The Lowdown on AUSOTS: Australian Flex Tracks

OPSGROUP Team
15 March, 2021

If you haven't heard of the **AUSOTS** then it means the **Australian Organised Track Structure**, and is basically a bunch of Flex Tracks that are produced on a daily basis, aimed at helping aircraft benefit from the best wind conditions.

The inventors define it as – "A non-fixed ATS route calculated on a daily basis to provide the most efficient operational flight conditions between specific city pairs".

Sounds familiar? That's because it is basically the NAT OTS but over a different bit of big, not-much-out-there, airspace on the other side of the world.

Where exactly?

The AUSOTS are currently published for routes between Australia and the Middle East, Australia and South East Asia and for domestic routes between Brisbane and Perth. **They pretty much cross the entire YBBB and YMMM FIRs** and a few other parts too.

Opposite direction tracks are **spaced by 50nm in Oceanic** and **30nm in domestic**, but with the introduction of ADS-B this is reducing. Again, probably all sounds quite familiar.

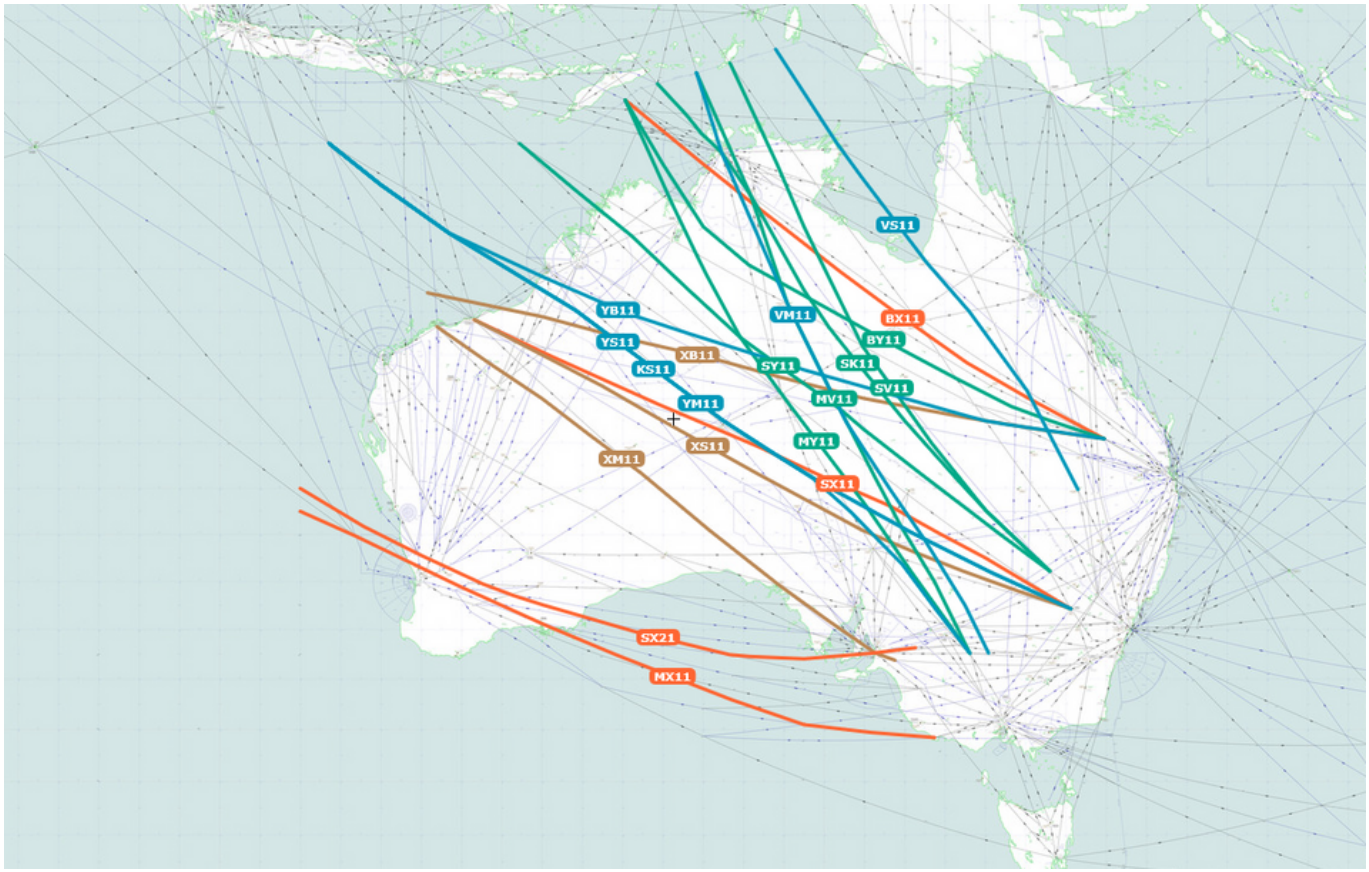
Group Type	effective from	Validity	Sector
Group **A**	13:00 UTC	• Initial stage: **13:00 – 22:00 UTC** • After review (see chapter 4.4): **13:00 – 00:00 UTC**	WSSS* – YBBN WSSS* – YSSY WSSS*– YMML YBBN – WSSS* YSSY – WSSS* YMML – WSSS*
Group **B**	00:00 UTC	• After review (see chapter 4.4): **00:00 – 13:00 UTC**	WSSS* – YBBN WSSS* – YSSY WSSS*– YMML YBBN – WSSS* YSSY – WSSS* YMML – WSSS*
Group **C**	13:00 UTC	**13:00 – 13:00 UTC**	OMDB – YPPH YPPH – OMDB VABB – YSSY YPPH – NZAA
Group **D**	00:00 UTC	**00:00 – 00:00 UTC**	OMDB – YSSY OMDB – YMML YSSY – VABB NZAA – YPPH

* - Singapore Area

The User Preferred Routes are available in the YMMM/Melbourne, YBBB/Brisbane, AGGG/Honiara and ANAU/Nauru FIRs.

Your UPRs can be constructed between **gates** (entries and exits to FIRs), or by **published waypoints** (so long as time between them is not greater than 80mins), **NAVAIDs** or **Lats/Longs** (and you can use ones that are not whole degrees if you want).

You do need a **reporting point on an FIR boundary** (except for between AGGG-ANAU or YBBB-AGGG FIRs).



Overlay of some of the daily tracks in SkyVector

What do I need?

In terms of equipment, your usual stuff giving you **RNP10/ RNP4** type capabilities, **Datalink** (CPDLC), **a couple of LRNS** and bits to help you navigate accurately – all that sort of thing.

Unsurprisingly, what you put in your flight plan is much the same as well – if you are RNAV10 then write 'GR' and 'I' (if appropriate) in item 10 and PBN/A1 in item 18. If you are RNP4 then throw in a 'GR' and write PBN/L1 in item 18

You also need **HF comms** and **ADS-B** to fly on the UPRs.

```
INTERNATIONAL FLEX TRACKS GROUP A: SOUTH EAST ASIA

TDM TRK MY14 200325233001
2003252330 2003261400
SVC TRK MY14 NO TRACK - USE PUBLISHED FIXED ROUTES
RMK/AUSOTS GROUP A

TDM TRK MV14 200325230001
2003252300 2003260900
SVC TRK MV14 NO TRACK - USE PUBLISHED FIXED ROUTES
RMK/AUSOTS GROUP A

TDM TRK SV14 200325230001
2003252300 2003260900
SVC TRK SV14 NO TRACK - USE PUBLISHED FIXED ROUTES
RMK/AUSOTS GROUP A
```

Last but not least, pick your track and file for it

What if something goes wrong?

If you are on a track and **lose your RNP capability** then as long as you can still navigate the track you can stay on it. If you can't, you probably will want to let ATC know fairly quickish so they can put you onto a fixed track.

If you **lose all your comms** then it is simple as well – try other methods, squawk 7600, do some broadcasting on 121.5 and 123.45, put your lights on, and maintain your last assigned speed and level for 60mins (following failure to report over compulsory point), then follow your flight plan. Once you leave Oceanic, follow the procedures of the state you've gone into.

In general, if you are flying over Australian airspace they are going to want to know if your estimate over a reporting point **changes by more than 2 minutes**. They are also going to want to know if you are **off your track by more than 20nm** (small weather deviations).

