100 Years of Aeronautical Risk Management

by John Dunne, Airclaims



This year the Aviation World's diaries are full of events to mark Man's first historic flight back in December 1903. In the span of just 100 years we have made huge and significant strides by developing an effective, efficient, economic and safe air transportation system. The progress has been impressive but not always without its cost.

We have made significant progress in such a short span of time which is due in part to the human spirit of adventure and risk taking and in part to the continuing development and application of viable risk assessment techniques. However, a review of aviation history will show us that we do not always learn from lessons already painfully learnt. Known risk is not the same as managed risk, neither does it always apply to lessons from the past, which have been long forgotten.

A quick review of 2003's accidents to date highlights four CFIT events and a departure from controlled flight.

A BAe RJ100 in Turkey, an F28 in Peru, an Antonov 24 in Gabon and an Ilyushin 76 in East Timor were all CFIT events. Over the years our industry has conducted extensive research into CFIT, that has resulted in volumes of advisory material and enhancements to GPWS. Having identified the risks during approach and landing why are we still seeing skilled people taking risks? What is the next step we need to take to ensure that people recognise the CFIT risks more clearly in an operational environment?

A Beechcraft 1900 accident in Charlotte is still under investigation; however initial reports suggest that a combination of miss-rigged pitch controls and a weight and balance issue led to the departure from controlled flight. Central to the weight and balance issue is the use of standard weights for passengers. How does your company determine the aircraft weight? Has your company ever conducted a risk evaluation exercise to determine calculated take-off weight against actual take-off weight?

Then in early February the American President announced, "The Columbia is lost." The investigation process into this accident will no doubt be long, detailed and arduous. NASA is a unique organisation and has been at the cutting edge of human endeavour and technology for over forty years. In this time they have continually pushed back the boundaries and produced remarkable achievements. Perhaps significant in the Columbia accident investigation for all of us in terms of lessons learnt will be the evaluation of: how the standards are established; how standards are reviewed over a period of time to test their validity; how risks are detected, assessed and managed; how organisational oversight is measured and conducted; how their continuing safety management processes is managed. An issue that may well impact us all at some time in the future was NASA's willingness to allow the media to drive the release of information during the accident investigation process. This hasn't enhanced the accident investigation process and has probably had a negative effect in that it is diverting key members of the team away from their prime role in order to brief the press on the day's findings.

Following publication of the report into the Boeing 757 landing accident in Gibraltar, Industry is revisiting existing FOQA systems and determining how they may be better utilised in the measuring, understanding and management of risk in everyday operations. It is interesting to note that although large amounts of data is processed and recorded on the aircraft it isn't all made available to the crew, especially in real time.

Perhaps, taking this initiative a step further, now (in this 100th Anniversary year) is an opportune moment for us to examine in detail what data is already available and recorded in the FDR / QAR systems and determining what, if any, of that, data could usefully be made available to the crew in real time presentations that could potentially enhance their situational awareness.

Don't forget that Murphy is alive and well; he's out there and waiting for you to take that acceptable risk.

Global Navigation Satellite System Landing System Technology/ Product Development

The aviation industry is developing a new positioning and landing system based on the Global Navigation Satellite System (GNSS). The GNSS landing system (GLS) integrates satellite and ground-based navigation information to provide the position information required for approach and landing guidance. Potential benefits of GLS include significantly improved takeoff and landing capability at airports worldwide and at reduced costs, improved instrument approach service at additional airports and runways and the eventual replacement of the Instrument Landing System. Boeing plans to certify the airborne aspects of GLS on the 737, to support Category I operations, by the end of 2003.

For more than 10 years, the aviation industry has been developing a positioning and landing system based on the Global Navigation Satellite System (GNSS). These efforts culminated in late 2001, when the International Civil Aviation Organization (ICAO) approved an international standard for a landing system based on local correction of GNSS data to a level that would support instrument approaches. The ICAO Standards and Recommended Practices (SARPS) define the characteristics of a Ground-Based Augmentation System (GBAS) service that can be provided by an airport authority or an Air Traffic Service provider. The GBAS service provides the radiated signal in space that can be used by suitably equipped airplanes as the basis of a GNSS landing system (GLS). The initial SARPS support an approach service. Future refinements should lead to full low-visibility service (i.e., takeoff, approach, and landing) and low-visibility taxi operations. This article describes

1. Elements of the GLS.
2. Operations using the GLS.
3. Benefits of the GLS.
4. Operational experience.

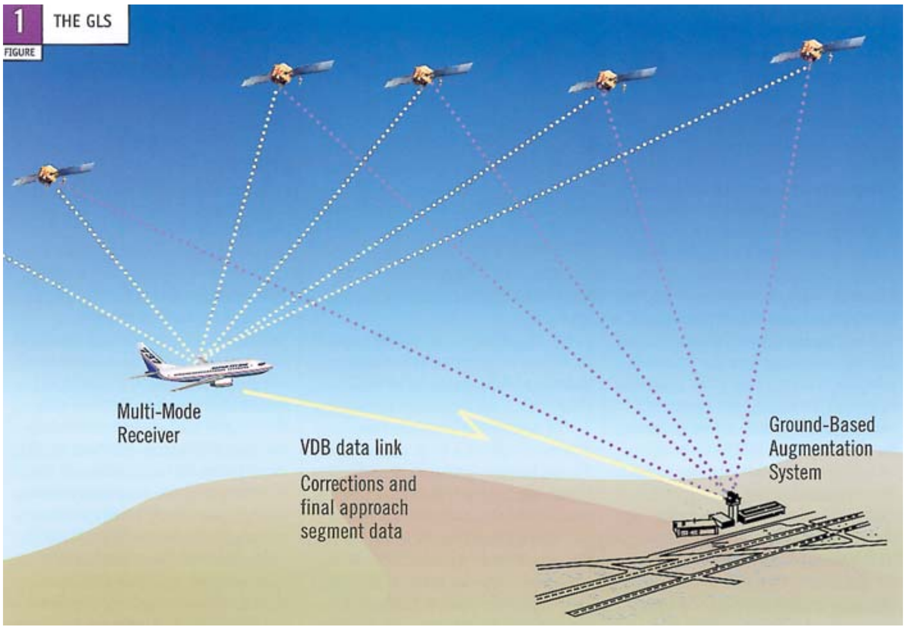
1. Elements of the GLS

The GLS consists of three major elements - a global satellite constellation that supports worldwide navigation position fixing, a GBAS facility at each equipped airport that provides local navigation satellite correction signals and avionics in each airplane that process and provide guidance and control based on the satellite and GBAS signals (fig.1).

The GLS uses a navigation satellite constellation (e.g., the U.S. Global Positioning System [GPS] the planned European Galileo System) for the basic positioning service. The GPS constellation already is in place and improvements are planned over the coming decades. The Galileo constellation is scheduled to be available in 2008.

The basic positioning service is augmented locally - at or near the airport - through a GBAS radio transmitter facility. Because the ground facility is located at a known surveyed point, the GBAS can estimate the errors contained in the basic positioning data. Reference receivers in the GBAS compare the basic positioning data with the known position of the facility and compute corrections on a satellite-by-satellite basis. The corrections are called pseudorange corrections because the primary parameter of interest is the distance between the GBAS facility and individual satellites. The satellite constellation is continuously in motion, and satellites ascend and descend over the horizon when observed from any point on Earth. The GBAS calculates corrections for all the satellites that meet the specified in-view criteria and transmits that information to the nearby airplanes over a VHF Data Broadcast (VDB) data link.

FIGURE 1 THE GLS



Boeing airplanes that are currently being produced contain Multi-Mode Receivers (MMR) that support Instrument Landing System (ILS) and basic GPS operations. These MMRs can be modified to support GLS and potentially Microwave Landing System operations. The GLS capability is supported through the addition of a receiver and processing in the MMRs of the GBAS data provided through the VDB data link. The MMRs apply the local correction data received from the GBAS to each satellite that the airplane and GBAS share in common. Because of position and altitude differences and local terrain effects the GBAS and the airplane may not necessarily be observing the same combination of satellites. The airplane systems only use satellite information that is supported by correction data received from the GBAS. When the airplane is relatively close to the GBAS station, the corrections are most effective, and the MMRs can compute a very accurate position. Typical lateral accuracy should be <l m.

2. Operations using the GLS

A single GBAS ground station typically provides approach and landing service to all runways at the airport where it is installed. The GBAS may even provide limited approach service to nearby airports. Each runway approach direction requires the definition of a final approach segment (FAS) to establish the desired reference path for an approach, landing, and rollout. The FAS data for each approach are determined by the GBAS service provider and typically are verified after installation of the GBAS ground station.

One feature that differentiates the GLS from a traditional landing system such as the ILS is the potential for multiple final approach paths glideslope angles and missed approach paths for a given runway. Each approach is given a unique identifier for a particular FAS glideslope, and missed approach combination. FAS data for all approaches supported by the particular GBAS facility are transmitted to the airplane through the same high integrity data link as the satellite range correction data (i.e., through the VDB data link). The MMRs process the pseudorange correction and FAS data to produce an ILS-like deviation indication from the final approach path. These deviations are then displayed on the pilot's flight instruments (e.g., Primary Flight Display [PFD]) and are used by airplane systems such as the flight guidance system (e.g.. autopilot and flight director) for landing guidance.

