focus

ON COMMERCIAL AVIATION SAFETY

AUTUMN 2006

ISSUE 64

THE OFFICIAL PUBLICATION OF THE
UNITED KINGDOM FLIGHT SAFETY COMMITTEE

ISSN 1355-1523

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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.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 Fax: 01276-855195
email: admin@ukfsc.co.uk
Web Site: www.ukfsc.co.uk
Office Hours: 0900 - 1630 Monday - Friday

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

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Front Cover Picture: Cessna 172 of Flight Images Aerial Photography Company painted in high visibility dark blue/yellow paint scheme

Disruptive Passengers

During the mid 1990s the number of Disruptive Passenger Incidents was starting to attract the attention of the airlines. The United Kingdom Flight Safety Committee formed the Disruptive Passenger Working Group to look into this issue and to make recommendations. The result of this working group was the production of a "Guide to Handling Disruptive Passengers".

In 1998 the UKFSC planned to hold its Annual Conference on the subject of Disruptive Passenger Behaviour. Just prior to this Seminar in October, a cabin attendant flying with a charter carrier was attacked on board the aircraft and hit by a passenger with a bottle causing serious damage to her person. This incident hit the news and attracted press attention to the Seminar.

During 1999 the UK Civil Aviation Authority started to collect disruptive passenger information and introduced a form to collect this information. The form was embraced by the airlines with the aim of collecting valuable information and as a means of producing statistics previously not available.

The police introduced procedures for dealing with disruptive passengers when the aircraft landed. The resulting court cases had mixed results.

The past six years have seen a steady rising number of Disruptive Passenger incidents mainly caused by the consumption of alcohol consumed prior to and during flight and the inability of passengers to smoke on board the aircraft.

During the period 2002/3 the law was changed increasing the penalty for disruptive passenger behaviour in order to give the police more power.

The number of incidents continues to rise, prosecutions continue but some villains have escaped serious sentences by claiming that the small amount of alcohol consumed had reacted with medication they were taking. There is nothing in the act or the Air Navigation Order that deals with drugs, prescription or recreational. Perhaps it is time to change the law to include the effects of drugs and alcohol.

This may take some time but it is worth starting now before drugs become much more of a problem.

The UK Airport Police Commanders Group on behalf of ACPO has recently launched a new Disruptive Passenger Protocol. The Commanders Group represents 59 airports in the United Kingdom and Northern Ireland. Many of these do not have a permanent police presence and are serviced from the local police station.

The national protocol is not a panacea to the problem of disruptive passengers. It sets out a base line or standard through which the police and Crown Prosecution can communicate and collaborate effectively with the industry throughout the country to prevent disruptive passenger behaviour and robustly enforce the law.

The Airport Commanders Group cannot force airlines or airport authorities to act in a particular way. What it can do is encourage local police commanders to sit around the table with airport service partners to develop a constructive working relationship and a clear memorandum of understanding.

The fact that an airport does not have a permanent police presence does not prevent the local police commander from implementing the new protocol. Operators who have not had contact with the police at their UK destination airports are encouraged to do so. Good communication at an early stage of the operation may make for a much better relationship in the event of assistance from the police being required.

Manchester Police has developed a form for cabin staff to use for their original notes, having experienced a disruptive passenger incident. The purpose of these notes is to ensure that all the relevant information is recorded very shortly after the event. This information and the terminology is then used when writing their statement for the police. Often when providing their statements cabin staff subtly change information and this later provides a loophole for the accused when they get to court.

Operators may have developed their own form that their cabin crew are required to use. It would be beneficial to compare these forms to ensure that the company form does record all the information required by the police. Or simply to just accept the use of the police designed form.

The Crown Prosecution Service recently held a Seminar at Heathrow where issues relating to how to make the framing of charges more effective were considered. The CPS has taken over the role of charging from the police. The CPS are hoping that by framing the charges better and by collecting all the relevant evidence they will be able to secure more successful prosecutions.

It is unlikely that we will ever eliminate disruptive passenger events particularly as airports and operators continue to serve alcohol before and on flights. In addition we are likely to see an increase in the use of recreational drugs, which may cause a corresponding increase in disruptive behaviour. We must therefore make every effort to co-operate with both the police and the CPS to ensure a higher rate of successful prosecutions.

What's on the Menu?

by Ian Crowe, Willis Ltd

I was recently chatting with a retired Captain who has over 40 years experience in this industry. In his youth, he had always wanted to fly and was very excited about the prospect of operating a shiny new B727. Having passed all the requirements he was cleared to operate as an FO, looking forward to a long and exciting career.

Technically demanding to operate but a joy to fly, his thirst for professional knowledge and understanding (encouraged by his crew) knew no bounds.

The day of his first flight came with the sad news that a close family member had been involved in a car accident. Our FO's problem was, should he visit this family member or operate the flight? He decided to operate the flight. However, his DFO found out what was going on and the visit took place. By the way, the family member made a full recovery.

Over time as aircraft and systems became more sophisticated, he noticed a change in the attitude of some junior flight crew. Rather than asking about the operation of the aircraft, one of the most regular questions posed was "What's on the (first class) menu"?

He appreciated that times were changing and with it the need to adapt to new operational procedures. In other words the "menus" were changing.

In this developing aerospace business the menu is constantly changing for all of us. Certain philosophies of operation have changed, some for the better.

What should always be on the menu is safety, which is sometimes easy to miss, being crowded out by these new demands.

For engineers, the new menu items now include more component replacement; for air traffic controllers more automation; for cabin crew more responsibilities; for flight crew more operational management; for airport operators more aircraft; for aviation authorities more legislation and for airlines more demands from shareholders.

As a risk adviser I view safety from a different perspective. I believe safety is a sub-set of risk, so let us introduce an additional entry to the main course menu - RISK.

Understanding risk and the impact it can have on operations brings with it its own set of disciplines, in a life these days that often lacks discipline.

What does adding risk to our routines mean to us in the safety business? Perhaps a change in the way we complete a task, self analysis of our actions, questioning previous activities and providing solutions that really work.

We all know the phrase "aviate, navigate and communicate". This embodies the concept of risk management by identifying, analysing and categorising risk to achieve safe operation. This phrase is easy to understand and prioritise. Without understanding risk however, the priorities may change and the concepts of safety and safe operation are lost.

My previous column was entitled the risk of complacency. Introducing the concepts and disciplines of risk into our daily "menus" of operation must surely reduce complacency and improve the overall safety of our business.

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.**

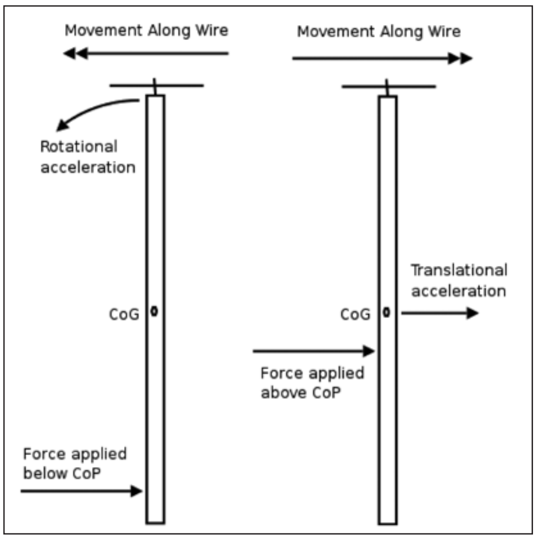
The Sweet Spot, or did you really get away with that landing?

by Alex Fisher, GAPAN

Many pilots are sports players, and are familiar with the concept of the sweet spot. It is that point on the bat or racket where the ball flies off with a wonderful effortless ease. You may wonder what on earth that has to do with landings, but the connection is very close, though not always appreciated. I recall clearly years ago a meeting where recent Flight Data results were being discussed and a number of firm (>2g) landings appeared. The training manager was naturally concerned that the fleet was thumping the odd airplane through the 'surface film of concrete', but he was far more worried at how few firm arrivals were reported in the Tech Log. The same discussion just took place, years later, in the UKFSC. While pride might have played some part in the lack of reporting, there are sound physical reasons why the landing could be misjudged by pilots sitting at the far front of the aircraft. Enter the sweet spot.