Also know that **Standard ICAO Contingency and Weather Deviation Procedures** apply here.

SLOP?

Yep, they like it. **Up to 2nm right of track** is the way to go, and in 0.1nm increments if your airplane can do that. You don't need a clearance for it, but remember you cannot use it in addition to offsets for wake, or weather avoidance.

Block Altitudes

Also allowed in this airspace, and given you are probably flying some mega miles through it, **it might be a good idea**. That way you can climb up when your weight will benefit, or avoid turbulence if there are reports of it without having to talk to ATC…

You mentioned talking?

We did, but to be honest there is not a huge amount of it going on in this area. **Most comms are taken care of through CPDLC.** They like a position report sent via CPDLC when you get to the boundary of the FIR (all position reporting procedures are in accordance with ICAO Doc 7030).

The Australian controllers really know how to control. They are great at it. But they also have some pretty high standards which means **if you make a mistake they are going to get grumpy and report/fine you**. It might seem obvious, but if you're off track for weather avoidance, once clear, don't assume you can head direct to the next point – they want to see you **regain your original track**.

What will I find out there?

A whole lot of empty space and open sea.

The distance between Singapore and Brisbane is roughly 6,000km. The distance from Perth to Brisbane is over 3,500km. In between them? A lot of dry, dusty bush, and kangaroos.

Not much in the outback… although a fairly decent straight road for landing on

The middle of Australia is quite an empty place so if you're looking for airports to use, we would recommend the ones around the edge of the country. **YSSY/Sydney**, **YMEL/Melbourne**, **YBBN/Brisbane** are the biggies on the eastern side and you'll find nice long runways, decent approaches and good facilities at each of them. **YPPH/Perth** is the main south west one, while if you're heading north-ish then **YPDN/Darwin** or **YBCS/Cairns** are probably your best bets.

You do have **YBAS/Alice Springs** in the middle if you really need it, and its a fairly decently equipped airport with a 7,999 ft/ 2438m runway and an ILS/RNAV approach.

Who can I ask for info on AUSOTS?

Should you need it, then you can email these folk with all your AUSOTS queries
– uprs@airservicesaustralia.com

You can also try the Melbourne Center Operations Manager at Melbourne ACC on +61 3 9235 7420 or on AFTN: YMMMZRZS if you have specific questions about the published AUSOTS Flex Tracks.

Spot The Difference: Oceanic Airspace With

Non-Standard Contingency Procedures

OPSGROUP Team
15 March, 2021

On 5th November 2020 the new ICAO PANS-ATM Doc 4444 sprung into action like a super hero in a paper cape. Doc 4444 is the Standard for Air Traffic Management. It is a big deal in the world of documents. It is what provides the **worldwide recommendations on Procedures for Air Navigation Services**, including those for **Contingency and Weather Deviation situations.**

But…

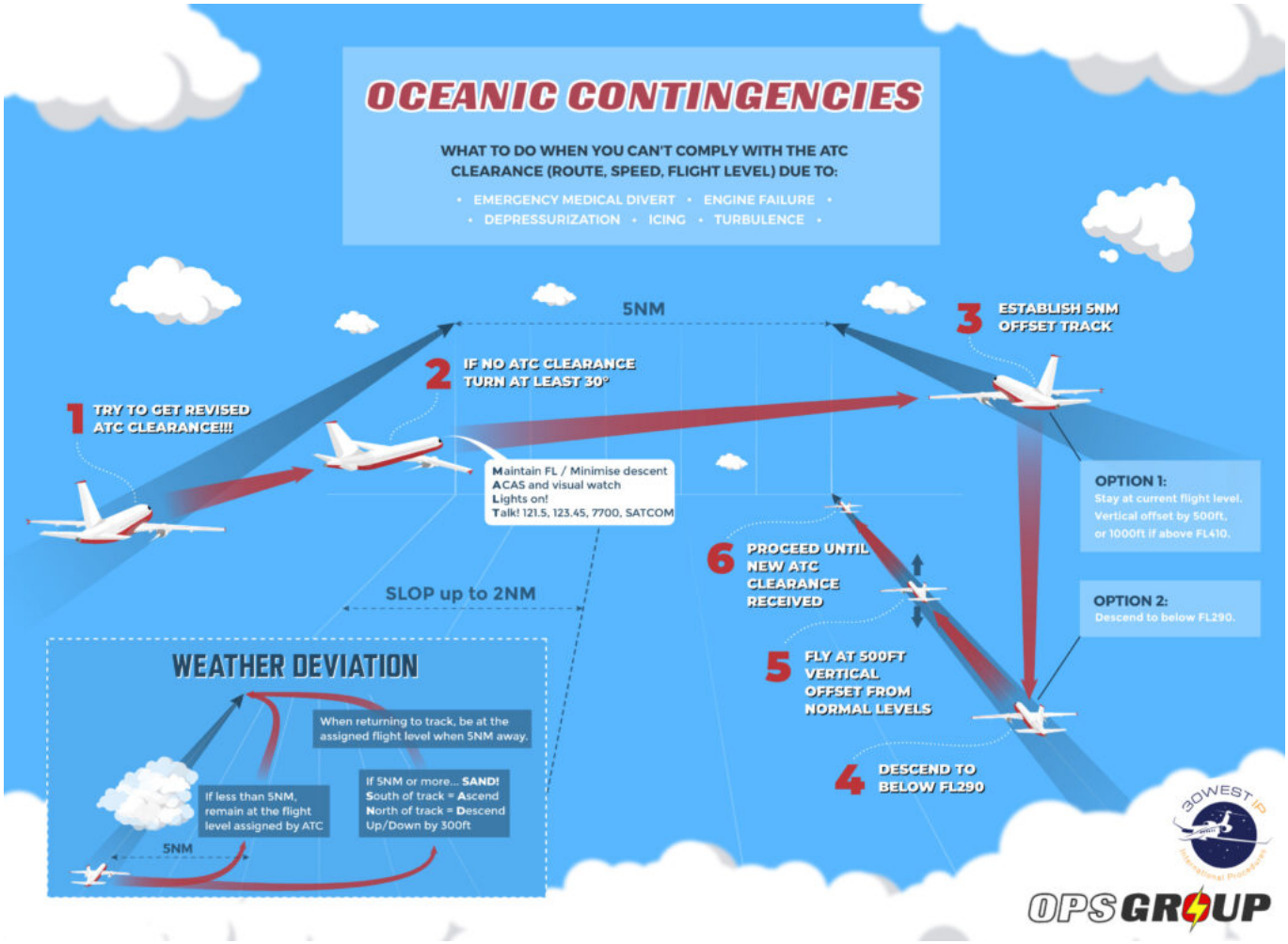
That does not mean states have to follow it. They really should. But if they don't that is ok, they just need to let everyone know in their AIP what their different procedures are.

One Contingency Procedure to Rule them All

So, on 5th November the new recommended Contingency Procedures came into being. In fact, these were the procedures that had been in place in the North Atlantic Region since March 2019. But with the release of the new ICAO Doc 4444, the plan was for these procedures to now be rolled-out everywhere – so there would be **one standard set of Contingency and Weather Deviation Procedures for all oceanic airspace worldwide**.

The procedure is straightforward: Contingency offsets that previously were 15nm are basically now all **5nm offsets** with a turn of at least **30 degrees.**

Here's how it works:



But you know this already, so why are we repeating it?

And that would be great. Pilots, no matter where they are, would know exactly what to do when something goes wrong. But…

Some places aren't playing by the (new) rules

There are four named oceans on Earth – the Atlantic, Pacific, Indian and Arctic. They are quite big. So big they are often "broken" into North and South as well, and who rules the airspace above said oceans is a mishmash of who borders what bits.

This means while you might *just* be routing over the Indian Ocean, you might not *just* be under Indian control, which also means **the contingency for each bit of airspace might vary** since it is up to each State to decide whether to implement the standard procedure over their bit of the ocean. And not all of them have.