The ILS-like implementation of the GLS was selected to support common flight deck and airplane systems integration for both safety and economic reasons. This implementation helps provide an optimal pilot and system interface while introducing the GLS at a reasonable cost. The use of operational procedures similar to those established for ILS approach and landing systems minimizes crew training, facilitates the use of familiar instrument and flight deck procedures, simplifies flight crew operations planning and ensures consistent use of flight deck displays and annunciations. For example, the source of guidance information (shown on the PFD in fig. 2) is the GLS rather than the ILS. The scaling of the path deviation information on the pilot's displays for a GLS approach can be equivalent to that currently provided for an ILS approach. Hence, the pilot can monitor a GLS approach by using a display that is equivalent to that used during an ILS approach.

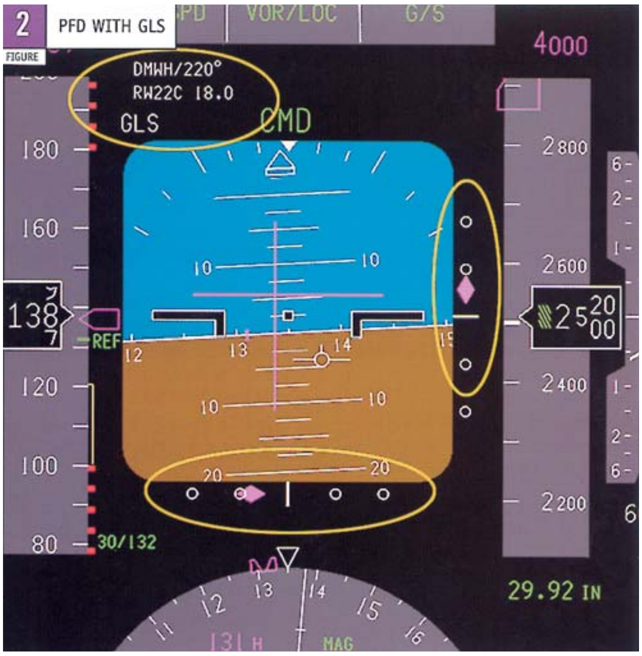
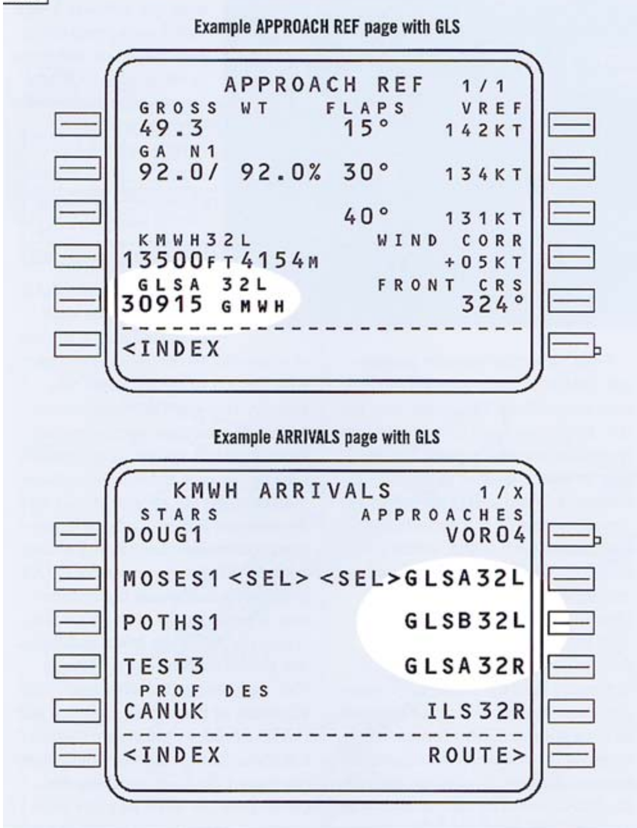


FIGURE 2 PFD WITH GLS

Figure 2 shows a typical PFD presentation for a GLS approach. The Flight Mode Annunciation on the PFD is "GLS" for a GLS approach and "ILS" for an ILS approach.

To prepare for a GLS approach the pilot selects GLS as the navigation source and chooses the particular approach to be flown. This is accomplished by selecting a GLS approach through the FMS (fig. 3) or by entering an approach designator on a dedicated navigation control panel (fig. 4). In either case, a unique five-digit channel number is associated with each approach. With the FMS interface, the pilot does not need to enter a channel number; tuning is accomplished automatically based on the approach selected, just as is now done for ILS. However, for an airplane equipped with separate navigation tuning panels, the pilot tunes the MMRs by entering a GLS channel number in that panel. This is similar to the equivalent ILS flight deck interface where a pilot tunes the ILS by

3 FIGURE FMS APPROACH SELECTION INTERFACE EXAMPLES



using a designated VHF navigation frequency. As with the ILS certain GLS identification data are available on other FMS pages such as the APPROACH REF page, which shows the runway identifier, GLS channel, and associated approach identifier (fig. 3).

Regardless of the selection method the five-digit GLS channel number is encoded with the frequency to be used for the VDB data link receiver and with an identifier for the particular approach and missed approach path (FAS data set) that corresponds to the desired approach.

Figure 4 shows a navigation control panel used to tune navigation radios, including GLS, for the 737-600/-700/-800/-900.

The approach plate shows the channel number for each approach and a four-character approach identifier to ensure consistency between the selected channel and the approach procedure chosen by the pilot. The approach identifier is read from the FAS data block and displayed to the pilot on the PFD to provide positive confirmation that the desired approach has indeed been selected.

Figure 5 shows a typical GLS approach procedure. The procedure is similar to that used for ILS except for the channel selection method and the GLS-unique identifier. The approach chart is an example of a Boeing flight-test procedure and is similar to a chart that would be used for air carrier operations, with appropriate specification of the landing minima.

Figure 6 is an example of a possible future complex approach procedure using area navigation (RNAV), Required Navigation Performance (RNP), and GLS procedures in combination. Pilots could use such procedures to conduct approaches in areas of difficult terrain, in adverse weather, or where significant nearby airspace restrictions are unavoidable. These procedures would combine an RNP transition path to a GLS FAS to the runway. These procedures can also use GBAS position, velocity, and time (PVT) information to improve RNP capability and more accurately deliver the airplane to the FAS.

The GBAS is intended to support multiple levels of service to an unlimited number of airplanes within radio range of the VDB data link. Currently, ICAO has defined two levels of service: Performance Type I (PT 1) service and GBAS Positioning Service (GBAS PS). PT 1 service supports ILS-like deviations for an instrument approach. The accuracy, integrity, and continuity of service for the PT 1 level have been specified to be the same as or better than ICAO standards for an ILS ground station supporting Category I approaches. The PT 1 level was developed to initially support approach and landing operations for Category I instrument approach procedures. However, this level also may support other operations such as guided takeoff and airport surface position determination for low-visibility taxi.

The GBAS PS provides for very accurate PVT measurements within the terminal area. This service is intended to support FMS-based RNAV and RNP-based procedures. The improved accuracy will benefit other future uses of GNSS positioning such as Automatic Dependent Surveillance - Broadcast and Surface Movement Guidance and Control Systems.

The accuracy of the GBAS service may support future safety enhancements such as a high-quality electronic taxi map display for pilot use in bad weather. This could help reduce runway incursion incidents and facilitate airport movements in low visibility. The service also may support automated systems for runway incursion detection or alerting.

As important as the accuracy of the GBAS service is the integrity monitoring provided by the GBAS facility. Any specific level of RNP operation within GBAS coverage should be more available because the user receivers no longer will require redundant satellites for satellite failure detection (e.g., Receiver Autonomous Integrity Monitoring).

Because the GBAS PS is optional for ground stations under the ICAO standards, some ground stations may only provide PT 1 service. The messages uplinked through the VDB data link indicate whether or not the ground station supports the GBAS PS and specify the level of service for each approach for which a channel number has been assigned. When the GBAS PS is provided, a specific five-digit channel number is assigned to allow selection of a non-approach-specific GBAS PS from that station. Consequently, the channel selection process allows different users to select different approaches and levels of service.

The GBAS PS and the PT 1 service are not exclusive. If the ground station provides the GBAS PS. selecting a channel number associated with any particular approach automatically will enable the GBAS PS service. The receiver provides corrected PVT information to intended airplane systems as long as the GBAS PS is enabled. ILS-like deviations also are available when the airplane is close enough to the selected approach path.

ICAO is continuing development of a specification for service levels that would support Category II and III approaches.