The basic physics are easy to understand. Whenever a bat hits a ball, an impulse is imposed on the bat by the ball (and vice versa). That impulse always accelerates the centre of gravity of the bat. If the ball hits the bat at its centre of gravity (CoG), all the motion of the bat is 'translational' i.e. without any rotation. If the ball hits the bat anywhere else, away

from the CoG, the bat still moves back but it rotates too. The amount of rotation depends on the distance of the point of contact from the CoG and the moment of inertia of the bat. The figure (thanks to wikipedia) shows the situation where a bar (or bat) is suspended from a wire along which it is free to slide. It shows that a blow right at the end of the bat, moves the CoG to the right, but causes sufficient rotation to move the pivot point at the top to the left. A blow further up the bar causes less rotation and so the pivot point slides to the right. Somewhere between these two blows, the rotation of the pivot exactly equals the movement of the CoG and the pivot remains stationary (and the bat rotates around the pivot as if it were fixed). If one were holding the bar at the top when the force was applied at that point, there would be no force or feeling of the blow; the blow has been applied at the Sweet Spot (or Centre of Percussion, CoP, for those who remember their A level Physics). (For the true pedant, it should be noted that some sportsmen find the shot is sweeter if the pivot is further up the wrist, which means a sweet spot may not be exactly at the CoP but the principle is the same).



What is the connection with landings? Just turn everything through a right angle and just think where the pilot, the CoG and the wheels of a typical airliner are. The crew sit well forward of the CoG, and the wheels are a short distance behind (the wheels must be behind the CoG or the aircraft would sit on its bum on the ground). So any impulse at the wheels caused by them striking the ground, produces an upward acceleration through the CoG (where the FDR records it) but also some downwards acceleration, due to rotation, at the pilot's seat. Whether or not the wheels are exactly at the CoP does not matter; what is important is that the impulse felt by the pilot is always less than that felt elsewhere. Conversely, all those sitting behind the CoG enjoy the translational impulse plus an impulse due to rotation. So if your estimate of the excellence of your landing differs from the cabin crew's, they might actually have a point.

Finally, our FDR showed that the 'hottest' firm landings were less likely to be reported than the rest. Again ruling out pride, this might be because the faster landings mean a lower attitude and, because the CoG is some distance above the wheels, a slightly further forward position of the CoG relative to the wheels. This might just heighten the CoP effect. Conversely a firm arrival following a prolonged flare feels more 'solid'.

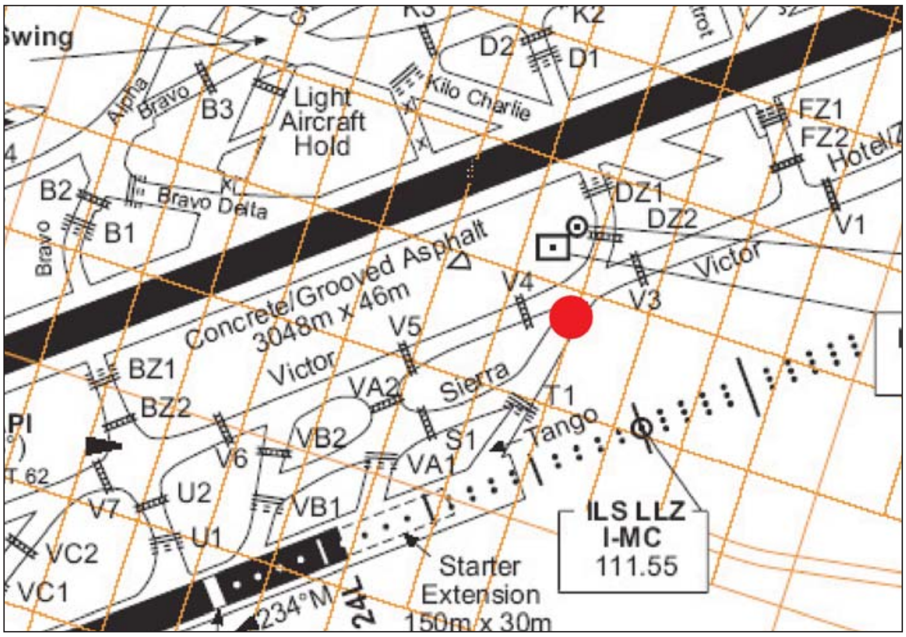
Airport Safety
When It Comes To The CRUNCH,

It's a Team Game!

by Sue Scott - Manager, Safety for Airport Services, NATS

Depending upon the type of airspace and the flight rules being flown, the respective safety responsibilities of pilots and controllers are usually clear. However, on the ground – it's not always so obvious.

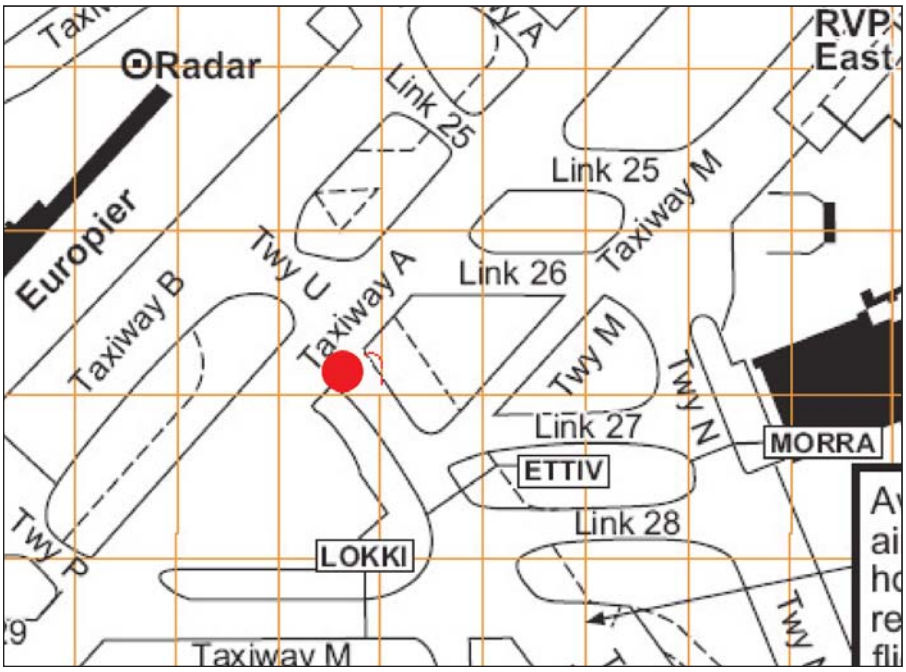
I was asked to write this article following a short presentation I made at an aviation forum recently, and duly grabbed the opportunity to raise awareness of a subject that is causing us some concern. One of the topics I had been talking about was the issue of who has responsibility for preventing collisions between aircraft, vehicles and obstructions on an airport manoeuvring area.



Point of Collision

Early in 2005, NATS embarked upon a programme of changing the way we evaluate and improve operational safety within our organisation. We have always prided ourselves on our strong safety record and have constantly sought to further improve our safety performance. As part of this work, we have been looking closely at those incidents which, following investigation, have been assessed as having a high safety significance to our operation, whether or not caused by us.

Much of this work has focussed upon "high profile" subjects, such as Runway Incursions, Level Busts and Airspace Infringements. A great deal of activity has gone into working out how to achieve a reduction in both the occurrence rate and severity of these incident types. However, while a great deal of our work has focussed upon those issues where we have an obvious and direct responsibility, we have also widened our scope to assess those safety issues where this is not always the case. One such area of concern is that of ground collisions, where taxiing or towed aircraft have collided either with another aircraft or vehicle or with an obstruction. Investigation into recent collisions has indicated differences in understanding between drivers, pilots and controllers



Point of Collision

Photographs taken from AAIB Report 11/2004

alike, regarding who is responsible for maintaining wingtip clearance from other aircraft or obstructions, when manoeuvring on an airport's surface.

One example occurred in November 2004 at Manchester when a B767-204 which was taxiing for departure from Runway 24 Left collided with the tailfin of a stationary B737-300. The B737 was holding for departure at Holding Point T1 behind a British Aerospace RJ100. The B767 had just crossed Runway 24R at D1 and was also taxiing for departure from Runway 24 Left. On first contact with the Air Departures controller, the B767 pilot was asked whether a departure from Holding Point VA1 would be acceptable.