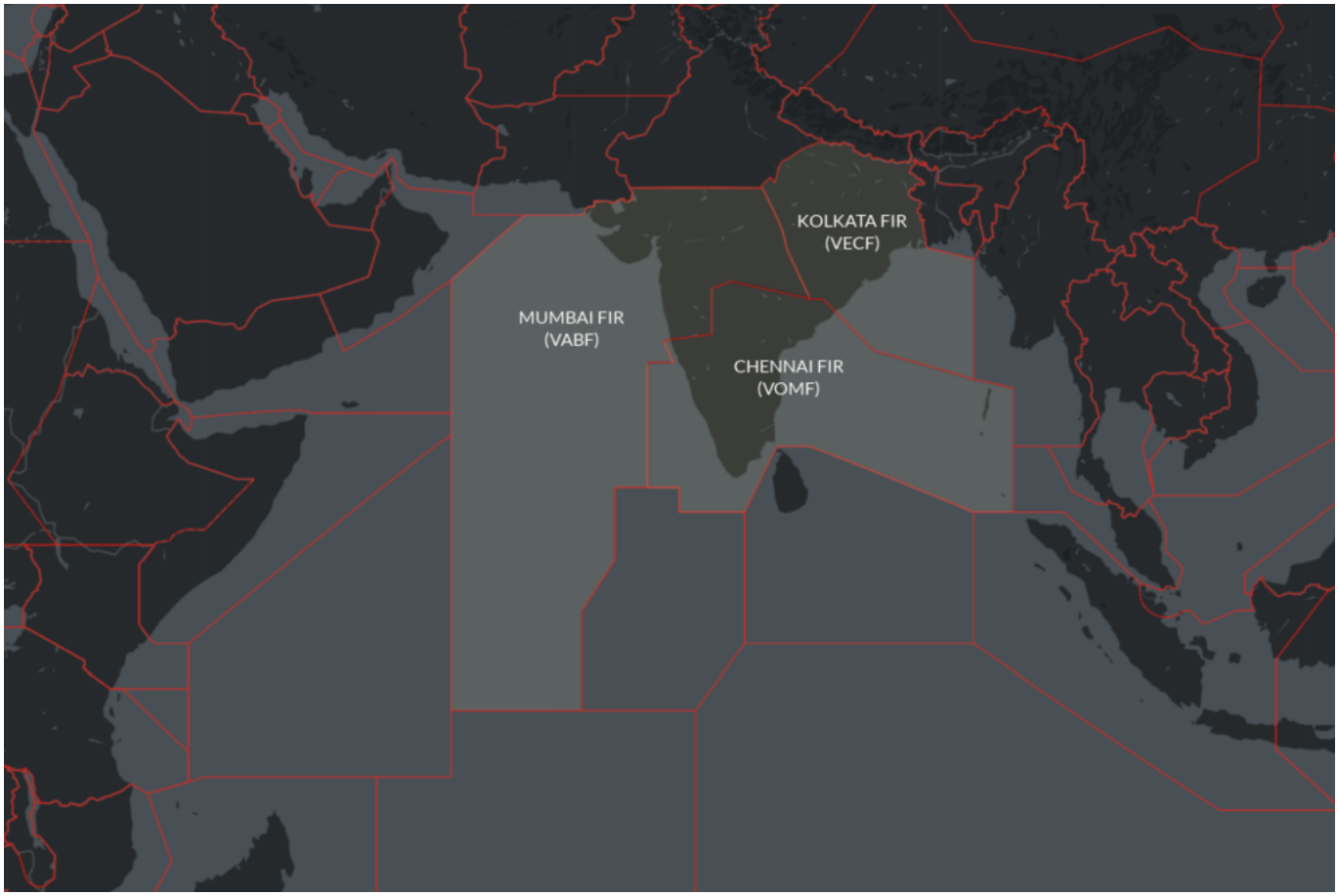
So which ones do we know of that you still need to look out for?

India

India control a big bit of Oceanic Airspace which falls under their **VABF/Mumbai, VOMF/Chennai and VECF/Kolkata FIRs**.

Until August 12 2021 India did not follow the standard ICAO contingency. From then, they do.

Here is a copy of the new AIP SUP updating their manuals.



China

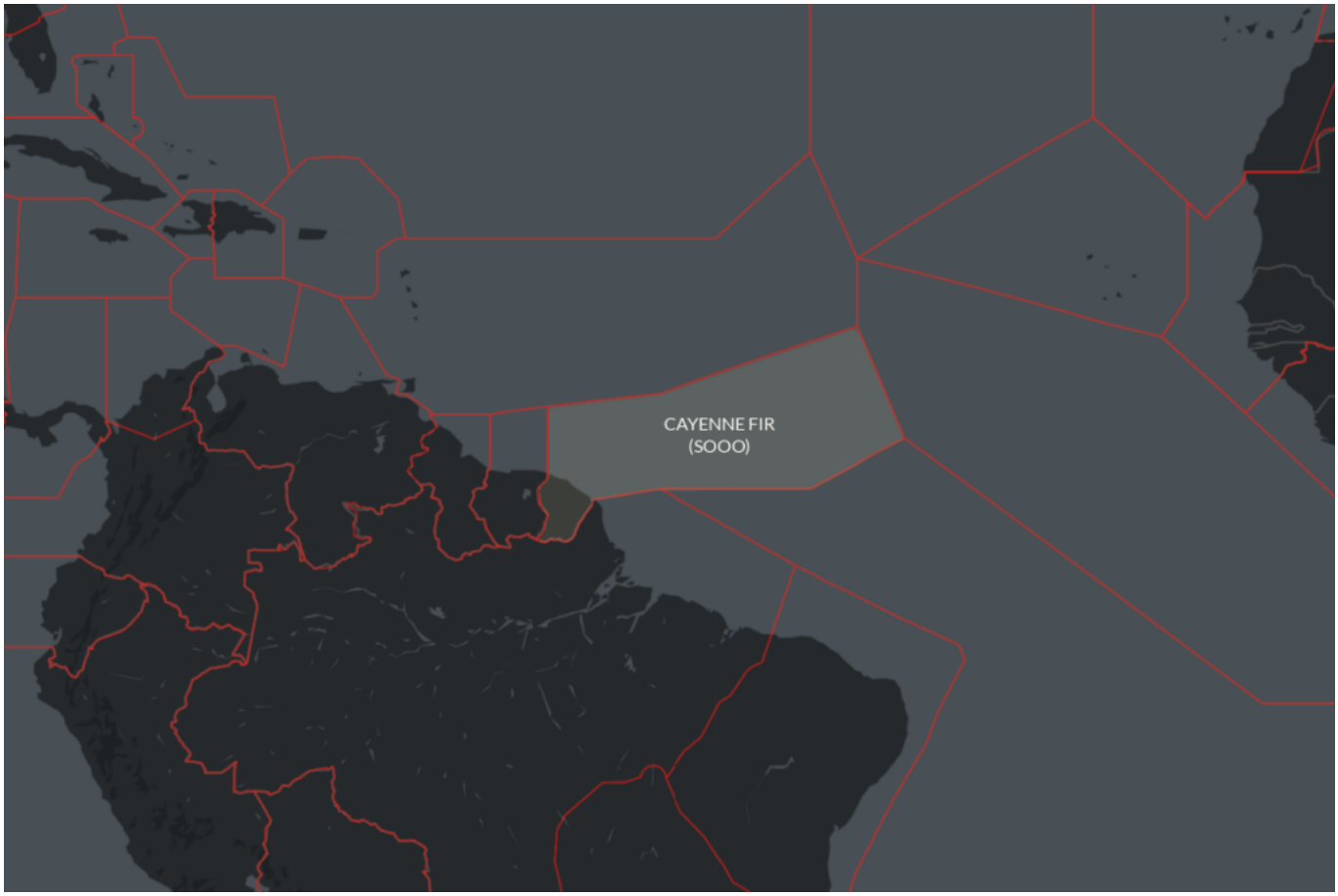
The ZJSA/Sanya FIR includes an oceanic portion in the South China Sea. It is a “marginal sea” that is part of the Western Pacific Ocean (marginal meaning: would just be the ocean only a bunch of islands and archipelagoes sort of divide it off a bit).

China also do not follow ICAO standard contingencies and instead require you to turn **90 degrees** right or left, **offset by 25nm** and then climb or descend 500ft.

China are pretty strict on deviations and detours. They even use different sized airways in some spots. So check their AIP and China specific Rules and Regs before a flight.

French Guiana

The SOOO/Cayenne FIR extends halfway across the South Atlantic Ocean towards Cape Verde and the West African coastline. The procedures here are also yet to be updated. The French AIP here has the info (ENR section 1.8.5) and tells you to turn left or right by **90 degrees**, **offset by 15nm** and climb or descend 500ft. Nothing strange, but it ain't your ICAO standard.