3. Benefits of the GLS

From the user perspective, the GBAS service can offer significantly better performance than an ILS. The guidance signal has much less noise because there are no beam bends caused by reflective interference (from buildings and vehicles). However, the real value of the GLS is the promise of additional or improved capabilities that the ILS cannot provide. For example the GLS can

- Provide approach and takeoff guidance service to multiple runways through a single GBAS facility.
- Optimize runway use by reducing the size of critical protection areas for approach and takeoff operations compared with those needed for ILS.
- Provide more flexible taxiway or hold line placement choices.
- Simplify runway protection constraints.
- Provide more efficient airplane separation or spacing standards for air traffic service provision.
- Provide takeoff and departure guidance with a single GBAS facility.

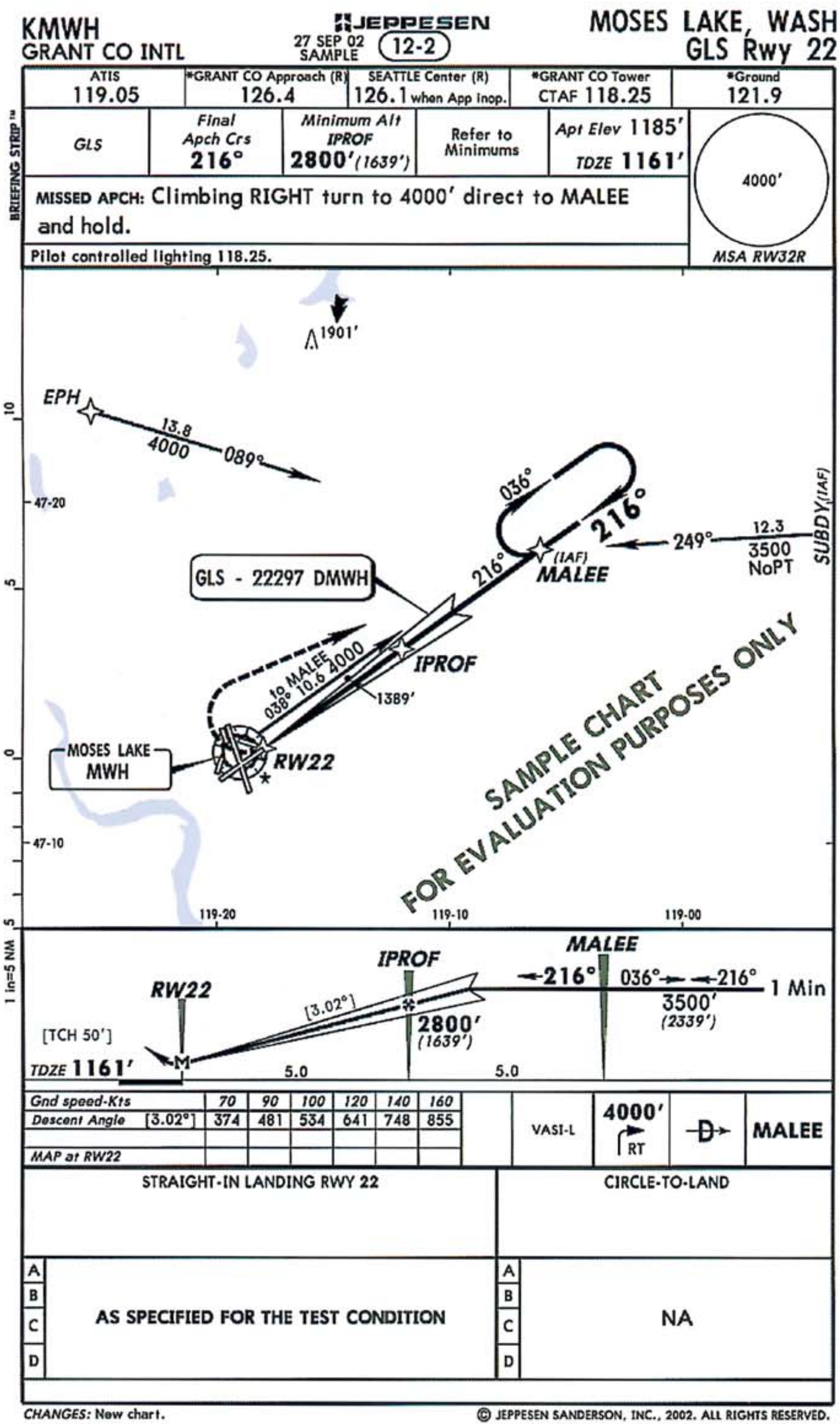
From the service provider perspective, the GBAS can potentially provide several significant advantages over the ILS. First, significant cost savings may be realized because a single system may be able to support all runways at an airport. With the ILS each runway served requires an ILS and a frequency assignment for that ILS which can be difficult because of the limited numbers of available frequencies. Operational constraints often occur with the ILS when an Air Traffic Service provider needs to switch a commonly used ILS frequency to serve a different runway direction. This is not an issue with the GBAS because ample channels are available for assignment to each approach. In addition, because the GBAS serves all runway ends with a single VHF frequency the limited navigation frequency spectrum is used much more efficiently. In fact, a GBAS may even be able to support a significant level of instrument approach and departure operations at other nearby airports.

The siting of GBAS ground stations is considerably simpler than for the ILS because GBAS service accuracy is not degraded by any radio frequency propagation effects in the VHF band. Unlike the ILS, which requires level ground and clear areas on the runway, the siting of a GBAS VHF transmitter can be more flexible than ILS. The removal of the requirement to provide a large flat area in front of the ILS glideslope alone can represent a very significant savings in site preparation cost and opens up many more locations for low-minima instrument approach service.

Although GBAS accuracy can be affected by multipath interference, careful siting of GBAS receivers can readily eliminate multipath concerns because GBAS receivers do not need to be placed near a runway in a specific geometry, as is the case with the ILS or MLS. Hence, this virtually eliminates the requirements for critical protection areas or restricted areas to protect against signal interference on runways and nearby taxiways.

FIGURE 4 GLS AS ACTIVE

5
FIGURE
TYPICAL GLS APPROACH PROCEDURE



Finally, the GBAS should have less frequent and less costly flight inspection requirements than the ILS because the role of flight inspection for GBAS is different. Traditional flight inspection, if needed at all, primarily would apply only during the initial installation and ground station commissioning. This flight inspection would verify the suitability of the various approach path (FAS) definitions and ensure that the GBAS-to-runway geometry definitions are correct. Because verifying the coverage of the VDB data link principally is a continuity of service issue rather than an accuracy or integrity issue, it typically would not require periodic inspection.

GBAS systems capable of supporting Category II and III operations internationally are envisioned. Airborne system elements that would be necessary for the enhanced GLS capability (e.g., MMR and GLS automatic landing provisions) already are well on the way to certification or operational authorization. Airborne systems and flight deck displays eventually will evolve to take full advantage of the linear characteristic of the GLS over the angular aspects of the ILS.

4. Operational Experience

To date, flight-test and operational experience with the GLS has been excellent. Many GLS-guided approaches and landings have been conducted successfully at a variety of airports and under various runway conditions.

Both automatic landings and landings using head-up displays have been accomplished safely through landing rollout, in both routine and non-normal conditions. On the pilots' flight displays, the GLS has been unusually steady and smooth when compared with the current ILS systems even when critical areas necessary for the ILS approaches were unprotected during the GLS approaches.

The Boeing Technology Demonstrator program has used a 737-900 to demonstrate successful GLS operations to airline customers, airplane and avionics manufacturers, airport authorities, Air Traffic Service providers, and regulatory authority representatives.

The GLS represents a mature capability ready for widespread operational implementation. When implemented, the GLS will improve safety, increase capacity, and provide operational benefits to airlines, pilots, passengers, airports, and Air Traffic Service providers. Boeing plans to certify the airborne aspects of the GLS on the 737 by the end of 2003 to support Category I operations, with other models to follow. Work is continuing for the airborne certification of the GLS to support Category II and III operations when suitable GBAS ground facilities are specified and made available.

SUMMARY

The aviation industry is developing the GLS, a new positioning and landing system that integrates satellite and ground-based navigation information. Potential benefits of the GLS include significantly improved takeoff and landing capability at airports worldwide at reduced cost, instrument approach service at additional airports and runways, and eventual replacement of the ILS. Boeing plans to certify the airborne aspect of the GLS on the 737 by the end of 2003 to support Category I operations, with other models to follow.