The aircraft was subject to a "slot time" and this manoeuvre would allow the aircraft to depart ahead of at least one of the aircraft holding at T1. Having accepted VA1 for departure, the B767 pilot was then given taxi instruction via taxiway "V" for VA1. Both the captain and the co-pilot could see the two aircraft holding at T1 but did not believe there was any problem relating to wingtip clearance. On taxiing past T1, the port side wingtip of the B767 sliced through the tailfin of the B737, the second aircraft holding at T1, causing significant damage.

Another example occurred at Heathrow when a Boeing B747-436, which was being towed from the maintenance area to Terminal 1, collided with a stationary Airbus A321 holding at Holding Point ETTIV behind an Airbus A330.

The tug crew had been instructed to proceed via Link 26 and turn left onto taxiway "A". The A321 was taxiing for departure on Runway 27L and had been instructed to hold at ETTIV. Upon arrival at ETTIV, the crew brought the aircraft to a halt behind a A330, also holding. When the B747 under tow turned left and began to proceed along taxiway A, its port side wingtip "clipped" the tail of the A321.

As with most accidents or incidents, both events occurred as a result of a number of causal and contributory factors. However, an important fact to emerge from these investigations is that, in both these cases, the driver or pilot concerned was operating in the belief that, as they had ATC approval to proceed, they were clear of obstacles and other aircraft.

The Manual of Air Traffic Services specifies that while an air traffic control service is provided for the purpose of *preventing* collisions in the air, it is provided for the purpose of *assisting* in preventing collisions on the manoeuvring area.

When controlling traffic in the air, the duties and responsibilities of ATC are usually well defined, dependent upon the type of operation. However, the situation changes during ground movement operations upon the manoeuvring area. It

Photographs taken from AAIB Report 11/2004 is not always possible for ATC to exercise the same level of control which it can during airborne operations. Other than when operating according to Low Visibility Procedures, where a more positive level of control of traffic on the surface is required, a controller is not necessarily aware of all traffic on the manoeuvring area – many airport vehicles are allowed to "free range". Neither is the controller always in a position, either visually or with the assistance of technology, to assess accurately the distance between aircraft which may be operating in close proximity on the surface. The size and dimensions of a major airport, coupled with the position and geometry of manoeuvring aircraft, can mean visual assessment of wingtip clearance from the control tower is not an easy task. Additionally, although a large number of airports have Surface Movement Radar (SMR) installed, this technology is not yet sophisticated enough to allow accurate assessment of distance between aircraft or vehicles.

The Air Navigation Order specifies *"notwithstanding any air traffic control clearance, it shall remain the duty of the commander of an aircraft to take all possible measures to ensure that his aircraft does not collide with any other aircraft or with any vehicle".*

Also, the Civil Aviation Publication CAP637, entitled "Visual Aids Handbook" states: *"Taxi holding points are normally located so as to ensure clearance between an aircraft holding and any aircraft passing* ***in front*** *of the holding aircraft, provided that the holding aircraft is properly positioned* ***behind*** *the holding position. Clearance to the rear of any holding aircraft cannot be guaranteed. When following a taxiway route, pilots are expected to keep a good lookout and are responsible for taking all possible measures to avoid collisions with other aircraft and vehicles".*

So that's okay then, wingtip clearance between aircraft manoeuvring on the ground is no concern of the controller – it's all down to the pilot or the driver? Not entirely; at NATS we are working on a campaign to highlight the issue of ground collisions and raise awareness of individual responsibilities. A poster campaign is planned. This is aimed primarily at pilots and drivers but we are also doing much to improve controller awareness. The following points are aimed at everyone involved in operation of aircraft or vehicles on the manoeuvring area:

1. Pilots: If your taxi clearance requires you to pass another aircraft, possibly already at a holding point or pushed back from stand. check: is there room to pass? If you are not sure then tell ATC and request further guidance.

2. Drivers; be aware of other traffic and obstructions around you. ATC may have approved the movement of the aircraft under tow, but you are still required to ensure you maintain wingtip/fuselage clearance from other aircraft and obstructions.

3. Controllers; It is not always possible to assess clearance distances between all traffic operating on the surface. However, the visibility from the tug or from the aircraft can also be limited; and the airfield can look very different on the ground than it does from the tower. Traffic and RT loading permitting, exercise caution when authorising taxi or tow manoeuvres which will bring aircraft into close proximity. If a non-standard or unusual manoeuvre is being authorised, consider alerting the pilot to other aircraft in the vicinity.

4. RT discipline; We've all heard, or maybe even been part of heated exchanges over the RT; sometimes arising from irritation over requests to confirm information or clearances. Not only is this unprofessional, it could potentially deter people from querying instructions when unsure. A little tolerance goes a long way. Controllers – a request to confirm something is not the pilot trying to second-guess your judgement. Pilots – when a controller asks for a complete read-back, it's for a good reason and not pedantry!

Like the title says; it's a team game! In this industry, regardless of our role or organisation, we all have a moral responsibility to do everything we can to ensure that we provide a safe and efficient working environment. Lets look out for each other!

NATS Safety Notice

EXT 01/2006 Use of Satellite Phones to alert UK ATC of an RTF failure

Over the last year the number of reported radio failure incidents in UK airspace increased from 65 to 81, an increase of 25%.

With the heightened awareness in airborne security, ATC's inability to contact an aircraft experiencing an RT Failure could lead to that aircraft's interception by the Ministry of Defence.

In order to ensure the safety of aircraft experiencing RT failure within the London and Scottish FIRs, pilots and operators are able to use the following satellite telephone numbers to contact ATC.

These telephone numbers connect directly to the appropriate UK Distress and Diversion Cells (D&D) who then alert the appropriate ATC unit and Ministry of Defence confirming your RT failure.

The AIP currently provides the following guidelines/information to operators:

ENR 3.2.2.11 states

Essential information may be relayed by ATC using the ACARS/Data Link. Pilots may endeavour to use alternative methods for communicating with ATC such as HF.

The Distress and Diversion Cells (D&D) serving the London FIR/UIR and the Scottish FIR/UIR may be contacted by phone by aircraft that have approved installations that can access the UK telephone network.

The telephone numbers are as follows:
London D&D Tel:01895-426150
Scottish D&D Tel:01292-692380

GEN 3.6.6states

4.1 For aircraft flying in the London, Scottish and Shanwick FIRs/UIRs, in the event that all other means of communication have failed, dedicated satellite voice telephone numbers for the London ATCC (Mil) and Scottish ACC D & D sections and for the Shanwick OAC have been programmed into the Aeronautical Ground Earth Stations of the Inmarsat Signatories.

4.2 The allocated airborne numbers for use via the aircraft satellite voice equipment are as ollows:

(b) Shanwick Radio 425002 To be used for aircraft communications failure.
(c) London D & D 423202
(d) Scottish D & D 423203

NATS Pilot RTF standards

NATS has recently conducted a seven day r/t survey at the four ATC centres in the UK and at the 15 airports where NATS provide ATC services. The survey was aimed at determining how frequently air traffic controllers have to confirm a cleared level because this has not been included in the first transmission by a pilot and how often they detect and correct an incorrect pilot read back of a level change clearance.

During the seven day survey period 1454 reports were collected. 73% of these reports involved a pilot failing to correctly state their cleared level on first contact with ATC. When pilots fail to report their cleared level on first contact the air traffic controllers are required to ask for the information which leads to additional r/t calls. 20% of the reports involve a pilot incorrectly reading back a level change clearance or stating an incorrect level on first contact.

By ensuring that the content of the first r/t exchange with each ATC sector contains the correct information and by ensuring that the readback of clearances is correct pilots can reduce the risk of a level bust occurring and assist in reducing frequency occupancy levels.

The following information is reproduced from the UK AIP GEN section 3.3.8 Air Traffic Services

Initial Call on Departure

9.1 Pilots of aircraft flying Instrument Departures (including those outside controlled airspace) shall include the following information on initial contact with the first en-route ATS Unit*:

a) Callsign;

b) SID or Standard Departure Route Designator (where appropriate);

c) Current or passing level; PLUS

d) Initial climb level (i.e. the first level at which the aircraft will level off unless otherwise cleared. For example, on a Standard Instrument Departure that involves a stepped climb profile, the initial climb level will be the first level specified in the profile).