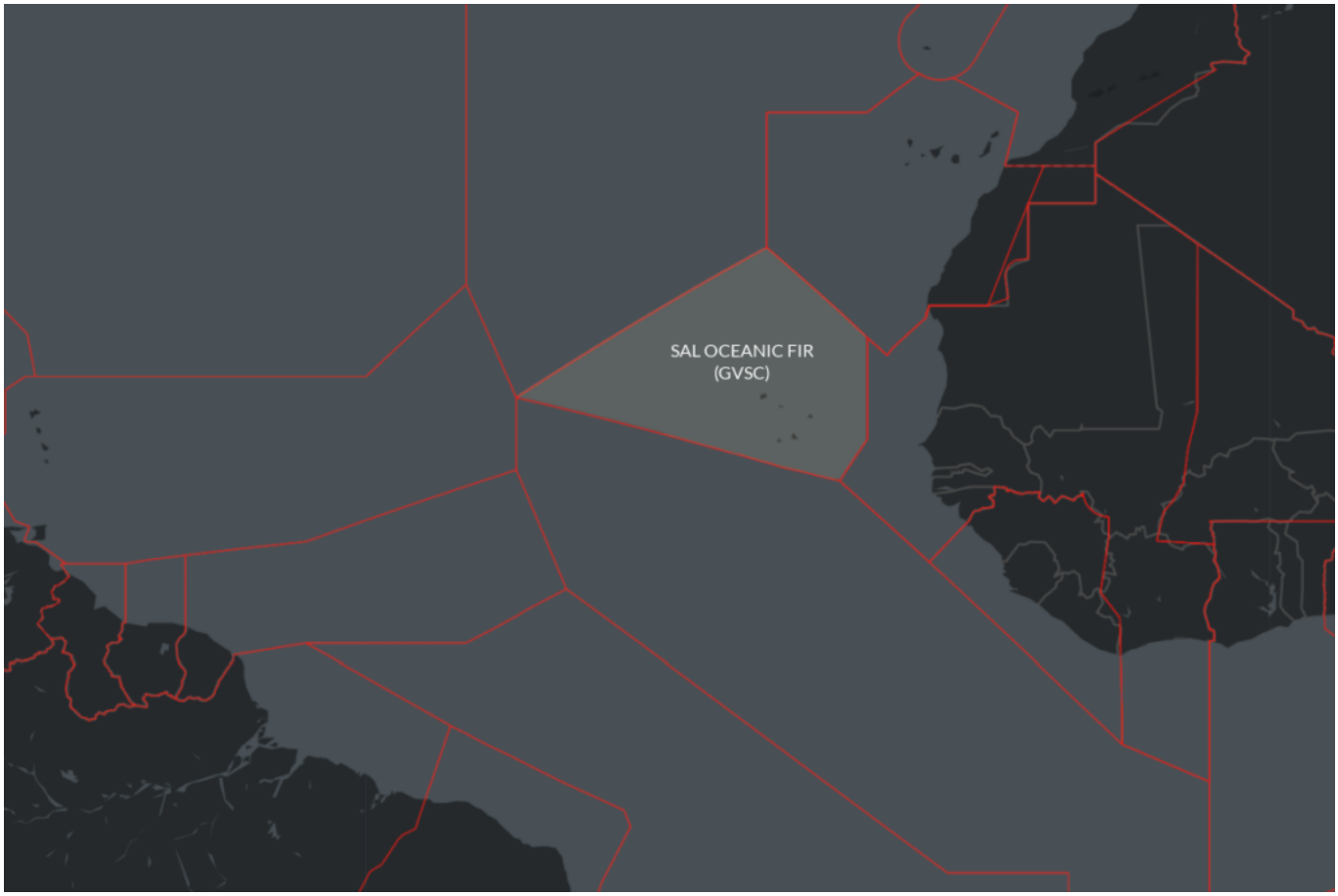


French Polynesia

The **NTTT/Tahiti FIR** in the Central Pacific ocean is another one that comes under the French AIP and still uses old procedures – the now familiar **90 degrees left or right and 15nm offset**.

Cape Verde

In the **GVSC/Sal Oceanic FIR** you are also going to find the old procedures are still in force – the **90 degrees** left or right and **15nm offset**. You might also want to keep an eye on areas with only 30nm separation and avoid shooting through those 15nm offsets.



Malaysia

The **WMFC/Kuala Lumpur** FIR Oceanic Airspace requires a **90 degree** left or right and **15nm offset**

Maldives

They don't refer to the **VRMF/Male FIR** as 'Oceanic', we think it is so we are not sure on this one. We do know that if you need to do an emergency descent, they want you to **remain on away T456.** If you are on airways **Z653 or Z749** then you can leave the route.

Seychelles

There is a special procedure if you are in FSSS/Seychelles Oceanic FIR. It is in the Seychelles AIP SUP 02/2014. The procedure is a **45 degree turn** and a **15nm offset.** If you are **able** to maintain your flight level then once at 10nm, select a level 500′ different to assigned (if at or below FL410), or 1000′ different (if above FL410)

If **unable** to maintain your assigned level, then pick a level you can maintain and apply the 500'/1000′ difference above, but watch out for aircraft who might be on a SLOP

Where else? We need you to tell us!

If you are flying through a region and spot a non-standard contingency or "different to ICAO" note in the AIP then be a superhero and **share it with us**, and then we can share it with you all and help keep everyone safe and up to date. Email us at: news@ops.group

One Contingency Procedure to rule them all

Chris Shieff
15 March, 2021

From 5 Nov 2020, there will be **one standard set of Contingency and Weather Deviation Procedures for all oceanic airspace worldwide**.

If you've been flying in the **North Atlantic Region** over the past year and a half, you'll be familiar with how it works – the new procedures were introduced there back in March 2019, **and now they're being rolled out everywhere**.

The FAA has already published a Notice to say that these procedures will take effect in US oceanic airspace from 5 Nov 2020, and ICAO is expected to formally publish the Standard in an update to PANS-ATM (ICAO Doc 4444) to take effect from the same date.

Rarely do we see worldwide oceanic contingency procedures undergo a formal revision. The last time a major revision occurred was in 2006 when ICAO standardized a 15 NM offset executed with a turn of at least 45 degrees. Prior to that, the North Atlantic and the Pacific had used different offset distances and a 90 degree turn.

Wait… what are "contingency procedures"?

These are basically any time you have to do things differently if you need to deviate from your cleared route, and for one reason or another you cannot get permission from ATC first.

Why would you need to bust your clearance? You may not have the ability or capacity to communicate with ATC, or they may not be able to respond to your request quickly enough for a variety of reasons – meteorological conditions (severe turbulence and weather avoidance), aircraft performance, loss of pressurisation, immediate diversion, or a loss of navigational accuracy.

What are the new procedures?

The short answer
Contingency offsets that previously were 15 NM are basically now all 5 NM offsets with a turn of at least 30 degrees (not 45 degrees).

The long answer
Read the FAA Notice.

The slightly less long answer
– Turn at least 30 degrees (reduced from 45) to the left or right of track and establish yourself on a parallel track that is offset by 5nm (reduced from 15).
– The direction of turn is up to you, but you should consider airways around you – the likely direction of other aircraft, the applicable SLOP procedures, the direction of your diversion airport and of course terrain. (If going left or right is a 50/50 choice, going right is probably better – it gets you out of the way of all the SLOP offset traffic that might be coming at you from the opposite direction!)
– When established on your offset track, maintain an altitude that is vertically offset by 500 feet from normal levels (or 1000 feet if above FL410).
– In areas of parallel airways, it is recommended you descend below FL290.
– Watch your TCAS, and if possible, keep your eyes outside for other aircraft.
– Make sure your transponder is set to TA/RA (if able).
– Be seen – turn on as many exterior lights as possible.
– Squawk 7700.
– Try and talk to ATC via voice or CPDLC, and declare a PAN PAN, or MAYDAY.
– Establish comms with other aircraft on 121.5 MHz or 123.45 MHz. Make a position/intention report as you would in TIBA procedures.

The best answer
A picture! So often the best answer. And this one's pretty neat. Not least because you can click on it, download it, print it out, and put it in your flight bag to take with you. (If you'd also like to laminate it, we're ok with that).