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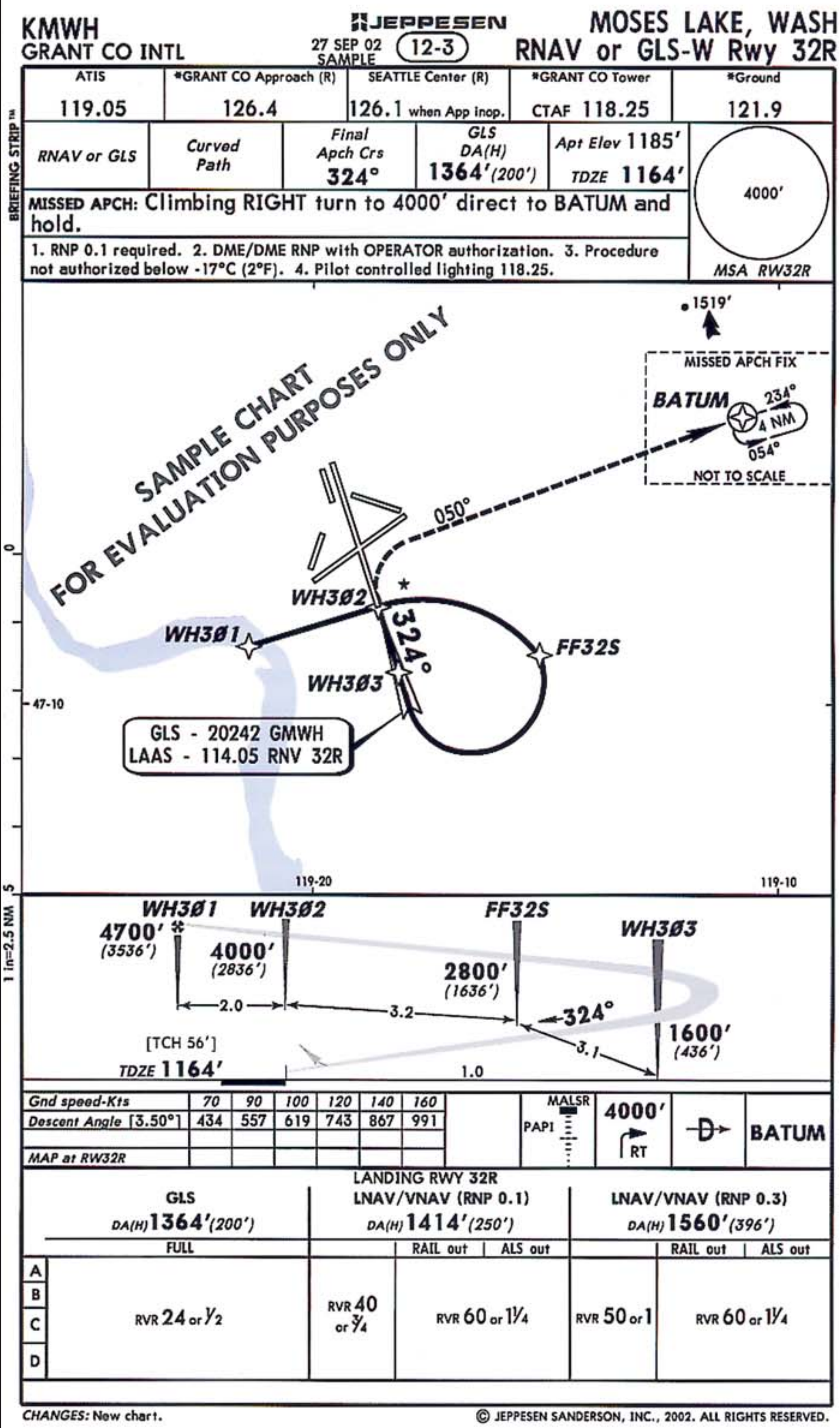
6 FIGURE — POTENTIAL FUTURE APPROACH PROCEDURE USING BOTH RNP AND GLS CAPABILITY



DVT – What is all the fuss about?

Simon Phippard - Partner Aerospace Department Barlow Lyde & Gilbert, London

Readers of this journal and airline management will almost certainly be aware of recent court decisions on this subject. Some of the press has been confusing with reports of conflicting decisions in Australia and England. The aim of this article is to shed some light on what is actually going on and where airlines stand.

Of course Deep Vein Thrombosis (DVT) is not really a flight safety issue but a passenger health issue. Nevertheless it has assumed high profile for airlines in recent years and with increased political interest and a blurring of the distinction between health and safety we may see regulators taking a more direct interest. In any event, the present state of the law could have implications for flight operations procedures.

I am not an expert in the medical aspects of DVT. There are many around and not all share the same view. However some degree of consensus is emerging that particular factors predispose an individual to be more likely than others to suffer a thrombosis or actually to trigger an instance. Some of those, such as depressurisation, prolonged immobility and cramped seating or poor posture are often present in the airliner passenger cabin. There are few other modes of transport, or indeed other activities, which entail sitting in the same seat for more than twelve hours at a stretch. On the other hand there are many other factors which can affect anyone, anywhere: these would include age, medical history (including reduced blood clotting ability, a previous occurrence or cardiovascular disease), hormone medication, recent surgery, obesity or dehydration. People fly further, on longer sectors, more often, than ever before. Unsurprisingly there is therefore a range of views as to whether the aircraft cabin environment is itself the immediate cause of a thrombosis in any given case.
It is of course important to appreciate that there is no single answer to the question of whether air travel causes DVT. Although a German court appears to have rejected a claim on the basis that there is, statistically, a low likelihood of any given passenger suffering a DVT[1] most courts worldwide will look at the evidence and particular facts of each case.

What did the recent cases decide?

Just before Christmas, the High Court in London and the Supreme Court in Victoria - the senior first instance Courts in each jurisdiction - both handed down judgments in cases seeking damages following alleged instances of DVT suffered during air carriage. Neither was, however, a final judgment following trial with evidence on the facts and so on. Each dealt with legal issues alone - but the effect of the English decision, if upheld on appeal, will be to prevent a significant number of DVT claims against airlines.

The Australian decision[2] was presented as a victory for the passenger. It is nothing of the sort. The airlines had applied to strike out the claim on a summary basis. To do that the Court needed to be satisfied the case had virtually no prospect of success. The outcome is that Mr Povey has been granted leave to reformulate his claim - if he believes he can - to allege that the failure of the carriers to warn of the risks of DVT might constitute an "accident" - which, as you all know, is the principal trigger of liability under Article 17 of the Warsaw Convention. If Mr Povey's claim proceeds, he still has to prove - as a matter of medical evidence - that the DVT was caused by his travel on the aircraft. This is, of course, a contentious issue. The Judge did not come to any conclusion on it: it has simply declined to dismiss his case.

The English decision[3] was rather different. It attracted considerable publicity because it was group litigation involving 56 passengers against 27 airlines. The purpose of the hearing in November 2002 was to decide whether the atypical reaction of any particular passenger to a normal and unremarkable flight, without more, constituted an "accident". Mr Justice Nelson held not.

The issues of law were considered against a factual matrix, agreed between the parties solely for the purpose of resolution at a generic level of those legal issues. Under the matrix, it was assumed that the cabin layout was usual, the usual flight procedures were followed, the aircraft seating and systems were in normal working order, and the flight complied with all applicable regulations. It was also assumed that passengers were at an increased risk of suffering DVT in circumstances where the carrier knew of that increased risk and did not give them any warning as to the risk or any measures as to how to minimise such risk.

What this judgment did <u>not</u> do was to address the issue of causation - i.e. the link between instances of DVT, either generally or specifically, and air travel. In other words, the judgment did not conclude that DVT cannot, or in any one instance did not, arise as a result of the flight or the aircraft cabin environment.

That is something which any given passenger will have to try to prove in due course. Although the decision is a victory for the carriers, it does not eliminate future claims, which must be likely. Doubtless, they will be pursued on the basis that something unusual occurred. This might on the basis of a system malfunction or a seat not reclining properly, or that a passenger asked to be moved and was not allowed to do so. Such a passenger would have to demonstrate that that unusual event constituted an "accident" within the meaning of the Convention, which has been interpreted as "an unexpected and unusual event … that is external to the passenger". It does not include "the passenger's own internal reaction to the usual, normal and expected operation of the aircraft".

So where do airlines go from here?

First, operators need to consider their procedures in the event that aircraft systems or equipment which have a bearing on the passenger cabin environment are not functioning correctly. If the cabin pressurisation system, or a seat recline mechanism, or the passenger health video, are not working, a passenger may be able to characterise this as an "accident".

Second, operating procedures need to address what cabin crew should do in the event a passenger complains of symptoms which may indicate a clot. Leg or chest pain is a possible symptom: it is worth establishing, with appropriate medical guidance, what precautionary steps might be taken at that stage - whether it be taking more fluids, moving around the cabin or exercises to promote circulation. One gets into a difficult area in terms of how far flight crew can offer medical advice so this is an aspect to be resolved with the aviation medicine specialists. Nevertheless, recent case law in the United States suggests that an inappropriate response to a passenger health event could itself be an accident, even if the symptoms being suffered by the passenger are – to borrow the well-known phrase - themselves purely an internal reaction to the normal operation of the aircraft.

The political and press interest in the subject may have waned recently, perhaps due to greater interest in wider international political issues. Further studies on DVT are in hand. Nevertheless, one hears murmurings of legislation to circumvent the obstacles to recovery by passengers posed by the Warsaw Convention regime - which will not change when the Montreal Convention comes into force, probably later this year. If result-orientated legislation of that nature does come into force, airlines may need to reconsider their own position vis à vis passengers, although one might be forgiven for suspecting that liability would not be predicated on fault, in which event a high standard of care and concern for passengers' welfare would be irrelevant.

