On Oceanic Tracks, Fly SLOPily!

By Capt. Mark Seal (United), IFALPA Vice President – North Atlantic

Oceanic navigation was, for millennia, an exercise in bracketing, an imprecise art at best—find the island group, then the island, or make landfall, then correct left or right as needed.

After World War II, when civilian flights across oceans, deserts, and the high Arctic became commonplace, airline pilots used celestial navigation, ded reckoning, and eventually a series of over-the-horizon electronic navigation systems (Omega, Loran, Decca, and others) followed by onboard INS/IRS systems, each with its own set of shortcomings, limitations, and quirks. These systems were state-of-the-art for their era, but not accurate even by the standards of domestic navigation via NDBs, VORs, and VORTACs.

GPS and other satellite-based systems brought a tremendous paradigm change, offering truly global coverage and virtually pinpoint navigation anywhere over the earth. And there's the rub: GPS/GNSS has improved lateral accuracy on oceanic tracks from scores of miles down to mere meters. That's good—except that, from the standpoint of avoiding midair collisions and wake turbulence, the astounding accuracy provided by GPS/GNSS puts both overtaking and opposite-direction traffic on precisely the same lateral path far from radar coverage.

The risk is real. Consider the midair collision between a B-737 and an Embraer Legacy in 2009. Relatively benign circumstances put two aircraft on the same track at the same altitude in opposite directions. Once upon a time, the "big sky" theory would likely have prevented a tragedy. The inherent imprecision in navigation capability would likely have given the two aircraft at least enough lateral separation to prevent a collision, even if both were indicating "on course." Tragically, the fact was that both aircraft had the capability to be within meters of their intended course, and the result was a collision costing 154 lives.

That's why the strategic lateral offset procedure (SLOP) was developed for oceanic routes—to permit pilots to select a nav track that is offset 1 nautical mile (nm) or 2 nm to the right of the "on course" centerline. SLOP was designed to retain accurate course guidance and efficient routing while also providing the means to allow traffic on oceanic tracks to have a safety margin of lateral separation and reduce "vertical risk" of both midair collisions and wake turbulence encounters, especially in nonnormal events, such as aircraft navigation errors, altitude deviation errors, and altitude-keeping errors induced by turbulence and emergency descents.

But it doesn't work if you don't use it, and it doesn't work if it's not used as designed.

The problem

The air navigation service providers (ANSPs) in the North Atlantic, including the FAA, NAV CANADA, ISAVIA, and UK NATS, have found that some airlines have been instructing pilots that they may use only one SLOP option—usually 1 nm to the right. In fact, the FAA has seen a general distribution pattern in which a 1-nm right offset exceeds equal distribution among the three options and is trending toward a higher proportion. For the offset options, the use of 1 nm exceeds the use of 2 nm by approximately 2 to 1. So if we all fly a mile right of the track, for same-direction traffic we're back to the original situation, we've just moved the problem over. If this trend continues, it will reduce or nullify the benefit in reducing vertical operational risk that SLOP was designed to provide.

The goal is an approximately equal lateral distribution of tracks selected by random use of all of the SLOP options. Pilots should select the SLOP option based on prevailing conditions and operational needs. They also should use all available means of maintaining awareness of surrounding traffic—TCAS, voice communications, and visual acquisition—when selecting the SLOP option. Avoiding turbulence and maximizing lateral spacing from aircraft above and below on the same track are other important factors to consider when selecting a SLOP option.

Never choose an offset to the left of centerline.