On first contact following a frequency change

9.2 Unless otherwise instructed or where paragraph 9.1 applies, when changing communication channel to an ATC unit (including changes within the same ATS unit), the initial call on the new frequency shall include **aircraft identification and level only.**

When making such an initial call and the aircraft is in level flight but cleared to another level, the call shall include the **aircraft identification followed by the current level and the cleared level.** When making such an initial call and the aircraft is not in level flight, the call shall include the **aircraft identification followed by the cleared level only.**

When making such an initial call and the aircraft has been assigned a speed, this information shall also be included.

When the ATC sector is an approach unit, typically denoted by the airport name and the suffix *Approach, Director or Radar*, the initial call by arriving must contain aircraft type information and the ATIS letter.

*First en-route ATC unit is the first frequency after the tower frequency irrespective of suffix i.e. London Control, Birmingham Radar, Luton Approach etc

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Flight Outside Controlled Airspace – A Guide

by The BALPA ATS Study Group

IFALPA and BALPA, are opposed to the operation of controlled and uncontrolled or unknown traffic in the same airspace as this malpractice has contributed to several accidents and numerous airprox incidents and therefore is a constant threat to air safety. Controlled and uncontrolled or unknown traffic should be effectively segregated, and therefore the operation of normal commercial air transport outside controlled airspace or equivalent airspace providing a known traffic environment, should be avoided.

Class 'A' airspace is the ideal but is not always a practical solution for many areas, particularly in the UK. IFALPA disapproves of commercial operations in less than Class 'C' airspace.

Class 'D' is quite prolific in the UK where fortunately it is operated almost as though it were Class 'C'. VFR traffic in Class D is given avoidance advice , and this becomes a mandatory instruction in order to keep VFR traffic clear of IFR flights (the only difference between C and D in the UK is that in Class D separation minima between IFR and VFR are not prescribed).

Airprox Issues

When one crosses the line between controlled and uncontrolled airspace (the open FIR), one moves from a known traffic environment into one based ultimately on visual sighting (possibly with the assistance of TCAS), where significant volumes of traffic are unknown to any ATC provider.

ATC will no longer have a complete picture of traffic around you, and you will only be informed of aircraft known to them. Excluded from their knowledge will be aircraft working other agencies, below radar cover or not operating their transponders (the latter equally negates TCAS).

As a result a pilot who is more used to the protection of controlled airspace (with its prescribed separation standards) might be surprised to see aircraft passing closer than he/she is used to. Military and GA pilots are used to being close to other aircraft, and even if they acquire visual contact at a good distance, might avoid you by a margin that they are perfectly comfortable with while you are not. In such cases a collision is never in prospect but one party might be concerned for their safety.

Be aware of the military Low Flying System that covers most of the open FIR from the surface to 2000 ft agl. Tornado formations of 8 - 10 aircraft travelling at 450 knots, particularly in the area north of Newcastle are not uncommon. While one obviously has to pass through this layer to land, it would be prudent to avoid extended transits below 2000 ft agl and try to ensure that final descents are contained as much as possible within an airfield's local CAS (ATZ, CTZ or CTA).

Lookout

Most airliners have relatively poor "lookout facilities". The full sphere of view is 4pi steradians and we can only see about 10% of that. How poorly placed we are is brought home to one sitting in a modern RAF fast jet where perhaps 50% of the sky can be seen, if you twist your head. For this reason alone the "see and be seen" principle is a poor one. Visibility in the UK is often weather limited and military aircraft might be doing 450 knots in an area where civil aircraft are limited to a maximum of 250 knots. Sadly there have been collisions between civil and military machines and we wish to reduce the chances in the future. Military airborne collision avoidance equipment is being developed too slowly.

There are a large number of gliding and parachuting sites in the UK. Parachutists might drop from 12,000 ft or so and are perfectly entitled to drop through cloud though probably do not often do so for their own safety. Ensuring clearance of such areas while scanning the sky, operating complex aircraft equipment and communicating with the crew is not easy. In the open FIR it is often a requirement of airmanship to talk to more than one ATS agency at a time as you penetrate instrument procedures such as around Sheffield. Overall the workload becomes very high.

Quadrantal Rule

One should be aware of the quadrantal rule used by aircraft flying IFR outside CAS which reduces planned vertical separation to 500 ft from the 1000 ft we

Track	ICAO	UK
VFR		*Recommended Only*
NE }	3,500…5,500…	3,000…5,000…
SE } Easterly	3,500…5,500…	3,500…5,500…
SW }	4,500…6,500…	4,000…6,000…
NW } Westerly	4,500…6,500…	4,500…6,500…
IFR		*Mandatory*
NE }	1,000…3,000…	3,000…5,000…
SE } Easterly	1,000…3,000…	3,500…5,500…
SW }	2,000…4,000…	4,000…6,000…
NW } Westerly	2,000…4,000…	4,500…6,500…

are more familiar with - apart from anything else this can upset TCAS. For VFR traffic the quadrantal rule is only advisory For flights within class G airspace in the UK, the quadrantal rule applies to all IFR flights above 3,000 ft (or the transition altitude).

Consider the following scenarios for flight in class G airspace

(NB: The table is for flight below 24,500 ft as above 24,500 ft is class B airspace in the UK, and therefore controlled airspace)

Thus the UK has significant, albeit notified, differences from the ICAO Standards and Recommended Practices (SARPS) with regard to cruising levels for flight.

Briefing

Some pilots operating outside controlled airspace will have briefing data provided by their operator. This data might be filtered and this filter might rely on a person who is not a pilot. Alternatively you might need to obtain your own briefing material. Sources of briefing material are NOTAMs, the AIP (Air Pilot) and AICs. In Class 'G' airspace you will need to look through the 'Navigation Warning' NOTAMs that you would not normally examine when remaining in controlled airspace.

Any operational frequency that might be needed should be found as part of the briefing. It is not sufficient to rely on being passed from one agency to another. If possible identify any part of the route where it will be necessary to work more than one frequency simultaneously and plan how this will be handled.
Much briefing material is available on the Internet, but some familiarisation is needed to obtain this effectively.

Charts

The ? million topographical chart is probably the most suitable chart for planning and navigation outside controlled airspace in the UK.

Some pilots (probably most operating commercial services) will have one of the variety of electronic navigation systems available, ranging from handheld GPS units (even though not an approved aid) to full Flight Management Systems (FMS). Even the simpler systems will usually have some form of moving map capability, and it will be rare that no deviation from the pre-planned route is needed, for weather or traffic. A moving map will make the task of regaining the route simpler but even the more sophisticated systems will not usually show controlled or other restricted airspace. These should be prepared carefully and accurately prior to flight, as they will simplify the navigation task. It is unlikely that you will carry a ? million on the aircraft but we would recommend that you check it before departure and place and note the hazards, such as parachute/ gliding sites. You will then need to note the relative position of such hazards either on the 'fix' page of the FMS if practical, or note the relative position of the hazard to a waypoint contained in your FMS flightplan.

FMS Integration

FMS eases the navigation task as long as any required route data has been pre-entered. Liaison with ATC might be improved through accurate ETAs and position reporting.

FMS handling must not distract from look-out. Even where an operator has an agreement with NATS that the best possible service will be provided, not all traffic will be known to ATC.

Leaving Regulated Airspace

Aircraft will normally be instructed to leave controlled airspace at a specific fix or cleared direct to a fix or airfield outside regulated airspace. Even if given direct to your destination, once you leave regulated airspace, it is your responsibility to remain clear of any other regulated airspace, danger area, or airspace restriction. On some occasions, a radar service might have been pre-arranged with a military or other air traffic service unit. You will be given a contact frequency and sometimes a squawk change. When this has not been arranged, it is up to you to try to get some level of service from an air traffic service unit that operates in the area, or as a last resort, a flight information service from London/Scottish Information. Unless otherwise instructed, if you are not in receipt of a radar service, you should squawk the conspicuity code 7000.