Finally, what of the position of flight crew? This analysis is all about the relationship between airlines and their customers. None of these cases have any bearing on the duty of an airline to its own crews. The passenger relationship is the most obvious source of friction, but flight crew are more regularly exposed to some of the factors which can contribute to DVT such as reduced air pressure. Flight crew frequently spend prolonged periods of time in the aircraft and, in the case of flight deck crew, much of that is sedentary. If immobility is an important factor it may be that cabin attendants are at reduced risk.

Much of this is largely uncharted territory, both legally and in terms of medical studies and writing on the threat to flight deck crew. However the duty of an airline to provide a safe place of work may be defined - and it varies from country to country - there may be practical crew welfare issues if neither employer nor employee take appropriate measures to minimise any risk. Airlines would do well to keep an eye open for any firmer conclusions on the risk and, if those studies are limited to passengers, consider their implications for crews.

In the meantime, for flight deck crew, the obvious means of minimising the risk is to take every opportunity to move around!

1. **Rainer Vorlander –v- Deutsche Lufthansa,** Regional Court of Frankfurt, 29 October 2001
2. **Povey -v- British Airways and Qantas,** Bongiorno J, 20 December 2002
3. **In re Deep Vein Thrombosis and Air Travel Group Litigation,** Nelson J, 20 December 2002. The Times, 17 January 2003.

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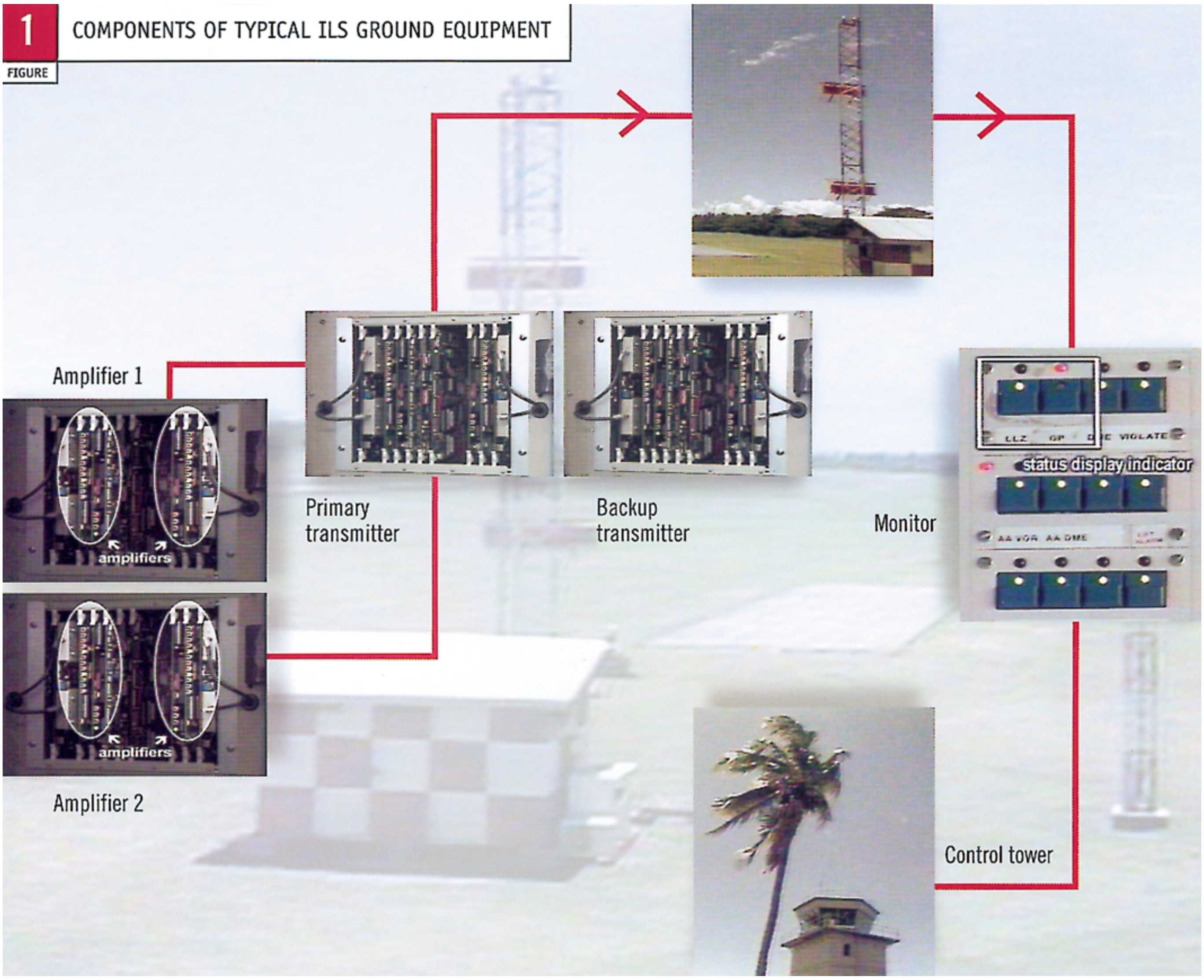
Hazards of Erroneous Glideslope Indications



All airplanes equipped with instrument landing systems are vulnerable to capturing erroneous glideslope signals. Boeing, the International Civil Aviation Organization, and the U.S. Federal Aviation Administration are working together to improve awareness and prevent such errors. Flight crews can help manage the risk by understanding the problem and performing glideslope confidence checks.

With the advent of instrument landing systems (ILS) in the 1940s came the possibility of erroneous or false glideslope indications under certain circumstances.

One such erroneous indication recently occurred on several 767, 777, and Airbus airplanes, resulting in coupled ILS approaches being flown toward a point short of the runway. This kind of problem can occur on any airplane with any ILS receiver.

Boeing has taken action to help prevent such incidents by revising operations manuals and working with the International Civil Aviation Organization (ICAO) and the U.S. Federal Aviation Administration (FAA) to address maintenance errors that can cause erroneous glideslope signals. The subtle nature of the indications makes it imperative that flight crews also help manage the risk by understanding the problem and performing glideslope confidence checks.

This article describes

1. Incident involving an erroneous glideslope signal.
2. Causes of erroneous glideslope signals.
3. Flight crew actions.
4. Industry actions.

1. Incident Involving an Erroneous Glideslope Signal

On the night of July 29, 2000, an Air New Zealand 767 was on a routine flight from Auckland, New Zealand, to Apia, Western Samoa. The night was moonless, with scattered clouds that prevented visibility of the runway lights.

The flight crew members were experienced in conducting routine automatic landing approaches in low visibility. They considered a routine automatic landing approach to be safe if the autopilot was coupled to the airplane; no warning indications were visible, and a valid Morse code identifier signal came from the ground navigation aids.

Well prepared before descent, the flight crew thoroughly briefed for the approach. When the crew selected the approach mode, the glideslope capture occurred almost immediately. All ILS indications appeared to be correct. With all three autopilots engaged the captain concentrated on configuring the airplane and slowing it for landing. The crew attributed the slightly steep descent of the airplane to its heavy weight and tailwinds. The crew noted a good Morse code identifier signal and no warning indications. At 1,000 ft, the crew completed the landing checks. Shortly thereafter, the first officer observed the close proximity of the island lights out his side window. The captain noticed that the distance measuring equipment (DME) indications differed slightly from what he would have expected.

The captain executed a timely go-around 5.5 mi from the runway at an altitude of less than 400 ft. The crew successfully executed a second approach by using the localizer and ignoring the on-glideslope indications.

2. Causes of Erroneous Glideslope Signals

Investigation of the Air New Zealand incident revealed important information about the causes of erroneous glideslope signals. Understanding these causes requires a discussion of the ILS and its normal operation.

ILS ground equipment provides horizontal and vertical guidance information to airplane instrumentation. The equipment typically comprises five components: a localiier transmission system, a glideslope transmission system, a DME or marker system, a standby transmitter, and a remote control and indicator system (fig. 1).