Weather deviations

If you have to deviate from your assigned track due to anything weather-related, there's a whole different procedure to follow.

Here's what to do:

- In the first instance, up the urgency with the phrase "WEATHER DEVIATION REQUIRED." ATC will attempt to provide separation, and if they can't they will ask you to advise your intentions.
- If you intend to deviate, let them know. Say something like – "I am deviating under PIC emergency authority. At 5 NM from course I will employ the Weather Deviation contingency."

Then apply the following:

- Declare a PAN.
- Deviate away from other airways if practical.
- Talk to other aircraft on 121.5 and 123.45.
- Keep an eye on your TCAS and outside.

- Turn on all your exterior lights.

For deviations of **less than 5 NM**, remain at the flight level assigned by ATC.

For deviations of **5 NM or more**, when you are at the 5 NM point initiate a change as follows:

If flying **EAST**, **descend** left by 300ft, or **climb** right by 300ft.

If flying **WEST**, **climb** left by 300ft, or **descend** right by 300ft.

In other words – **SAND!** (**S**outh of track = **A**scend, **N**orth of track = **D**escend; Up/Down by 300ft)

Once you are back on track, resume your cleared level. If you're already deviating and cannot get a clearance to deviate further. Change your level immediately in accordance with the table above.

Turnback procedure

The new guidance has left out any specific reference to how to divert across the flow of traffic or turn-back procedure, and instead simplified it to just "proceed as required by the operational situation". Turning back would assume you either employ the 5NM offset as per the new contingency procedure, or else get a new revised clearance.

Bottom line

Download the pic, and give the new procedures a good read (they're not actually *that* long). Beginning 5 Nov 2020, the new procedures are expected to be implemented. You might want to prepare changes for your ops manuals and checklists too.

No Room for Error – GNE's and the North Atlantic

Chris Shieff
15 March, 2021

Advances in technology mean that aircraft in the North Atlantic High Level Airspace (NAT HLA) are flying laterally, longitudinally, and vertically closer than ever before. But North Atlantic gross navigational errors (GNE's), which are lateral off-track deviations of 10nm or more, still occur regularly, and jeopardise the safety of you and the traffic around you. So don't leave it up to Air Traffic Control (ATC) to discover your GNE! In this article, let's look at some common human slip up's that lead to GNE's, and what we can do to prevent them.

[heading]Pre-Flight[/heading]Operating to the highest standards of navigational performance demands the **tedious and careful monitoring** of aircraft systems. Unfortunately, humans are by nature not the best monitors. During the long quiet of an oceanic crossing, we can fall victim to **cognitive traps** such as change blindness, expectation bias, and complacency.

But the potential for error on Atlantic crossings begins well before the first coast-out waypoint. In fact, it begins before take off. The following four areas are where strategies in mitigating a GNE begin.

1) Data Entry

Via ACARS:

Many pilots now use ACARS to automatically downlink the entire flight plan and winds aloft directly to the FMS. But an over-reliance on automation can lead to complacency, and so **the more reliable the system, the more complacent we become** as monitors. In one incident, a Boeing 747 suffered a GNE of ***120nm***. The flight plan downlink from ACARS unfortunately contained one bad coordinate that went unnoticed. Once lured into complacency by such reliable technologies, there can be a temptation to omit cross-checking.

What can we learn from this? Always verify the **full** coordinates in an ACARS downlinked flight plan. Similarly, if several different flight plans were run, ensure that you request your downlink using the **most current and filed flight plan number**.

Manually:

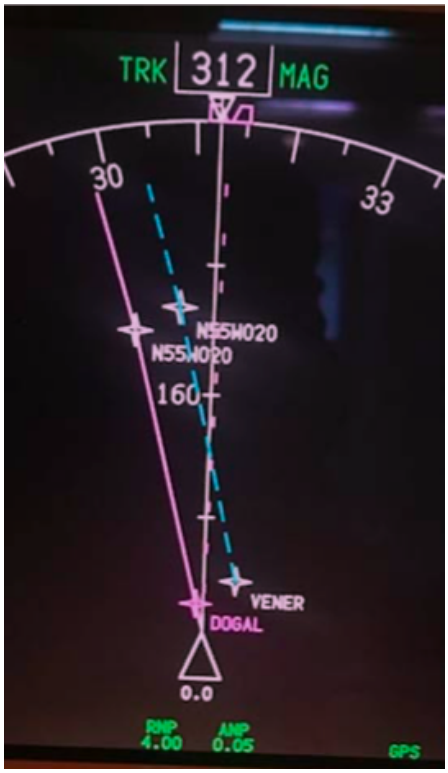
A manual entry means a pilot inserts the flight plan's waypoints directly into the aircraft's flight management system (FMS). But no matter how meticulously one may be, manual data entry can still produce errors. Then how do we guard ourselves against these errors?

Firstly, **avoid using ARINC 424** shorthand for programming oceanic points. This has been a factor in many GNE's, given how easy it is to misplace the letter as a prefix or suffix. For instance, consider how simply misplacing the "N" could cause a drastic lateral deviation:

- 50**N**60 = 50N 160W
- 5060**N =** 50N 060W

If you have the capability on your aircraft, use the full coordinates, including minutes.

For the last few years, use of half degrees of separation has been on the rise in an attempt to enhance airspace efficiency. But on flight displays units that only show 7 digits, these half degree coordinates are misleadingly displayed as full coordinates. For instance, the half coordinate N55°30' W020° will display as N55°W020° (see image below, which shows identical waypoint labels for points separated by half a degree!). In this case, it is imperative to view the expanded version of coordinates (degrees *and* minutes).



Another frequent error leading to GNE's is *transposing* numbers during data entry. This commonly occurs when you complete almost the entire crossing along one degree of latitude, then fly the last waypoint at a different latitude. For example, with a cleared route of 57°N 050°W, 57°N 040°W, 57°N 030°W, **56°N 020°W**, one can accidentally enter **57°N 020°W**. This will put you 60nm off course.

But there is good news! These errors are easy to recognize and avoid by having a specific method of waypoint verification.

2) Waypoint Verification

Whether entered via ACARS or manually, both crew members must come together to perform a **thorough cross-check**. The following method recommended by ICAO in Doc007 seems to work the best:

- One pilot reads the waypoint/coordinates, bearing and track from the FMS.
- On the master document, the other pilot will circle the waypoint to signify the insertion of the

correct FULL coordinates in the navigation computers

- The circled waypoint number is ticked, to signify the relevant track and distance information matches
- (In flight) The circled waypoint number is crossed out, to signify that the aircraft has overflown the waypoint.

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Cognitive Traps:

Expectation Bias is when your perception is influenced by your preconceptions. It is vital that the second crew member crosschecks **from the FMS/CDU** to the master document – and not vice versa – thereby increasing the chance of spotting an error.

Pop-up trip hustle – It's one thing reading about waypoint verification, but it's another thing actually sitting down and taking the time to do it. Do not be tempted to crosscheck your own work because you're in a time crunch – it requires at least **two separate sets of eyes**.[/fancy_box]

3) Initialisation of navigation systems

The navigational integrity of your entire flight is predicated on an accurate starting position. Even a small error with on the ground can translate into a gross error later down the line in flight.

The FMS GPS position and your current parking coordinates (found on the 10-9 pages) must match. Avoid using "last position" function in the FMS – if you were towed overnight, the "last position" will be your previous location, not your current one! Sounds obvious, but mistakes happen.

Inertial systems, once aligned, must also complement the GPS coordinates. Initialisation of inertial navigation systems can take between 6-15 minutes, and errs on the longer side at more northerly latitudes – so be patient! Moving the aircraft during alignment **will cause an alignment error**. **Bottom line: avoid repositioning/towing the aircraft during alignment, even it is to a nearby spot on the same ramp area.** Position errors like this cannot be corrected once in flight.

4) Your Master Clock – (iPhones not authorised!)