Crossing and Joining Regulated Airspace

You must obtain a crossing clearance for any danger area or airspace restriction and a crossing or joining clearance for any regulated airspace well before entering, irrespective of the level of air traffic service you are receiving when in Class G airspace. The air traffic service unit that is providing you with a service might obtain the clearances for you, but you must check and not assume that they will. If you do have to obtain the clearances yourself, they can be requested by free calling the appropriate air traffic control unit responsible for the airspace. When free calling, have the following information available:

Callsign, aircraft type, departure point, destination, the point at which you wish to cross/join, an estimate for that point, and the level you want to be at. You must request the clearance well in advance, ideally 10 minutes before the airspace boundary, and remain clear until a clearance has been issued. To join the airways system, try to get the air traffic service unit you are working, to get the clearance for you. If this is not possible, then call London/Scottish Information for a joining clearance, giving at least 10 minutes notice, as it can take a long time to get a clearance this way. It is still your responsibility to get a flow control slot, if one is required, before asking for a joining clearance. On a final point, it is not guaranteed that you will get a crossing or joining clearance issued, so you will need to have a contingency plan to cover this.

Lower Airspace Radar Service (LARS)

In many cases the transfer of radar service will be seamless and the only indication that one has left controlled airspace will be the change of service provided from radar control to radar advisory or radar information. However where the executive ATC unit is not equipped with radar (e.g. Inverness/Sheffield), one may be able to make use of LARS from an adjacent unit. If doing so, one must clearly state the fact that executive control is with another authority to avoid as far as possible, conflicts of ATC clearances. This will usually entail the use of two VHF radios, so due regard must be given to the CRM aspects of having two sets to monitor in a busy phase of flight. Also if any turns given under a RAS would involve a deviation from one's inbound clearance, this must be approved by the executive controller who may well be applying procedural control – the extra R/T involved may lead one to the conclusion that a RIS is more appropriate.

LARS is provided by designated military and civil ATSUs up to FL95 within approximately 30 nautical miles of the radar head. The service available is a radar advisory or radar information service (RAS subject to the controller's workload).

There may be limitations to either service the controller provides due to the limits of radar cover, weather or other radar clutter, traffic density, if the radar performance is suspect or if the controller is using SSR only. Most have published hours of cover, though a service might be available outside these hours on a 'call and see' basis. LARS coverage on weekdays during the daytime currently takes in most of mainland Britain with the exception of SW Wales and the West of Scotland. However there has been a general reduction in LARS cover as military airfields are rationalised, and cost considerations bite at civil units. Requesting a service from a unit which is not listed as a LARS provider might be unsuccessful.

LARS can be used by aircraft en route in the FIR below FL95. Whenever possible they will be handed over from controller to controller in an area of overlapping radar cover. Details are in the UK AIP ENR section 1.6.3.

Middle Airspace (Radar) Service

Middle Airspace (Radar) Service is available subject to unit tasking and workload between FL100 and FL245 outside controlled airspace except for flight along advisory routes, for flight within the NORCA (Northern Off-Route Co-ordination Area) and for flight within the Sumburgh FISA (Flight Information Service Area). Like LARS, it consists of RAS or RIS provided by military area radar units (LATCC Military and Scottish Military), some military airfield units (e.g. Boscombe Down) and some civil units (e.g. Warton RASA) Radar Advisory Service Area). This is for example, the service that a military aircraft receives from Scottish Military or LATCC Military between FL100 and FL245 in the area also served by Pennine Radar.
Details are in the UK AIP ENR section 1.6.4

RAS and RIS

Receipt of RAS provides a known traffic and known intentions environment (i.e. like Radar Control inside controlled airspace) but only against RAS and RIS participating aircraft. Therefore, the intentions of non-participating aircraft, even if squawking what is termed a "validated & verified" (by another ATC unit) SSR code (that is, one which has a Mode-C readout that is taken as being correct) might not be known, with the result that quite violent avoiding action might have to be passed if the other aircraft suddenly changes course or height. Controllers endeavour to "co-ordinate" such flights if they affect someone receiving RAS, and in doing so agree a temporary course of action to maintain prescribed separation. However, if the other aircraft is simply squawking 7000 or 7001 for example, it is not possible to undertake this inter-unit co-ordination because the aircraft might not be under the control of any ATS unit and even if in R/T contact, would not be identified anyway. Therefore, once again violent avoiding action might need to be passed if the other aircraft suddenly changes course or height – not recommended for passenger comfort!!

ATCOs find that many civil flight crew - especially those who did not come into civil flying via a military route - do seem to equate RAS in the FIR with radar control in Class A, but the question of known intentions is a subtle but crucially important element when receiving RAS. ATCOs do not believe RAS in Class G is any substitute for having adequate controlled airspace that provides a known traffic and a known intentions environment.

If you are in receipt of a RIS the controller will advise the bearing, distance and if known, the level of conflicting traffic, but unlike RAS no avoiding action will be offered. The pilot is wholly responsible

for maintaining separation from other aircraft, whether or not the controller has passed traffic information.
Details in the UK AIP ENR section 1.6.1
See also AIC 71/2001.

Flightdeck Workload and Situational Awareness

It should be clear from much of the foregoing that the considerations involved in flying outside CAS are many and varied. It becomes obvious that all of these factors will have a significant bearing on the crew's level of situational awareness (SA) and overall capacity.

The basic principles of CRM are now well established and understood within the flight crew community but it is important to bear in mind that many UK operators spend the bulk of their time operating inside CAS where there is a certain predictability to the ATC service provided, the types of traffic involved and the likely future movement of this traffic. A familiarity with standing agreed levels and ATC sectorisation all enhances this mental picture to the benefit of the entire crew's overall level of SA.

In contrast the traffic situation outside CAS can be extremely varied and dynamic. The combination of high workload due to phase of flight (climb, descent or approach) with the requirement to maintain a good lookout, remain clear of terrain (particularly in those areas without the backup of ground radar cover) and possibly work a number of frequencies all adds significantly to the crew's workload. The obvious danger is that this can lead to one or all crew members becoming overloaded with a subsequent breakdown in crew communication and cross-cockpit monitoring.

So how best to manage this additional workload? The first important point to remember is of course that all of the basic principles of good CRM apply. Because there are so many factors which must be given a high priority there is no substitute for recognising where the periods of high workload are likely to be, and then briefing thoroughly in advance - be that on the ground or through a timely and relevant approach briefing. It is important not only that note is taken of areas of activity such as parachuting and gliding sites etc. but that the full implications are understood by the crew members (e.g. gliders flying cross country may be found at any position or level, not just near gliding sites). Even a little knowledge of how other airspace users operate is useful in anticipating potential conflictions. Think about relative speeds and maneuverability (or lack of!) of other types of traffic - remember all those most basic Rules of the Air? Do you use, or does your operator promote, a more formal outside scan when outside controlled/regulated airspace? For example, the amount of outside scanning might be radically different over the Vale of York compared with the North Atlantic.

Similarly a really thorough knowledge of the types of airspace to be used, service available and the limitations of that service is vital - this can be comprehensively briefed on the ground (is there an ICAO Airspace Classifications chart in your Ops/Briefing room?). Discussing in advance which ATS units (e.g. LARS) will be used and which pilot will work which frequencies, will mean less decision making during a busy period. Also where appropriate it can be useful just to monitor a frequency even if there is no requirement to work it, this together with judicious use of TCAS can help to build up a picture of surrounding traffic (but always remember this will not be all of the traffic as there is no obligation in Class G to either transpond or talk to anybody, and remember the algorithims of TCAS which will remove traffic displayed in certain cases, although still always giving RAs when required).

Finally there are enormous benefits in developing a good knowledge of Air Traffic Services and the varied responsibilities of, and limitations placed on, controllers in the various types of airspace. This is particularly vital for those of us who spend most of our time in controlled airspace who might have too high an expectation of the service being

provided outside CAS. ATS units are always very keen to see pilots on familiarisation visits and the mutual benefits are immense. The more that pilots and controllers can learn about each other's operational problems and limitations the more realistic will be the expectations we have of each other.

NATS Mode S in the London Terminal Control Centre.

Bill Casey - NATS
Adrian Price - NATS

1. Introduction and Background

NATS provides Air Traffic Control (ATC) services to aircraft flying in UK airspace, and over the eastern part of the North Atlantic. The London Terminal Control Centre (LTCC) is based at West Drayton and is responsible for traffic below 24,500 feet arriving at, or departing from, the five main airports close to London. For a 30 Year period NATS, along with every other ATC service provider, relied on Secondary Surveillance Radar (SSR) to provide aircraft information. During that time, traffic levels have increased dramatically and it became vital to exploit new technology, which addressed the limitations of SSR. In December 2005 NATS introduced the next generation of SSR technology called Mode Select (Mode S) into the LTCC (References 1 and 2). The purpose of this article is to give a short insight into Mode S, its development, functions, and its operational introduction.