During normal ILS operation the localizer and glideslope transmitters each radiate a carrier wave of 90- and 150-Hz signals of equal amplitude. These signals alone do not provide guidance but are compared with separate 90- and 150-Hz sidelobe signals radiated by the localizer and glideslope to create complex interference patterns. The patterns are designed so that when an airplane is below the desired glideslope the instruments will sense a predominance of 150-Hz signals; when the airplane is above the desired glideslope, the instrumentswill sense a predominance of 90-Hz signals; and when the airplane is on the glideslope, the instruments will sense equal amounts of 90- and 150-Hz signals (fig. 2.)
The ILS was designed to protect against

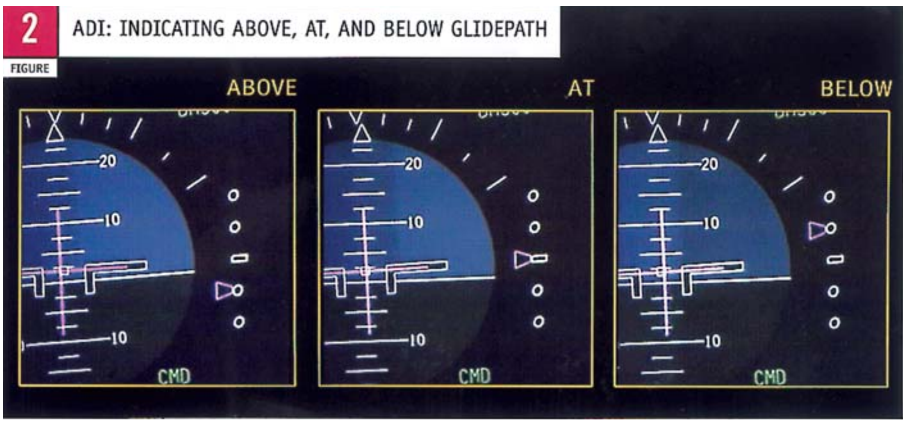
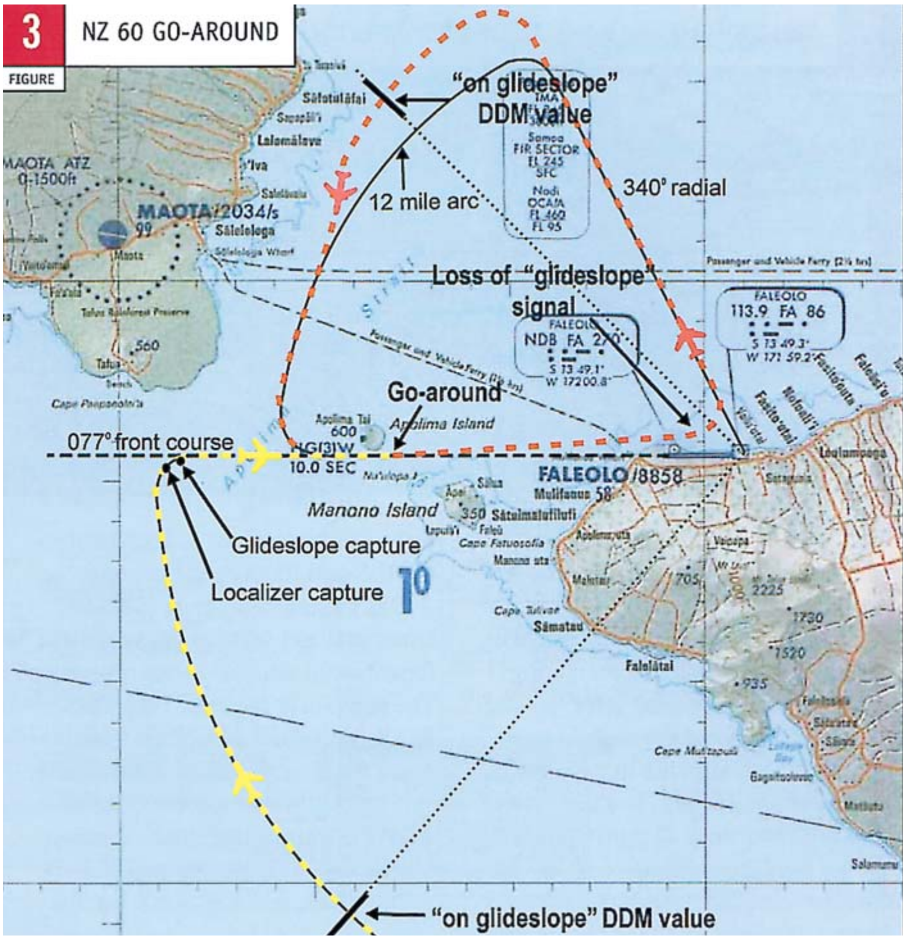


FIGURE 2 ADI: INDICATING ABOVE, AT, AND BELOW GLIDEPATH



transmitter malfunctions. If a primary transmitter malfunctions, the system automatically will transfer to the standby transmitter. If the ILS does not change over to the standby transmitter, or if the standby transmitter is faulty, the system automatically will shut down, and an alarm will sound in the control tower.

It is important to note that, because the Morse code identifier signal is earned only on the localizer carrier signal, the flight crew only knows whether or not the localizer is transmitting. No information on the health of the glideslope, localizer, or other functions is provided.

On the night of July 29, 2000, the glideslope sidelobe amplifier was not operating in Apia. In addition, the ILS ground equipment had been left in bypass mode following calibration maintenance. This prevented system transfer to the standby transmitter. No alarm sounded in the control tower because the cable that fed information to the tower navigation status displays had been cut during construction. As a result, the Air New Zealand flight received only the glideslope carrier wave transmission, which was interpreted by the instruments as being on glideslope, with no warning indications.

3. Flight Crew Actions

The Air New Zealand incident exemplifies why flight crews need to be aware of the potential for erroneous glideslope signals, even when the ILS is indicating correctly and a distance-altitude check is performed at glideslope capture. Frequent crosschecks and crew vigilance are key in detecting potential problems.

Crosschecks

A single distance-altitude check does not guarantee the subsequent descent path will be correct. Similarly, a single altitude check crossing the outer marker does riot guarantee the glideslope is correct. The best strategy is to cross-check the airplane altitude against distance periodically during descent. Methods to accomplish this include

- Crosschecking altitude and DME distance periodically.
- Crosschecking altitude and flight management system (FMS) threshold distance.
- Crosschecking altitude and the crossing altitude of the outer marker (or locator, very-high-frequency omni-range [VOR] navigation equipment, or FMS).
- Crosschecking radio altitude and barometric altitude.
- Crosschecking ground speed and rate of descent.
- Questioning air traffic controllers when indications do not appear to be correct.

Similar erroneous indications can occur with the localizer signal. Cross-checking the signal with other navigation indicators, such as VOR and navigation database course heading and tracking information, can help reduce risks in such occurrences.

Crew vigilance

Human factors were very important in the successful outcome of the Air New Zealand incident. Crewmembers were alert to possible ILS problems because notice to airmen (NOTAM) bulletins had informed them that the ILS was unmonitored, and they discussed this during their approach briefings. They also paid attention to subtle

cues that something might be wrong, even though the automatic flight systems was indicating normally. Last, the crewmembers were willing to execute a go-around to give them more time to sort through the conflicting information (fig. 3).

4. Industry Actions

Boeing, the FAA, ICAO, and others in the aviation industry are working together to address the problem of erroneous glideslope indications. Actions have included issuing maintenance guidance, improving equipment, revising flight crew training manuals and operations manuals, and facilitating discussions at industry safety forums.

Maintenance guidance

ICAO and the FAA have released guidance for the proper conduct of ILS ground maintenance activities. The guidance

- Clarifies the content of NOTAMs that are sent when maintenance work is in progress and the possibility of false indications prohibits the use of a particular approach aid.
- Recommends that maintenance personnel confirm whether or not a NOTAM has been issued before beginning ILS maintenance testing.
- Recommends that the Morse code identification feature be suspended when maintenance testing is in progress.
- Recommends that air traffic control advise the flight crew, either by voice or through an automated terminal information service (ATIS), that ILS maintenance testing is in progress and that the flight crew should not use the glideslope or localizer.
- Recommends that maintenance personnel turn off the glideslope transmitter during localizer testing and turn off the localizer transmitter during glideslope testing.

Equipment improvements

In the case of the Air New Zealand flight, the ground proximity warning system (GPWS) did not warn the crew flying the erroneous glideslope. This is because the airplane did not have an excessive closure rate with terrain and the flaps were in landing configuration. However, an airplane equipped with a terrain awareness warning system (TAWS) (e.g., the Honeywell enhanced GPWS) would have warned the crew of the situation because TAWS compares the flight path with a terrain database.

TAWS is standard equipment on all in-production Boeing airplanes and is available for retrofit on all models delivered before 2000.

Training

In addition to improving equipment, Boeing has revised its flight crew training manuals and operations manuals and has sent all airline customers a 26-min CD-ROM video, "New Zealand 60 - A Free Lesson." The video and revised manuals detail the problem of and solutions to erroneous glideslope indications.

Safety forums

Boeing also promotes discussion of erroneous glideslope indications in various industry safety forums worldwide.

Editor's note: Additional copies of the training video, New Zealand 60 - A Free Lesson," may be obtained from the Flight Safety Foundation, 601 Madison St., Suite 300, Alexandria, VA 22314; telephone 703-739-6700; fax 703-739-6708; web site www flightsafety org.

SUMMARY

The transmission of erroneous ILS information at Apia on July 29, 2000, was caused by an unusual set of circumstances. However, technicians will continue to conduct testing and maintenance of airfield navigation aids. A similar situation could occur in any ILS-equipped airplane during what appears to be a routine instrument approach.

The best defenses against erroneous glideslope indications are understanding how the ILS works, equipping airplanes with modern warning systems, and implementing training and procedures that ensure crewmemebers are prepared to take appropriate action. Flight crew action should include crosschecking the airplane altitude against distance periodically during descent.

Special recognition is given to investigators David Stobie, Rod Smith, Chris Kriechbaum, Bob Henderson, Joey Anca, and Dr. Gordon Vette for their contributions to understanding this incident.