Since our ETAs for oceanic waypoints must be accurate within +/- 2 minutes, it is vitally important that, prior to entry into the NAT HLA, your master clock is accurately synchronised to UTC. ICAO Doc007 has a list of approved sources from which you can set your aircraft master clock (and your iPhone isn't one of them!). You are approved to use the GPS time which can be found in the FMS.[fancy_box box_style="default" icon_family="none" color="Accent-Color" border_radius="default" image_loading="default"]

Cognitive Trap:

Close to the E/W Greenwich line or close to the equator, you'll just be on the fringes of the opposing segment. So, take a close look at the E/W or N/S letter coordinates, especially if you are usually accustomed to flying from one particular geographic area.[/fancy_box][heading]Clearances & Communication[/heading]With a move away from spoken communications and towards datalink procedures, requesting, copying and verifying a clearance becomes a much simpler task! But it is still important to know your own limitations in the rare instance that you need to copy a clearance via voice.

Casual radiotelephony should be avoided

Casual radiotelephony can be the source of misunderstanding coordinates or clearances, and so all waypoint coordinates must be read back in detail, adhering strictly to standard ICAO phraseology. An example of standard ICAO phraseology requires enunciation of every individual digit. 52 North, 030 West would be read back as “Fife two north, zero tree zero west” as opposed to “fifty-two north thirty west”. Have no doubt about it, Shanwick can be the most strict in this regard.

Distractions and workload

If your departure airport is close to the oceanic boundary, e.g. Shannon or Miami, the benefit is that you will copy your oceanic clearance on the ground. Unencumbered by distractions typically associated with being in flight, you can focus almost fully on the task at hand. However, most flights pick up an airborne clearance, and it is important to **prioritise this for a period of low workload.**

Take the example of a Bombardier Global Express crew that narrowly avoided a GNE after copying a clearance. While they were in the midst of crosschecking the clearance with the FMS *and* climbing to their initial altitude, the flight attendant approached them with an issue. Instead of waiting, one of the pilots attended to the problem. A new waypoint wasn’t entered, and it was later caught by ATC in a position report. **Try to avoid non-vital tasks until ALL the steps regarding copying, verifying and inputting a clearance are complete.**

Following these simple standard operating procedures (SOPs) step-by-step will guard against clearance errors. If the steps are interrupted for any reason, start again from the beginning.

- Two pilots monitor and record the clearance. The Pilot Monitoring (PM) will contact clearance delivery, while Pilot Flying (PF) monitors both the primary ATC frequency and the clearance delivery frequency.
- The PM then records the clearance on the master document. The PF also copies down the clearance separately.
- Clearance is read back to ATC. *Any disparities between both pilots’ interpretations of the clearance must be clarified with ATC.*
- A deliberate cross check of the clearance to the filed flight plan and the FMS is made.

Re-Clearance

According to ICAO Doc007, “*In the event that a re-clearance is received when only one flight crew member is on the flight deck…changes should not be executed…until the second flight crew member has returned to the Flight Deck and a proper cross-checking and verification process can be undertaken.”* Sorry, they just don’t trust you to do this by yourself, and neither should you!

Errors associated with re-clearances, re-routings and/or new waypoints continue to be the most frequent cause of GNE’s. Therefore, a re-clearance or amended clearance should be treated virtually as **the start of a new flight** and the procedures employed should all be identical to those procedures employed at the beginning of a flight.

- Both crews note the re-clearance

- Reply to ATC via ACARS or voice
- Amend the Master Document
- Load the new waypoints into the FMS from the updated Master Document
- One pilot verifies the input of the new waypoints reading ***from*** the FMS
- Verify the new tracks and distances, if possible
- Prepare a new plotting chart/re-plot in Jeppesen EFB

With datalink, you might have the capability to load the new route directly from the ATC message into your FMS flight plan. This will eliminate a transcription error on your part, but you cannot always count on the FMS to load this seamlessly. Oftentimes, if a revised coast-in waypoint doesn't connect with your originally planned domestic airspace airway, it might cause a discontinuity. Worse, some crew have experienced their entire domestic flight plan drop out, left with only the oceanic portion.

Conditional Clearances – There's always a catch!

A conditional clearance is an ATC clearance given to an aircraft with certain conditions or restrictions, such as changing a flight level based on a time or place. Conditional clearances add to the operational efficiency of the airspace, but are commonly misinterpreted by flight crews.

Shannon has been known upon first VHF contact to provide lateral conditional clearances on coast-in. For example: "N135AC, *after* DINIM, direct ELSOX". Often, crew have been known to read back the *correct* transmission, but then execute the wrong procedure by proceeding directly to ELSOX.

Why is this happening? In studies of linguistics, **verbs** (such as 'direct') have been noted as having a perceptual priming effect, that more **easily grabs our attention** at the expense of weaker prepositions (such as 'from' or 'after'). Listen carefully for prepositions. Similarly, in aviation vernacular, the word 'direct' means to proceed **now** to the specified waypoint. As pilots, we can distinguish this meaning with very little effort, and most of the time can expect to proceed present position direct. Thus, we are *primed* to go direct.

While this isn't a complex sentence, research indicates that transmissions involving serial recalls (such as "proceed here *then* here…") are susceptible to distortion, with the last word or item more commonly interfering with recall of the previous item.

A really simple way to prevent this is to **write down** clearances as they are being read to you, *then* read-back the transmission. You can also call attention to a conditional clearance by prefixing their read-back with the word "Verify" or "Confirm" over the radio. Via datalink, sufficient care always must be taken when factoring in all the contents of a clearance before acknowledging the message. The initial phrase "MAINTAIN FLIGHT LEVEL 300" is included to stress that the clearance is **conditional**. If the message is about to time out, and you need more time to process its contents, reply using "Standby". Respond at your own pace![fancy_box box_style="default" icon_family="none" color="Accent-Color" border_radius="default" image_loading="default"]

Cognitive Trap:

On the longer route segments between New York and Santa Maria, "when able higher" (WAH) reports might be solicited. ATC acknowledgement of a WAH report must not be misconstrued as a conditional clearance to climb. Any climb clearances will be issued **separately** from a WAH acknowledgement.[/fancy_box][heading]Miscellaneous[/heading]

10-minute Check – put the (Bad) Elf on the shelf for this

One of the best ways to capture a potential GNE and refresh your situational awareness is with the sublimely simple 10-minute check. Ten minutes after waypoint passage, you'll use your current coordinates to plot your position on your plotting chart. If the coordinates don't land on the plotted track line, an investigation into the source of the error must begin immediately. It doesn't hurt to even make additional plots between waypoints too, but ICAO only requires the one 10-minute check.

Today, more pilots are carrying independent GPS units in their flight bags, providing crew with own-ship on their oceanic route map. Tempting though it may be to use this for present position information, it is currently not an approved source of navigation, and should **NOT** be used in lieu of a 10-minute check.[fancy_box box_style="default" icon_family="none" color="Accent-Color" border_radius="default" image_loading="default"]

Cognitive Trap

It is easy to forget about the 10-minute check. Setting a timer once your waypoint passage tasks have been completed will help remind you to do so.[/fancy_box]

Autopilot mode – "Wait, are we supposed to be in heading?"

Incorrect autopilot mode selection has been known to be a factor in GNE's. On an oceanic crossing, you can bank on being in NAV or LNAV most of the way across the Atlantic. But perhaps you used heading mode to deviate for weather or to intercept a SLOP. It is not uncommon among pilots to spare your passengers two steep banking turns (thanks LNAV!) by manually flying a SLOP intercept in heading mode. But if you forget to re-engage LNAV, you will continue drifting on your merry way, further and further off course.

Distraction, fatigue or complacency are common reasons for losing mode awareness, so the following simple tricks will help mitigate autopilot induced GNE's.

- It helps to **verbally announce** when you are transitioning temporarily into heading mode, to bring both pilots in the loop.
- Employing **sterile cockpit** until you're back in LNAV will help mitigate distractions.
- In an abundance of caution, you can keep a **finger** on the heading button or heading dial until you are back in LNAV will serve as a reminder.

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Cognitive Trap:

The flight mode annunciators (FMA's) are the most reliable indicators of automation selection – more so than the flight guidance panel! Yet, a study found that pilots pay superficial attention to the FMA's during critical mode changes. Don't waste a valuable resource, and do consciously **bring the FMA's into your scan**.[/fancy_box]Deliberate cross-checking and monitoring are a critical last line of defense for which we, as pilots, don't get explicit training, but are nevertheless expected to perform effortlessly. But over the North Atlantic, there is little room for error. So, let's recap what can be done!