2. Traditional SSR

The previous Mode A/C SSR technology worked on a general 'broadcast and receive' principal that has recognised problems and limitations. The integrity of Mode A/C surveillance can be adversely affected by garbling of replies from aircraft close together (especially in stack airspace). In addition, Mode C replies have no encoded identity and rely on the association to the correct target by the ground system processing. These acknowledged limitations can affect the integrity of the information displayed to ATC.

3. Mode S Technology

There are two levels of Mode S, Elementary and Enhanced. Elementary allows selective interrogation of aircraft providing the potential to eliminate, amongst other things, the synchronous garbling of replies. Enhanced Mode S enables the selective interrogation of aircraft plus the facility to down-link specific airborne parameters from the cockpit, such as Indicated Airspeed and Selected Altitude.

4. Benefits of Mode S Technology

Improved integrity of radar surveillance and the availability of Mode S Down-Linked Airborne Parameters (DAPs) have enabled NATS to develop controller support tools that have provided benefits to the safety and efficiency of ATC operations. A three year development programme has culminated in a system where the display of aircraft information is easily assimilated and understood. The Mode S tool-set consists of two main elements: the Vertical Stack List (VSL) and the display of DAPs in the Target Label.

5. Safety Benefits

For Enhanced Mode S aircraft the Selected Altitude entered by the crew into the Mode Control Panel (MCP) or Flight Control Unit (FCU), that feeds into the aircraft's auto pilot system, can now be down-linked and displayed to ATC. Mode S Selected Altitude is potentially one of the most useful pieces of data to prevent Level Busts as it provides the opportunity of alerting ATC if there has been any misinterpretation of the altitude/level clearance. Aircrew should be aware that a controller may challenge that reading if there is any doubt over the cleared level.

6. Display of Selected Altitude

Operational experience to date indicates that the facility to display Selected Altitude has helped controllers to intervene in situations, which might have otherwise led to the erosion of standard separation.
It is accepted that whilst the display of selected altitude is an obvious safety enhancement, aircraft label overlap and human workload limitation will affect the controllers' ability to check the Selected Altitude every time a vertical clearance is issued. Time delays incurred whilst information is input into the MCP/FCU reduce the controllers' ability even further. Therefore, the requirement for aircrew to read-back all clearances and for controllers to check the read-back will not be affected by introduction of Mode S and the display of Selected Altitude.

7. Target Label

Mode S information has been displayed in the aircraft Target Labels of suitably equipped aircraft, on all LTCC sectors since December 2005. Fig 1 shows the Target Label of BMA3XF. The Mode C readout and intention (or destination) code shown in line 2 is unchanged from the previous format. (LL represents a flight inbound to Heathrow.) As well as traditional information, the Mode S Target Label also displays aircraft DAPs.

Fig 1: Mode S information in the Target Label.

The MCP/FCU Selected Altitude is displayed in line two in the dark orange colour to distinguish it from the Actual Flight Level (Mode C). In Fig 1 BMA3XF has selected 15000 feet and is passing Flight Level 165.

Many pilots will select the missed approach altitude once the aircraft is established on final approach. The Selected Altitude is automatically removed from the target label before this occurs to avoid any confusion. If the system detects that the aircraft has broken off the approach and is climbing then the Selected Altitude will automatically be displayed again providing the controller with the aircraft's revised intention.

Down-linked Mode S parameters such as Ground Speed, Indicated Air Speed, and Magnetic Heading can also be displayed in line 3 of the Target Label either individually, or in combination using a 'quick-set display' facility. In Fig 1 Magnetic Heading has been selected showing 135 degrees (prefixed with an 'H' to denote Heading).

8. Vertical Stack Lists

The most innovative function in the Mode S Tool Set is the VSL. It has been designed to compliment and support existing operations by providing controllers with enhanced vertical situational awareness in busy stack airspace.

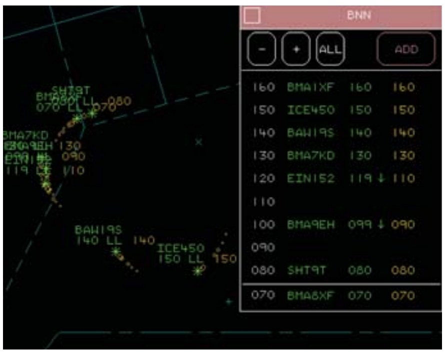

Fig 2: The Vertical Stack list

Fig. 2 shows a normal radar picture of the Bovingdon Hold on the left together with an enhanced view of the same hold as depicted in the Vertical Stack List on the controller's display. By utilising the integrity of Mode S derived altitude reports, the tool provides a vertical representation of aircraft in stack airspace. So, by monitoring the VSL, the controller can continuously see call-signs and occupied levels in the stack, even when SSR labels overlap on the radar display.

In the VSL, the white numbers in the column on the left-hand side of the VSL are the Flight Levels that are selected for display by the controller. The call-sign and Mode C (height derived via Mode S) of the holding aircraft are shown in green in the middle two columns and the final column shows the aircraft's Selected Altitude.

The system tracks arrivals to each of the four Heathrow stacks. Population to and exit from the vertical Stack Lists is automatic with the aircraft descending in the VSL as the controller issues descent instructions. As the aircraft continues its descent, its progress is automatically updated in the list and the aircraft is removed when it meets defined criteria. The system applies standard ATC rules regarding level allocation and departure. Through the use of the VSL, controllers no longer need to confirm via RT that levels have been vacated. Thus, RT congestion is reduced and stack management is enhanced.

9. Cockpit Procedures

The cockpit procedures for setting the MCP/FCU are vital in realising the potential safety benefits of introducing Mode S. Fig 3 shows an example of a typical Mode Control Panel.

Selected Altitude

Fig 3: Mode Control Panel

The following cockpit techniques will enhance safety in the London Terminal Control airspace (Ref: 3):

- Upon receipt of an altitude clearance from ATC, immediately set the assigned/cleared altitude in the altitude select window (except when established on the ILS).
- Positively confirm the altitude clearance via R/T read-back.

Please note that many operators require the Selected Altitude to be cross-checked by both pilots; an action that is endorsed by the Flight Safety Foundation (Ref: 4). Adherence to the above procedure will maximise the controllers' opportunity to check the altitude selected in the cockpit. Controllers have been advised that there is no absolute guarantee that an aircraft will actually level off at or maintain the Selected Altitude. For example an aircraft may not adhere to the Selected Altitude when the autopilot is being used with an incorrect mode or has suffered a technical problem. An incorrect pressure setting on the altimeters' subscale will also invalidate the Selected Altitude.

10. Conclusion

The display of Selected Altitude to ATC along with R/T read-back will confirm the aircrew's interpretation of the assigned/cleared level. The ability of a controller to check the Selected Altitude in the target label and the VSL is dependant upon workload the elapsed time between the vertical clearance being issued and that value being displayed back to the controller and the aircraft label being clearly displayed. Aircrew can assist ATC by promptly entering the new altitude in the altitude select window every time a vertical clearance is issued. For Enhanced Mode S aircraft the display on the controllers' radar displays of Selected Altitude, together with VSLs, are potentially a great step forward in safety and the campaign to reduce level busts

11. References

1. AIC105/2004 (Yellow 155) promulgated by the CAA 11 Nov 2004.
2. AIC49/2005 (Yellow 171) promulgated by the CAA 23 Jun 2005
3. AIC4/2006 (Yellow 187) promulgated by the CAA 5 Jan 2006
4. Briefing note 3.2 issued Year 2000 by the Flight Safety Foundation Approach and Landing Accident Reduction (ALAR), "Altitude Deviations".

For more information on the Mode S in the LTCC please contact:

Mr William Casey
Operational Support & Development
NATS, Porters Way, West Drayton,
UB7 9AX, United Kingdom
Telephone: +44 (0)1895 426356
eMail: william.casey@nats.co.uk
Web: www.nats.co.uk

Airline Liabilities in a Sick World

by Peter Coles – BLG Hong Kong Office

Summary: The close confines of an aircraft cabin carry the potential for on-board transmission of diseases and with it the potential also for resulting claims against the airline. Evidential difficulties may defeat some claims but, where it is clear that passengers have been exposed to an infectious disease, there is a real risk of carrier liability.