Minimum Safe Turnaround Time - A Briefing Paper for Schedule Planning Departments

Produced by the ERA Air Safety Work Group

The following paper introducing the concept of calculating safe turnaround times was produced by The European Regions Airline Association (ERA), Air Safety Work Group. It is intended for aircraft operators to use as a guide when establishing and revising their schedules. Obviously airlines operate in various circumstances, and the factors affecting turnaround time, outlined in this paper, are recommendations for consideration; it may be necessary for an operator to take account of many other factors.

ERA is the principal body representing the interests of organisations involved in air transport in Europe's regions. More than 70 million passengers fly with ERA member airlines each year.
The Air Safety Work Group is one of several ERA work groups; the Group meets quarterly, and delegates consist of airline safety managers and representatives from major aircraft manufacturers. The paper on Minimum Safe Turnaround Times is just one visible product of this Group that can help improve safety within the aviation industry.

For more details about ERA visit www.eraa.org and www.fly-safely.org

INTRODUCTION

Airline flight schedules provide time between scheduled arrival and departure times to allow essential tasks to be completed. These tasks include loading and unloading, maintenance, replenishment and cleaning, together with the completion of essential crew post and pre-flight administration.

Typically, airlines allow standard (minimum) turnaround times in the construction of flight schedules.

These do not take into account variable factors at specific locations, or peculiarities at non-standard locations. Where adverse conditions exist - for example, a combination of a crew change, refuelling the aircraft or a large load - it may not be possible for the crew to achieve an on-time departure.
In many cases, careful consideration of the relevant factors can lead to the calculation of a practical Minimum Safe Turnaround Time (MSTAT) which may have important benefits for the airline and crew.

These include:

- Improved departure (and arrival) punctuality
- Less likelihood of having to renegotiate a flight plan
- Less adverse impact on crew rostering, and
- Enhanced safety by preventing poorly managed and rushed turnaround times.

Additionally, this analysis can reveal the causes of persistent delays at certain locations, which can then be addressed and perhaps eliminated.

Often, schedule planners are not experienced operators, or do not have first-hand knowledge of the difficulties their crews have to cope with in order to achieve on-time departures from certain airfields.

AIM

The aim of this paper is to offer schedule planners advice when calculating the MSTAT, the use of which will bring operational and safety benefits to the airline.

To achieve this aim Flight Safety Managers should use this paper as a briefing guide with which they can raise awareness, within their planning and operations departments, of the factors that affect turnaround times, and the benefits that can be gained from realistic scheduling.

DEFINITION

The Minimum Safe Turnaround Time (MSTAT) is the minimum on-block time necessary to allow a crew to prepare for a flight, as well as to complete the paperwork for the previous flight.

FACTORS AFFECTING MSTAT

A number of factors affect the MSTAT. Some of these are unavoidable; others are variable.

Unavoidable factors include the following (this list is not comprehensive):

- Flight planning
- Preparation and checking of loadsheet
- Crew change
- Aircraft cleaning
- Refuelling
- Catering replenishment
- Airframe change
- Load characteristics.

With the imminent introduction of an EU regulation concerning aviation security, some turnaround times will be adversely affected. Aircraft are to be security checked, and once checked 'as clear' they are to be guarded, all access to that airframe will be strictly controlled. Aircrew, airport workers and sub-contractors (their baggage, tools etc.) will all be required to undergo full screening and frequent security checks. The impact of these rules may be minimal at large airports where security is already at a high standard; however, at other locations security could be the main limiting factor when calculating MSTAT.

Variable factors, because they are unpredictable, cannot be included in the MSTAT calculation.

Variable factors include the following:

- Crew debriefing
- Crew recovery
- De-icing and other non-scheduled maintenance tasks
- De-planing disruptive passenger
- Training.

The above lists are not exclusive; other factors may affect MSTAT for particular aircraft types, for specific operations, or for certain locations (or, any combination of these).

CALCULATION OF MSTAT

The calculation of an MSTAT is not an exact science, what may suit one operator (aircraft type, airport) may not suit another operator (aircraft type, airport). Similarly what may work for this year's scheduling might not work for next year's. The important point is to collect information for each type of operation, aircraft type and airport and assess the factors that hinder or help turnaround times. Only by using realistic MSTATs for planning can the operational and safety benefits be achieved.

Note: MSTAT may not only be different at different airports, but time may vary considerably between parking bays or terminals at the same airport.

One method of calculating a MSTAT is to first ascertain a MSTAT for ideal conditions, and then to adjust this ideal time by adding penalty times for known adverse factors.

For any aircraft type, the MSTAT may be determined in ideal conditions. Ideal conditions might include the following:

- Computer flight-plan available or flight planning completed prior to arrival
- Computer load-sheet available
- No crew change
- No cleaning required
- No catering replenishment required
- No refuelling required
- Moderate passenger load.

To calculate the MSTAT for non-ideal conditions, a correction factor can be added if any of the above conditions are not met. The following hypothetical example shows how the calculation might work in practice.

EXAMPLE

Assume an airline currently allows a standard 30 minutes for turnaround time on all schedules.

Now, suppose that the MSTAT, for an example aircraft, determined for ideal conditions is 15 minutes, it is clear that in many cases, the standard scheduled turnaround time would be generous, and easily achievable; alternatively, it could be reasonably reduced to 20 minutes and still provide greater flexibility within the schedule.

In non-ideal conditions, one or more penalty factors would have to be added to the ideal MSTAT. Suppose they are determined to be as follows:

No computer load-sheet:	+ 5 minutes
No Ground Engineer for pre-flight inspection:	+ 5 minutes

Crew Change:	+20 minutes
Cleaning by crew:	+10 minutes
Refuelling:	+10 minutes
More than 50 passengers:	+12 minutes

Note: Some of these tasks (cleaning and refuelling for example) may be combined. Also, these penalty times might be suitable when considered in isolation, however, a practical maximum time penalty should be considered, e.g;

Maximum correction to MSTAT:	+30 minutes

It is clear that with one or more factors affecting the turnaround of our example aircraft, a 30-minute MSTAT would be inadequate and only achievable by cutting corners or rushing procedures.

For example: suppose that for this sample turnaround a manual calculation of the load-sheet was necessary, cleaning and refuelling were required, and there were 80 passengers, but a ground engineer was available to complete the pre-flight inspection.

Ideal MSTAT:	15 minutes
Manual calculation of loadsheet:	+ 5 minutes
Cleaning/refuelling:	+10 minutes
More than 50 passengers:	+12 minutes
Total correction:	+27 minutes
Final MSTAT:	42 minutes

Note 1: if a crew change occurred at this stop, the total correction would have been limited to 30 minutes, making the final MSTAT 45 minutes.

Note 2: if the same conditions applied to another location, but an extra passenger bus was required, then an appropriate adjustment would have to be made, perhaps another 6-minutes?

EXPERIENCE

An ERA member airline has used a draft of this paper as a planning tool for their aircraft schedulers.

As a result, most of the unrealistic turnaround times have disappeared from their schedules. In order to raise the awareness of their planners, this operator found it invaluable to give practical experience to their planners by exposing them to as many routes as possible. The decrease in delays is harder to assess, as this airline includes flying times in these calculations. However, quality indicators of airline performance are frequently being demanded by customers, and adherence to departure times is a desirable element, in their eyes, when choosing an operator.

CONCLUSION

The use of standard turnaround times which do not take account of variations in operation, aircraft type or conditions at individual locations, can lead to consistently unpunctual operation, rushed (unsafe) procedures, poor quality performance.

Calculation of Minimum Safe Turnaround Time (MSTAT) by the Flight Operations Department for each aircraft type and for each sector of schedules will ensure that schedules are realistic and achievable. This will result in improved flight punctuality and enhanced safety. In some cases, the use of a reduced turnaround time so calculated may result in a more cost-efficient schedule.

The MSTAT calculation will reveal where critical departure times cannot be safely achieved. This will focus attention on the reasons for delays, permitting appropriate remedial action such as changing the location of crew changes, tanking fuel, or improving ground handling facilities.

Exposing schedulers to the realities of the operations that they plan will help them to understand the problems that crews face. Realistic times can then be assigned to the variety of tasks that occur during a turnaround, penalty times can be calculated for known variables, and the calculation of MSTAT can be confidently made for all situations.

RECOMMENDATION

The ERA Air Safety Work Group recommends that all airlines use the lessons outlined in this paper to recalculate their scheduled turnaround times.

Maastricht
February 2003

Waging War Against Unsafe Operations

by E. H. Paintin

Having been trained in the military I have often mused at the similarity between keeping Air Operation safe and the waging of war by the military.

On one hand commercial enterprise as we know it does not have a particularly long history, perhaps as little as 150 years, and as everyone knows aviation history is less than 100 years.

On the other hand wars have been waged for many thousands of years. Should there not therefore be some principle that the aviation sector can learn form the military?

If we also consider the amount of training that goes into building an efficient army and compare it to the relatively minimal training undertaken by Air Operators, it should not be surprising that the skill level within some Air Operators is not only inadequate but has stagnated.