Note that, in regions where a Flight Level Allocation Scheme (FLAS) is used (in former terminology, "correct altitude or flight level for direction of flight"), both opposite and same-direction encounters can occur, especially when an

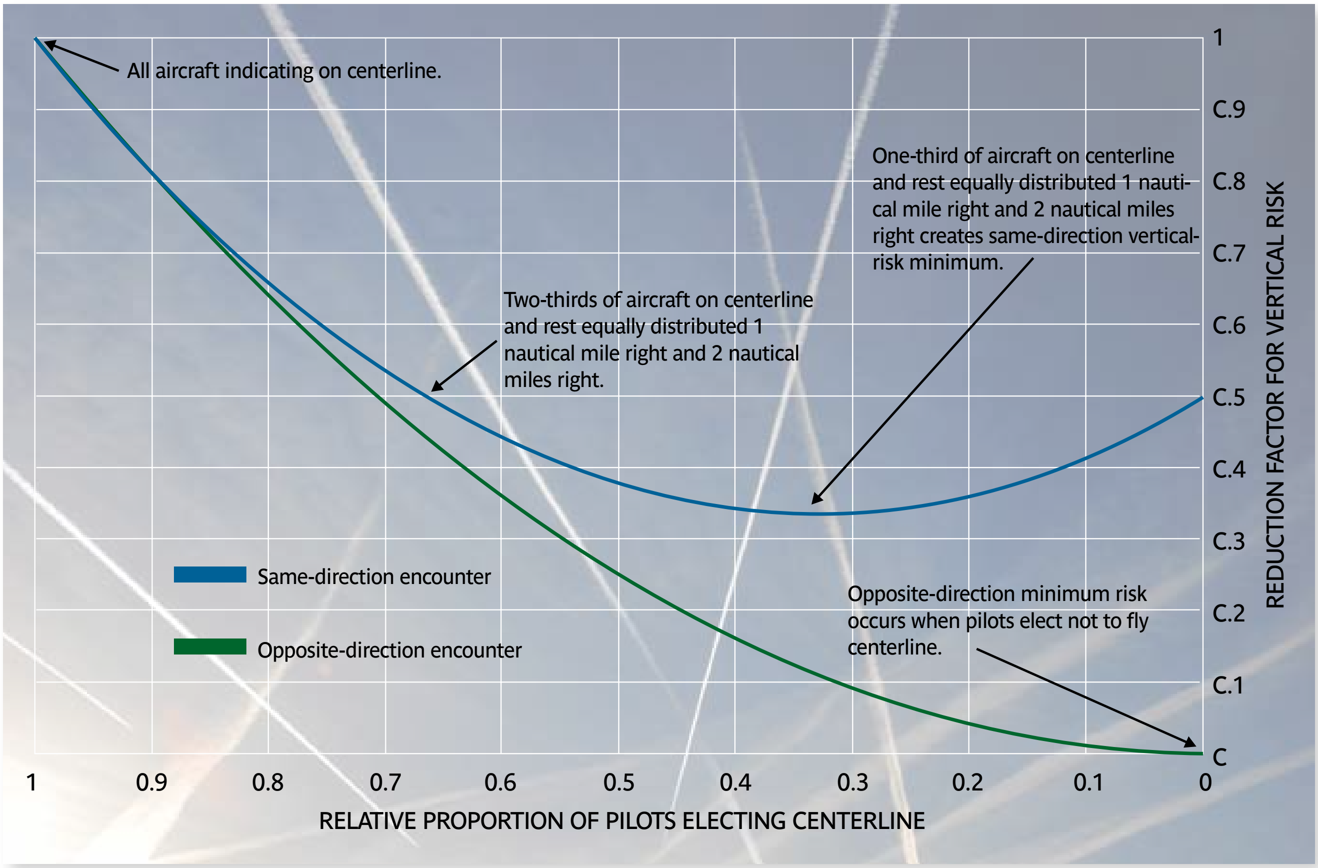
RULES TO REMEMBER

ONE Only use SLOP if your airplane has an automated offset programming capability.