In 1979, 72% of passengers on one aircraft contracted influenza. The attack rate was associated with the ventilation system not being in operation during a three hour ground delay. Since 1979, there have been several other reported cases of on-board transmission of diseases. For example, in 1996 six of the 249 passengers on board a flight from Chicago to Hawaii were found to have caught the pathogenic bacterium which causes tuberculosis when they travelled on the same flight as a woman suffering from tuberculosis.

Regulations

Airlines are expected to comply with international health regulations, which are designed to prevent the international spread of disease while interfering as little as possible with travel and trade. It is their responsibility to be familiar with the specific laws and regulations concerning infectious diseases applying to passengers and shipments at points of entry for each destination country, as well as the laws on safety procedures and on release of passenger information (data privacy) where they carry infectious agents or people.

The WHO's International Health Regulations 2005, which do not come into effect until 2007, will establish basic rules for international coordination in the detection, investigation and response to diseases including treatment and will establish special measures to be adopted during a public health emergency of international concern.

In some countries, proposals are afoot to hold carriers directly responsible for disease outbreaks if they fail to comply with regulations. A good example is the proposed amendments to the US Code of Federal Regulations Parts 70 and 71 which imposes fines of US$250,000 and US$500,000 for any violation of the regulations by an individual and organization respectively.

Air Carrier Liability

Airlines have a potential liability exposure to passengers (a) where the airline or its ground handlers know or have reasonable cause to suspect at check-in or at the gate that a passenger has an illness but fails to take any precautionary steps to check that the passenger is medically fit to fly or deny boarding the passenger; (b) where the airline discovers in flight that a passenger on board has an illness but fails either to take steps to isolate the passenger or honour requests by other passengers for alternative seating; (c) where the airline fails to call and await the assistance of medical authorities at destination before permitting disembarkation; (d) where the airline is notified that a passenger on one of its flights had an illness but fails to take reasonable steps to trace all the passengers on that flight; (e) where passengers are infected because defective equipment or systems have resulted in the contamination of the air supply; (f) where the airline fails to prevent sick crews from continuing in the workplace; and, possibly, (g) failing to warn passengers of the risk of disease transmission during air travel and the steps that can be taken to help prevent infection.

If a passenger contracts a disease prior to his flight then the carrier will not be liable to that passenger under the Warsaw/Montreal liability regime if the illness then develops during the flight since the passenger would have embarked with a pre-existing medical condition.

If, however, it is established that a passenger on board was in a contagious stage of disease and other passengers bring claims for illnesses they contracted on board then the claimants will need to prove they contracted the disease on board the aircraft or during the period of embarkation and/or disembarkation and that the fact that they were exposed to the disease constituted an "accident" for the purposes of Article 17 of the Warsaw or Montreal Conventions. The former issue may well present significant evidential difficulties. Without very clear evidence, it is always arguable that disease transmission could have occurred prior to embarkation, e.g. on public transport to airport, check-in queues, security check-points, customs, shops and restaurants. In relation to whether there has been an article 17 accident, the carrier does face a liability risk provided the contraction arose as a result of an unexpected and unusual event that was external to the passenger. Poor air quality in an aircraft cabin leading to a passenger contracting pneumonia has already been held to amount to an accident *(Dias v- Transbrazil Airline 1998 SDNY)*. Following the *Olympic Airways v Hussain* case - in which an asthma sufferer died following exposure to cigarette smoke after his request to be moved further away from the smoking section had been refused - and the English Court of Appeal's analysis of this judgment in the UK DVT litigation, it is also open to a court to hold that an airline's failure to isolate a passenger or move another passenger against a known risk that a disease may be contracted on board is an "accident".

Refusal of carriage

Many airlines reserve in their tickets and general conditions of carriage a right to right to refuse carriage to a passenger if necessary to comply with government regulations or if carriage endangers safety or health or comfort of other passengers and the crew. In reality, unless the passenger discloses their medical condition or is exhibiting clear symptoms, these provisions will be of little benefit to the carrier. The carrier must also keep in mind that there are specific air carriage regulations - like the US Air Carrier Access Act or broader anti-discrimination regulations elsewhere - which may prevent refusal of carriage unless there is something more than just a "reasonable belief" that someone has an infectious disease. The carrier may need to weigh the legal consequences of refusing carriage to one passenger against the risk of allowing them to fly with an infectious condition.

Flight cancellations

Flight cancellations may arise as a result a dramatic turndown in demand as we saw in Asia during the SARS epidemic. An airline's liability for cancellation is governed by its contract with passengers and by domestic or EU law rather than international air law conventions.

Many carriers exclude or limit their liability in respect of flight cancellations in their ticket conditions of contract or general conditions of carriage. However, these are not watertight. It is always open to passengers to argue that these conditions (a) were not incorporated into the contract (an argument which often succeeds in Thailand, for example); or (b) that they amount to unfair contract terms and, therefore, are void; or (c) that they do not apply to non-performance of the contract.

If a flight is cancelled due to Government action then the airline may be able to rely upon force majeure provisions in its conditions of carriage allowing it to walk away from its obligation to carry the passengers. Alternatively, it may be able to rely upon the doctrine of frustration provided that the action of the Government was not foreseeable.

If flights to which EU Regulation 261/2004 applies are cancelled, the carrier will have certain obligations including offering passengers a choice between re-routing and reimbursement of the full ticket price; plus assistance (phone calls, refreshments and accommodation); plus compensation. If flight cancellations occur as a result of government action or for other reasons outside the carrier's control, the carrier may avoid having to pay compensation but will remain obliged to provide a refund or re-routing and care and assistance to the passenger.

Conclusions

Absent actual evidence of disease transmission during a stage of transportation which airlines are responsible for, airlines have minimal exposure to awards of damages although claims will have to be defended. On the other hand, if there is evidence to demonstrate that passengers are being or have been exposed to an infectious disease then the potential exposure to private law damages and government imposed penalties is significant. BLG Aerospace has conducted an extensive investigation into the above issues after handling a number of SARS and influenza related claims in Hong Kong.

Reducing the Chance of a Mid-Air Collision in the North Atlantic
Brief Introduction to the North Atlantic

by Steve Kirby, Senior Research Analyst - NATS

North Atlantic airspace is delegated to various states that manage the airspace on behalf of ICAO. The UK and Ireland share a region of the North Atlantic called Shanwick (derived from 'Shannon' and 'Prestwick'), which extends out to the middle of the North Atlantic Ocean. HF radio communications operators are based at Shannon, Ireland, whereas the controllers are based at NATS's oceanic centre at Prestwick, in Scotland.

The structure of airspace in the North Atlantic is very different from, and much simpler than, UK domestic airspace, for several reasons.

Firstly, due to passenger demands, time zone differences and restrictions on night time flying, there are two distinct flows across the North Atlantic. Most westbound aircraft leave Europe in the morning or early afternoon arriving in the Americas in the late afternoon and early evening. Eastbound aircraft leave the Americas in the evening and arrive in Europe in the morning.

The jet stream, which changes daily, dictates the minimum time track between city pairs. A series of tracks are published twice daily which coincide with the minimum time track for the most popular city pairs. Typically five or so tracks are published, and are usually parallel to one another. This scheme is called the Organised Track Structure. About half of all North Atlantic traffic flies on this structure. This is an efficient way of managing such traffic.

Perhaps the biggest difference from domestic airspace is that control is procedural, due to the fact that little radar coverage is available. Pilots report their positions every 10° of longitude or so and the time when at these positions. NATS controllers scrutinise these periodic reports to ensure that aircraft remain safely separated.

Improved Navigation and Lateral Overlap

The introduction of very accurate aircraft navigation systems such as global navigation satellite system (GNSS) along with sophisticated flight management systems has enabled aircraft to navigate to such a high level of accuracy that aircraft on the same track but at different levels are increasingly likely to be directly above or below one another. This improved navigational performance increases the chance of mid-air collision if an aircraft deviates from its cleared level, for whatever reason. The chance of getting lateral overlap has increased eighteen-fold since 1977, and is set to increase further.

The chance of such a lateral overlap combined with increasing traffic levels and density, and a relatively high number of large height deviations at present, prompted the North Atlantic Systems Planning Group (NAT SPG) to introduce the Strategic Lateral Offset Procedure (SLOP) for North Atlantic region airspace on 10th June 2004.

