

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

Brief Introduction to the North Atlantic

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' 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.

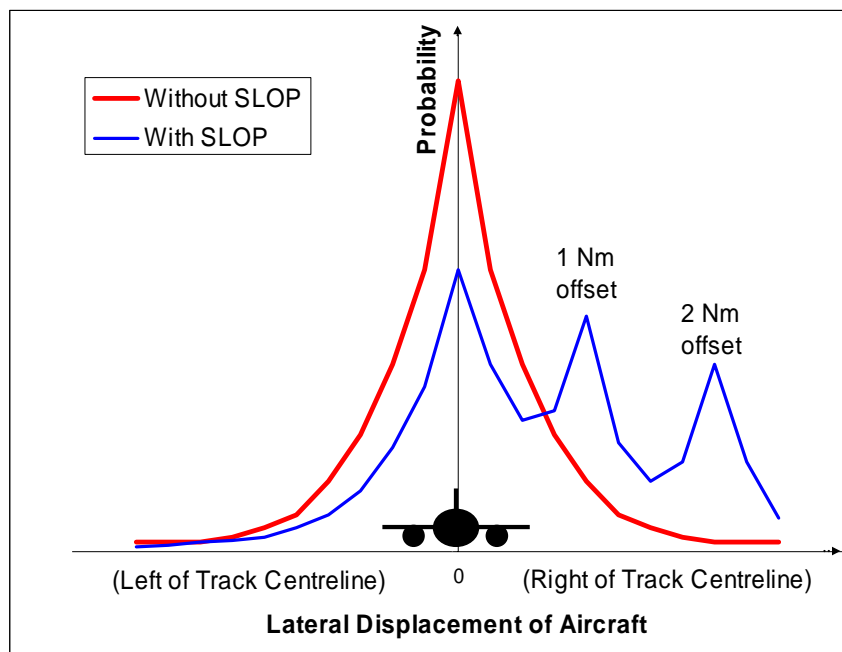


Figure 1 The SLOP intends to spread aircraft out laterally with the use of two offsets to the right.

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' 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.

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.

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