1. **Allow sufficient time on the ground to set up**
2. **Closely scrutinise data entry – whether the source is human or ACARS!**

3. **Work together on waypoint verification**
4. **Don’t work single pilot – always keep all crew in the loop**
5. **Deal with clearances and re-clearances methodically**

Understanding our vulnerabilities is key to the process of mitigating errors. Armed with an understanding of our own limitations, and an appreciation for the practices and habits mentioned above, a ‘would-be’ GNE can be averted.

Links

ICAO Doc 007

Global Operational Datalink Document (GOLD)

PBCS – What, Where and How

OPSGROUP Team
15 March, 2021

> **In Short:** The performance-based communication and surveillance (PBCS) framework allows for higher safety standards and more efficient airspace use. If your aircraft already has the equipment and you cross the Atlantic or Pacific Oceans often, it’s worth looking into getting your regulatory approval.

PB… what? It’s a good question. We have so many acronyms in aviation, it’s easy to forget what this one stands for and what it really means. So, let’s try and get to the bottom of it.

What is PBCS?

Official answer:

> The ICAO performance-based communication and surveillance (PBCS) framework ensures that emerging technologies for communication and surveillance fully support ATM operations and are implemented and operated safely.

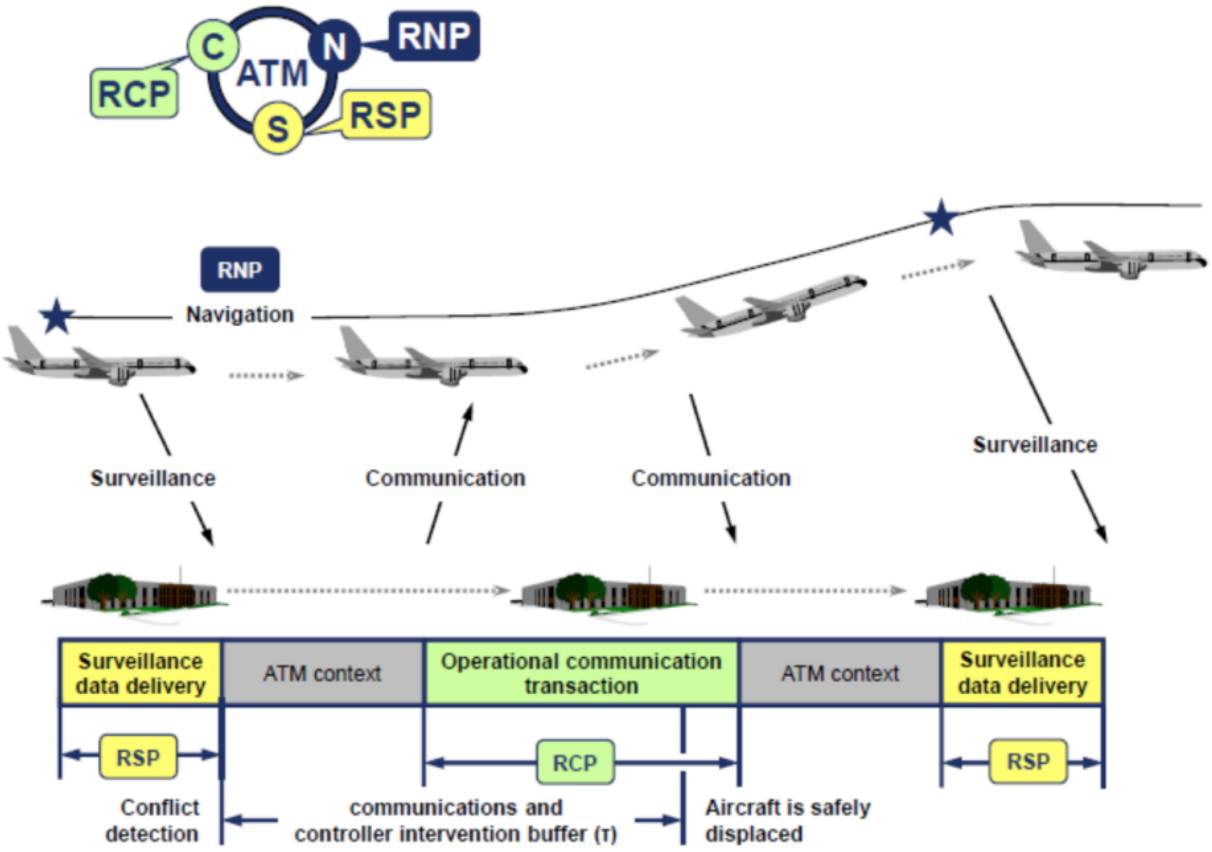
In plain speak:

> With the technology **already** available on many aircraft **and** in the Air Traffic Control facility, aircraft can now fly closer than ever before, especially over non-radar oceanic airspace.

RCP specification	RCP transaction time (sec)	RCP continuity (probability)	RCP availability (probability)	RCP integrity (acceptable rate/flight hour)
RCP 240	240	0.999	0.999 0.9999 (efficiency) *(See Note 3)*	10^{-5}
RCP 400	400	0.999	0.999	10^{-5}

There are two key buzz words, so let's define them. They are interlinked with RNP – Required **Navigation** Performance.

- **RSP** – Required **Surveillance** Officially known as "surveillance data delivery", often stipulated in the Airplane Flight Manual. Basically, how often does the aircraft send its position to ATC/ground station. There are two specifications, RSP180 and RSP400. The numbers indicate the maximum number of seconds (180 or 400) for the transaction to occur.
- **RCP** – Required **Communication** ICAO has two specifications, RCP240 and RCP400. Again, the numbers indicate the maximum number of seconds (240 or 400), or "transaction time" taken for the controller to issue an instruction to the crew **and** for them to receive a response. This could be via CPDLC, HFDL, VDL or SATCOM.



So, we have a loop here, **C-N-S. Communication**, **Navigation** and **Surveillance**. An aircraft sends surveillance information to ATC about where it is; the aircraft stays within confines of RNP navigation requirements and ATC communicates with the aircraft within the required transaction times. *Pretty easy!*

But why do we need PBCS?

The take away? If all given aircraft in a certain airspace have a **lower** RSP value and a **lower** RCP value, we can start putting these aircraft **closer** together.

Essentially – performance-based separation minima. This allows aircraft to be separated safely according to technological capability rather than *"one-size-fits-all"* prescriptive distances.

What are the differences from PBN?

They are similar but there are notable differences. In a simple sense, the PBN (RNP/RNAV) only requires that the *operator* obtains approval because it focuses on *how* the equipment works. PBCS (RSP/RCP) however requires the involvement and approval of the air traffic service provider because it's a two-way communication and surveillance effort. There are dependencies and complexity with the equipment standards on *both* ends.