How Strategic Lateral Offsets Work

The Strategic Lateral Offset Procedure was introduced specifically to reduce the chance of mid-air collision by spreading out aircraft laterally (see Figure 1). It reduces the chance of collision for non-normal events such as operational altitude deviation errors and turbulence?induced altitude deviations. In essence, the procedure demands that aircraft in North Atlantic airspace fly track centreline or one or two nautical mile offsets to the right of centreline only. However, the choice is left up to the pilot.

The Strategic Lateral Offset Procedure recommends that pilots use all available means to select the most appropriate position to fly, including visual acquisition, collision avoidance systems and communications with other aircraft. It allows pilots to change position more than once in the flight, if appropriate. For example, for overtaking manoeuvres, for avoiding wake vortex turbulence, or to avoid flying directly above or below other aircraft.

An alternative way that pilots may implement the procedure is to choose by random a position to fly (i.e., track centreline or one or two nautical miles to the right) and remain in that position for the duration of the transit through North Atlantic airspace. This less flexible approach provides less benefit than the tactical approach described above, but nevertheless spreads aircraft out laterally, thus reducing risk of collision for all aircraft, but particularly for the offsetting aircraft.

The Current Take-Up of the Procedure

For maximum risk reduction, all flights would be distributed evenly between the three lateral positions. However, recent studies by NATS's Operational Analysis department have indicated that few flights in the North Atlantic airspace region routinely adopt strategic lateral offsets. Analysis suggests that less than 10% of flights are adopting strategic lateral offsets at present. This take-up is somewhat disappointing considering the substantial safety benefit, and that the procedure has been in place for more than two years.

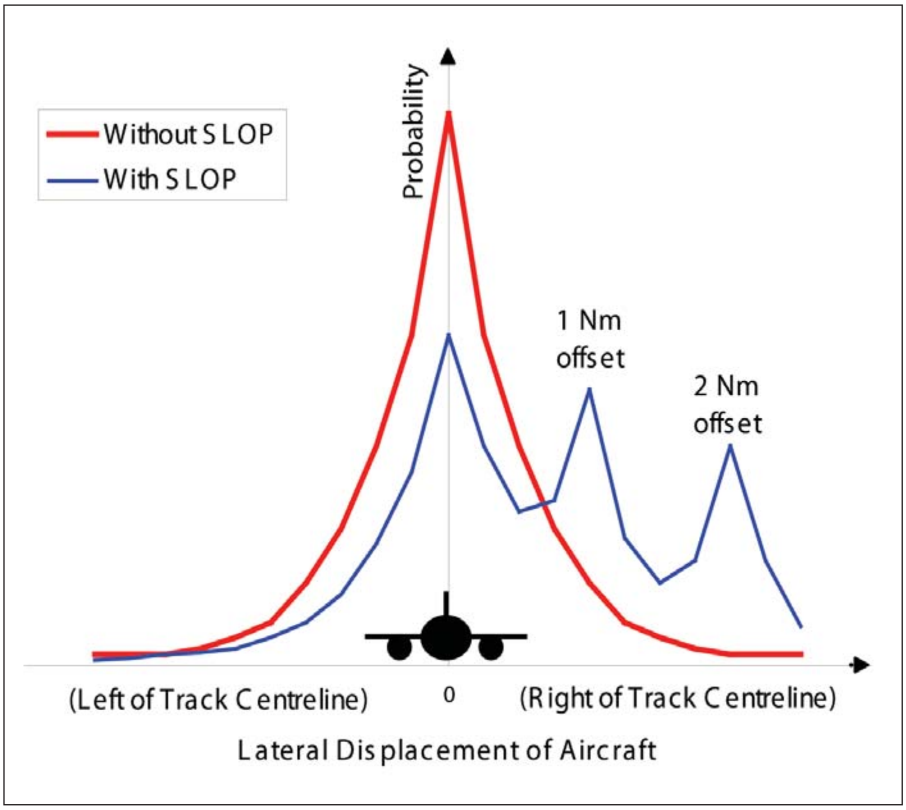

Figure 1
The SLOP intends to spread aircraft out laterally with the use of two offsets to the right.

NAT SPG and NATS are trying to redress this via an on-going education campaign. Recent initiatives have included the production of a training/educational DVD aimed at pilots, dispatchers and others concerned with operations in the North Atlantic (available free on application to customerhelp@nats.co.uk), and producing various publications for the pilot community.

Because more than 90% of flights remain on the track centreline, crews that routinely fly 1 Nm or 2 Nm offsets in accordance with the procedure are benefiting from a very large reduction in mid-air collision risk. Crews that fly track centreline are currently much more likely to be involved in a mid-air collision.

Summary

In summary, the Strategic Lateral Offset Procedure is designed to spread out aircraft laterally in North Atlantic airspace in order to bring a significant reduction in the chance of a mid-air collision. The procedure will be especially effective when crews take local traffic into consideration, using all means available to monitor other aircraft. The procedure reduces the risk of collision for non-normal events such as operational altitude deviation errors and turbulence?induced altitude deviations.

A full description of the procedure can be found at http://www.nat-pco.org. This site also provides free access to the latest version of the North Atlantic Operations Manual which details this and other procedures specific to the North Atlantic region.

NATS is committed to supporting and promoting collision risk reduction measures in the North Atlantic region.

UK FLIGHT SAFETY COMMITTEE

A RE-EVALUATION OF AVIATION TRAINING

Annual Seminar 2006

2nd/3rd October 2006
The Radisson Edwardian Hotel Heathrow

SEMINAR OBJECTIVE

The complex world of modern airline operations demands the highest levels of both competence and commitment. The operation of the most advanced aircraft types and their maintenance, ground and air traffic handling, and the processing of many hundreds of passengers per flight, requires an ever-changing training commitment. Once again, the UKFSC has brought together a cross-section of experts to re-evaluate the scope of training needs and the resources required. If your company aspires to be among the best, you should attend this Seminar.

PROGRAMME

2nd October 2006

2000hrs Seminar Dinner
After Dinner Speaker - Paul Barron - CBE - Chief Executive NATS

3rd October 2006

0800 - 0900	Registration
Session Chairman - Capt. Robin Berry - BMED	
0900 - 0915	Welcoming Introduction - Ian Crowe - Chairman – UKFSC
0920 - 0945	Keynote Speech - Capt. Bob Screen - Aviation Consultant
0945 - 1020	Training Deficiencies - What the Accidents Tell Us - Dave King, Chief Inspector of Air Accidents - AAIB
1020 - 1040	Refreshment Break
1040 - 1115	Training on Automated Systems - Capt. Simon Wood – BSc, BA, MSc Director, CAA Flight Operations Research Centre of Excellence - Cranfield University
1115 - 1150	Air Traffic Controller Training Coping with Change - Suzie Rudzitis, General Manager Training & Operational Resources - NATS
1150 - 1225	Questions
1225 - 1340	Lunch
1340 - 1415	Military Training for the 21st Century - Gp.Capt.Les Garside - Beattie - Head of RAF Training
1415 - 1450	Decision Making in Command - Capt. Chris White FRAeS - Parbrook Aviation
1450 - 1505	Comfort Break
1505 - 1540	Engineering Training - Steve Pennington, Director Maintenance Training and Standards - Alteon
1540 - 1615	Cabin Crew Training for European-wide Operations - Chris Hewitt - easyJet
1615 - 1645	Questions
1645 - 1700	Closing Speech - Ian Crowe - 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

- **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 in full one registration form per person. (Photocopies accepted)

(Please print clearly)

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

PAYMENT INFORMATION

Seminar Fee: UKFSC Member £185 ☐ Non-UKFSC Member £235 ☐

This includes the Seminar Dinner on the even 2nd October, lunch, refreshments and car parking. This does not include hotel accommodation - please see 'Seminar Information'.

Payment is by Sterling cheque only. No credit cards are accepted. Bank transfer is available, details on request (please note an additional cost of £6 will be added to cover 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 2nd October? Yes ☐ No ☐
- Do you require a Vegetarian alternative? Yes ☐ No ☐

PLEASE SEND YOUR COMPLETED REGISTRATION FORM WITH YOUR CHEQUE TO:

UK Flight Safety Committee, Graham Suite, Fairoaks Airport, Chobham, Woking, Surrey GU24 8HX

Tel: +44 (0)1276 855193 Fax: +44 (0)1276 855195 email: admin@ukfsc.co.uk

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

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