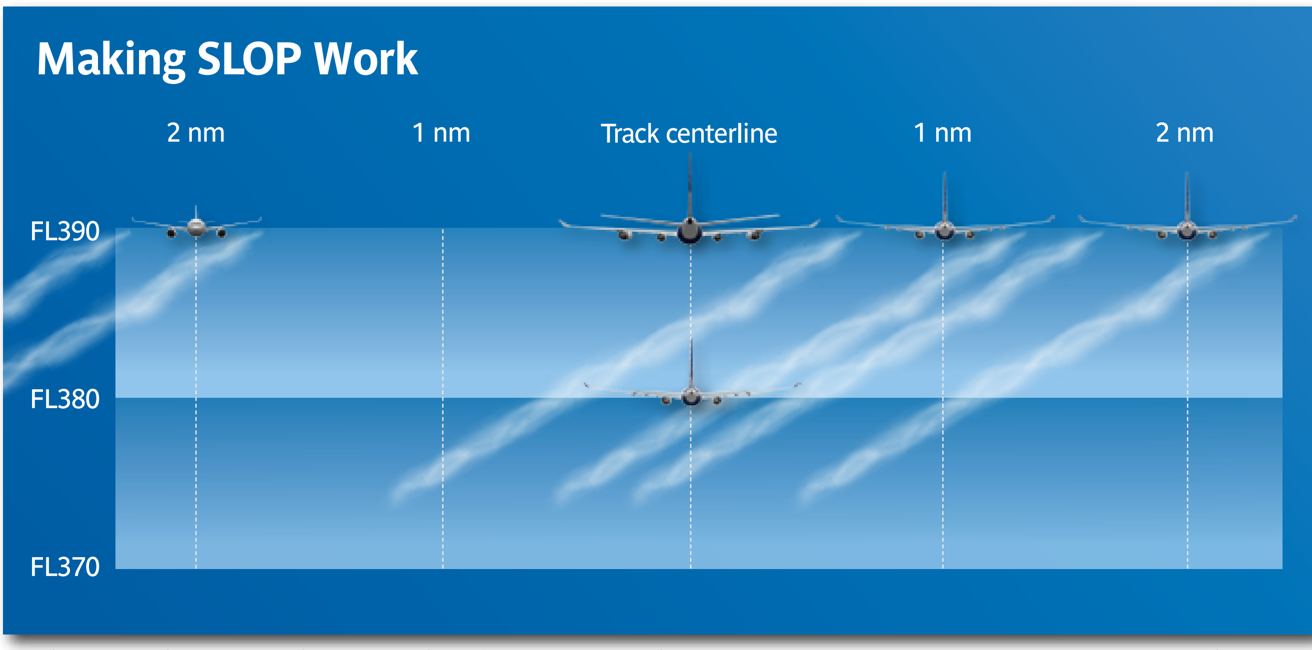
TWO Fly an offset from the oceanic entry point to the oceanic exit point.

THREE You don't need an ATC clearance for this type of offset.

FOUR If your offset causes wake turbulence problems for the flight crew of a following aircraft, choose a different SLOP option. Contact other flight crews on the inter-aircraft air-to-air frequency, 123.45 MHz, to coordinate offsets.



airplane would pass through more than one level on the way to a cleared altitude. The ANSPs therefore want pilots to adopt a systematic approach that distributes the aircraft evenly across the SLOP options (on centerline, 1 nm right, and 2 nm right). This will minimize the vertical risk for same-direction encounters and will significantly reduce the risk for opposite-direction encounters as illustrated in the graph above.



In this hypothetical cross-section of a portion of the North Atlantic track system (not drawn to scale), the three SLOP options for traffic going away from the reader are shown at FL390: on centerline, 1 nm right, and 2 nm right. In this example, winds aloft are carrying the wake turbulence of the airplane at FL390 and 1 nm right to the airplane at FL380. If the 2-nm offset was available, the pilots of the airplane at FL390 and 1 nm right could coordinate with nearby pilots on 123.45 MHz and move to the 2-nm offset, thus moving their wake away from the lower airplane and increasing lateral separation from the centerline airplane.