In what follows, I hope to draw out the learning points that an Air Operator might glean from the experience of the military waging war. In particular I intend to consider the British Military Doctrine and Principles of War as they are currently taught to Candidate Officers of Her Majesty's Forces Military Staff Colleges and Academies, at the Royal Military Academy, Sandhurst.

I have, for convenience written the Military Doctrine and Principles of War in italics, to easily identify them from my comments in relation to the Air Operator.

British Military Doctrine and Principles of War

Fighting Power

The term "fighting power", defines an army's ability to fight. There are three interrelated components of fighting power.

In the aviation business this can be compared with the ability of the Air Operator to combat the various hazards and threats to the safety of it's operation.

Conceptual

This can be described as the thought process behind the ability to fight. It is made up of:

The Principles of War

These are broad precepts that influence the conduct of war. There are 10. They have relevance at high levels of war where they assert criteria against which courses of action can be tested. At lower levels they provide a guide for planning and conduct of activity on the battlefield. The principles of war are based on past experience where application with judgement has led to victory. They are not rules, yet blatant disregard of them involves risk and could result in failure.

In business terms this can be equated to the overall business philosophy of the Air Operator and in particular its policy to Safety in the broader sense of the word. At the end of a given period it should be possible to look back at how the operation has functioned and to compare it with the general philosophy of the organisation. Each of the 10 principles will be dealt with independently.

Military Doctrine.

Military Doctrine is the highest level of Doctrine and is issued by the Chief of General Staff. It is concerned with conveying understanding, not instruction. It is based directly upon Government policy manifest primarily in White Papers. Its function is to establish the framework of understanding of the approach to warfare in order to provide the foundation for its practical application.

This is the accuracy and method used by the Chief Executive to communicate what the Management Board expects from its employees in terms of Safety Policy. Based on what the CEO communicates and the reactions and actions of the Board Members to safety issues, the Safety Doctrine will evolve.

I say evolve, because it takes time to achieve a coherent and consistent Safety Doctrine. Many Air Operators have senior managers who pay lip service to safety. This attitude is soon detected by subordinate managers and shop floor workers who then adopt a "could–not-care-less" attitude themselves.

Development

Development requires bringing an innovative approach to bear on all aspects of fighting power. Development will be clearly seen in the work of Research

Establishments and in the application of operational analysis techniques. The view of Commanders at all levels will also have major influence upon the development of the ability to fight.

Business development in its broader sense is the responsibility of every staff member. The development of new and better business processes needs to be actively encouraged. It is by this means that continuous improvement is brought about. Managers at all levels should be paying attention to the analysis of the processes employed and for their continuous revision where they are found to be in need of overhaul. The Quality System is a tool that easily facilitates this, as regular audits expose weaknesses that enable revision and the resulting improvements. The Hazard Analysis and Safety Case precipitate the development of the Safety System.

Morale

The morale component concerns the ability to fight. Many theorists and all practitioners of war have pointed to the significance of the morale aspect in fighting. It can be summed up in the term "morale" which Napoleon quantified in saying that "Morale" is to the material as three is to one.

The state of company morale is one area that seems to be totally ignored by Senior Management. It is difficult for middle management to remedy poor morale brought about by poor executive management decisions and behaviour.

The constant threat of redundancy, lack of communication by senior management, pay increases below the cost of living increase, lack of action in areas of concern raised by middle management and the workforce all have a debilitating effect on morale. This in turn reflects in poor productivity, declining work habits which all affect the safety of the operation.

Napoleon appreciated that one well motivated soldier was worth three unmotivated men. They worked well and motivated their peers. It was therefore possible to win battles over forces superior in number. Officers (managers) were therefore selected for their ability to motivate their men. Sadly this is not generally the case in many Air Operators today.

Physical

The physical component is the means to fight. This includes the organisation of the main elements of combat power, which are:

Manpower
Equipment
Logistics
Training and Readiness

Due to the ever-pressing need to manage the finances by senior management it is often the case the Air Operators have insufficient qualified manpower to ensure the safe operation of their enterprise. Interestingly the Royal Air Force is finding that having privatised some areas of its aircraft servicing, the adequacy of manpower is becoming an ever-increasing risk area.

This coupled to the inadequacy of equipment to cope with modern aircraft and insufficient spares holding makes the task of middle management very difficult causing unnecessary stress and depressing the morale of its managers and workers.

The shortage of skilled manpower, particularly in the engineering area is an ever-increasing area of risk to the Air Operator. Those Air Operators that used to run training schools and apprenticeship schemes no longer do so as part of one or other cost saving scheme. This short sighted policy is destroying their engineering infrastructure with an increasing risk to the safety of the operation. They propound a Company Safety Policy on the one hand whilst destroying their manpower skills on the other.

This article will be concluded in Issue 51.

Course Outline for the Human Factors Training in Aviation Maintenance

In conjunction with Baines Simmons Ltd

Course Dates:	01 – 03 April 2003
	27 – 29 May 2003
	24 – 26 June 2003
	22 - 24 July 2003
Course Fees:	£990 fully residential

Who should attend:

This course will be relevant for all those involved in aviation maintenance. It will be of particular interest for those companies who are JAR 145 approved or who are in the process of applying for JAR 145 status. The course is primarily a knowledge based course designed to equip industry to meet the training requirement within the JAR 145 Amendment 5 Maintenance Human Factors (MHF) syllabus.

Course Outline:

This is a 3 day programme the content of which is based on the course syllabus within the amendment to JAR 145. The main topics covered by the course are listed below.

The course material has been collated from considerable research and hands on experience of Human Factors issues. Baines Simmons has particular strength in the field of Human Factors. The Course Manager, Keven Baines, has worked with a number of industry experts such as David Marx and Professor James Reason and has been involved in the subject for the past ten years gaining a thorough understanding of Human Factors issues.

Through the combination of case studies, exercises and practical application, the course is constructed to encourage delegate participation and therefore maximise learning potential.

The course is based at Gatwick and is fully residential. Accommodation is booked for delegates from the night before the course starts to enable a prompt start.

Course Content

The main topics covered within the course are:

General introduction to Human Factors

- The meaning of Human Factors
- Why Human Factors are important
- The size of the Human Factors problem
- How Human Factors have contributed to aviation accidents
- The effect of Human Factors on airworthiness
- The error chain concept

Human Error

- Error and the different types of error
- Organisational accidents
- Safety nets and system defences

Human Error – Slips and Lapses

- Difference between slips/lapses and mistakes
- Main types of lapses
- Common factors promoting wrong action
- Situational awareness
- Perception and the link to error
- Complacency and the link to error

Human Error – Violations

- The different forms of violations
- Norms and habits
- Resources and the link to violations
- Working to approved standards
- Procedural compliance

Avoiding and Managing Error

- Human reliability limitations
- Error Management Principles
- Root cause investigation
- Cycle of blame and the ability to manage error
- Safety cultures
- Error management skills

Human Performance and Limitations

- The brain and memory
- Motivation
- Stress and fatigue
- Sleep and circadian rhythms
- Shiftwork
- The effects of alcohol, drugs, medication, caffeine and diet

Environmental Factors

- Environmental factors that affect human performance
- Vision requirements for inspectors and factors affecting visual inspection
- Improving visual inspection reliability

Communication

- Different types of communication and the effects of poor communication
- Importance of task/shift handover

Teamwork

- Team and individual performance
- Effective team work

Organisation's Human Factor Programme

- Effective error management and Human Factors programme.

For an application form, please contact

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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 -

30TH SEPTEMBER 2003

0800 – 0900	Registration
Session Chairman - **Ian Crowe, Willis**	
0900 – 0910	Opening Remarks **John Dunne, Chairman UKFSC**
0910 – 0940	Keynote Speech **Mike Hirst - Loughborough University**
0940 – 1020	Regulatory Minima **Dave Chapman/Dave Wright - CAA**
1020 – 1050	Board Decisions Cost v Benefits **Dave Henry - Consultant**
1050 – 1110	*Refreshment Break*
1110 – 1140	Development of an Affordable System **Mike Wood - flybe. british european**
1140 – 1210	Examples from other industries **Mark Williamson - Willis Space**
1210 - 1240	Discussion
1245 – 1400	*Lunch*
1400 – 1430	Where you Save and Lose Money **TBA**
1430 –1500	Where are you going with Safety Related Equipment **TBA**
1500 –1530	Development & Use of Non-Mandatory Safety Tools & the Benefits **John Savage - British Airways**
1530 -1550	Discussion
1550 -1600	Closing Remarks **John Dunne, Chairman UKFSC**

SEMINAR INFORMATION

- **Hotel Accommodation**

  Hotel Accommodation is not included in the Seminar Registration Fee. A rate of £145 (including breakfast & VAT) has been negotiated with the Radisson Edwardian Hotel (valid only until 22nd August). 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

- **Cancellations/Refunds**

  Cancellations received prior to 22nd August 2003 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 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 of your registration will be faxed to you on receipt of your Registration Form and payment