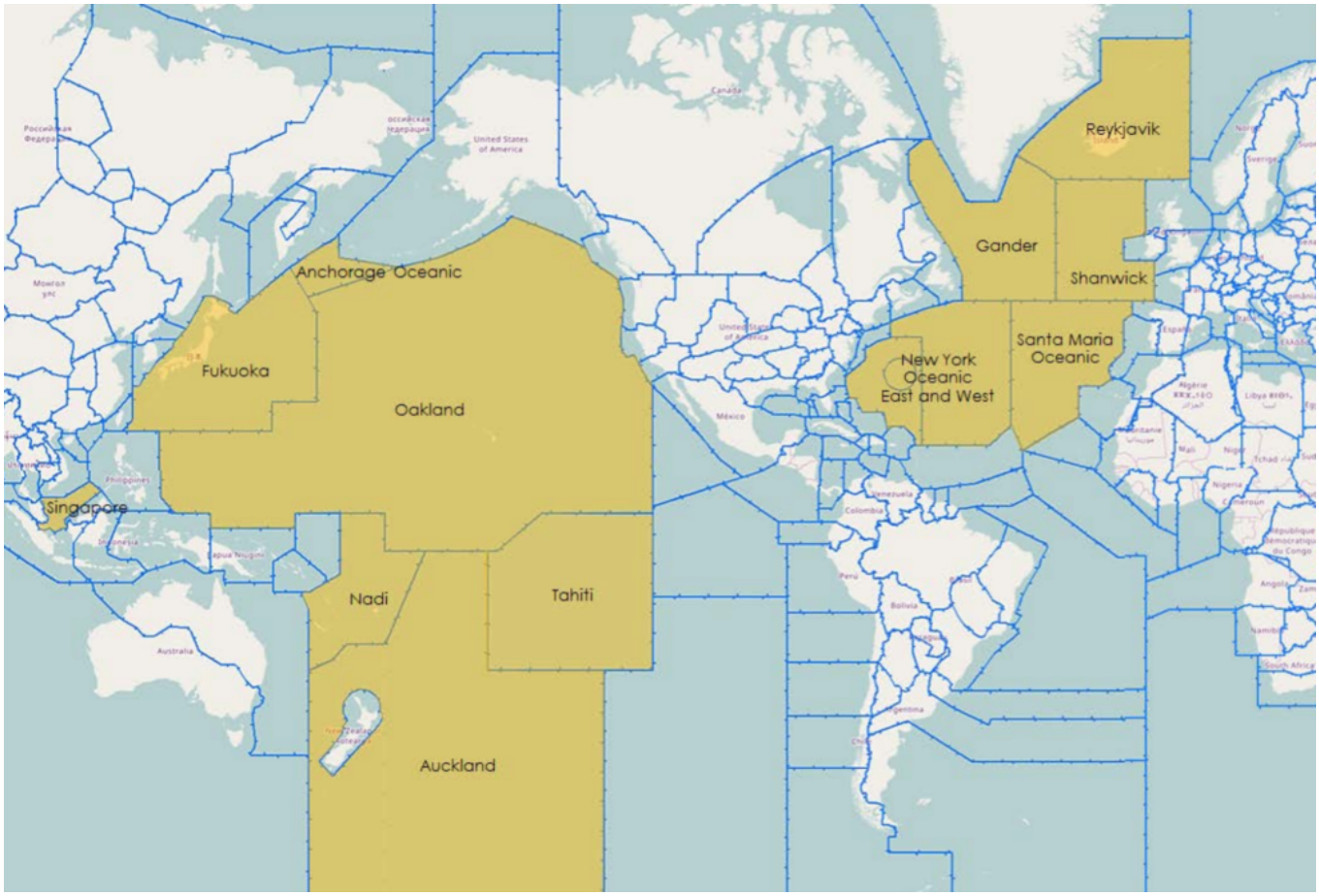
In this graphic you can see a high-level summary of who is responsible for what:

In accordance with the ICAO PBCS Provisions STATE RESPONSIBILTY	In accordance with State policies	
	ANSP RESPONSIBILTY	OPERATOR RESPONSIBILTY
❑ Establishes PBCS policies for ANSP, operator, airworthiness, etc. ❑ Prescribes RCP/RSP specifications in the applicable airspace for the relevant operations ❑ Publishes PBCS requirements in aeronautical information publication (AIP)	❑ Provides RCP/RSP-compliant services ❑ Recognizes RCP/RSP capabilities in air traffic control (ATC) automation ❑ Establishes PBCS monitoring program	❑ Files RCP/RSP capabilities in flight plan in accordance with State PBCS policy ❑ Participates in ANSP PBCS monitoring programs

Where is it in place?

Currently PBCS is in effect in one form or another in the following FIR's

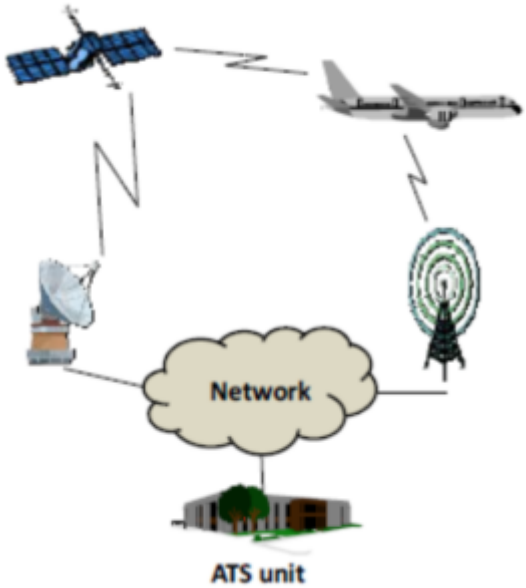
- NZZC/Auckland Oceanic
- NFFF/Nadi
- KZAK/Oakland Oceanic
- PAZN/Anchorage Oceanic
- WSJC/Singapore
- VCCF/Sri Lanka
- NTTT/Tahiti
- RJJJ/ Fukuoka
- KZNY/New York Oceanic
- CZQX/Gander
- EGGX/Shanwick
- BIRD/ Reykjavik
- LPPO/Santa Maria Oceanic



The Air Traffic Service providers of China, Brazil and Indonesia have also shown interest to introduce PBCS in the future.

Specifically, PBCS is being used between FL350 and 390 on certain “half” NAT tracks as we have written about before.

What do I need to do?



Requirements vary from state-to-state on the exact procedure for obtaining approval. It’s important to note that not all aircraft are automatically PBCS ready (refer to your aircraft manufacturer and your airplane flight manual).

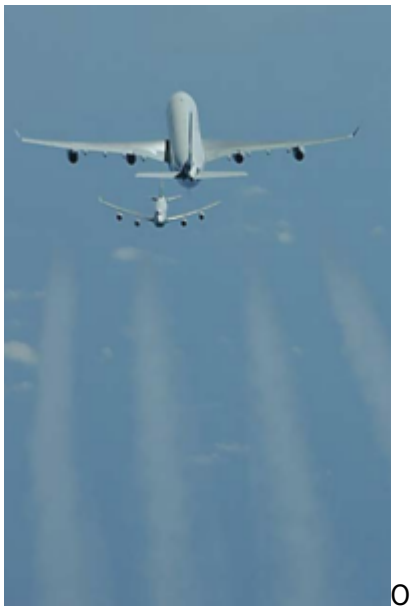
The FAA has outlined its approval process here and has a handy powerpoint document here.

An important element is to prove that you have signed the ***"PBCS Global Charter"*** which can be found at the FANS Central Reporting Agency (CRA) website.

When a PBCS authorization is obtained an operator is required to file both **P2** (indicating RCP240) in **item 10** and **SUR/RSP180** in **item 18** of the flight plan, in addition to the J codes for CPDLC and D1 or G1 for ADS-C in item 10.

The correct filing of these two codes will indicate to any ATM ground systems applying performance-based separation minima that the aircraft is eligible for these minima and that the crew have received the relevant training in order to safely operate using the reduced separations.

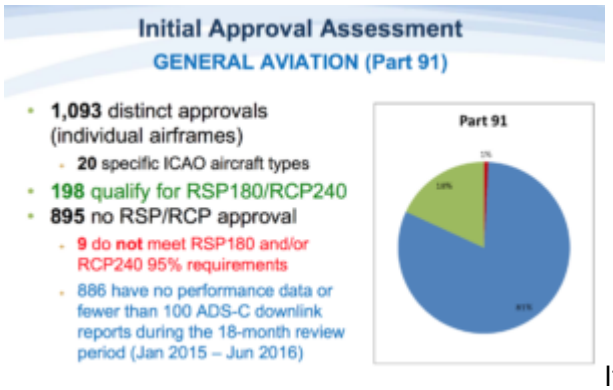
Will you notice that PBCS standards are being applied to your flight?



Ok this is the funny part of this story. The short answer, **probably not**.

While it may be easier for RCP240/RSP180 approved aircraft to obtain optimal flight profiles, especially during high traffic periods, and particularly for NAT flights using the OTS, the application of these standards is generally tactical in nature for ATC. An aircraft may not have performance-based separation applied at all on an individual flight, or possibly may never have had it applied to any of its flights. Even if a you have RCP240/RSP180 approvals, if the aircraft nearby does not also have the approvals, the separation standards cannot be applied!

What if I don't have RCP240 and RSP180 approval?



If you **do not have** RCP240/RSP180 approvals you will always have the **larger separations**, e.g. 10-min, applied, and **not be eligible** for the lower standards in cases where it may be beneficial.

The only airspace that has implemented tracks that will require PBCS to file is **in the NAT OTS**. There are still non-PBCS tracks in the OTS for which PBCS approvals are **not required**.

All other airspace in which performance-based separation minima are currently applied will allow aircraft with and without RCP240 and RSP180 approvals to enter and use the airspace in a mixed-mode operation.

Will I be penalized if I don't have it?

Probably not in the short term. In the future as more and more airspace corridors become PBCS only, then it is possible you may be subject to reroutes, delays or the requirement to fly outside of certain flight levels.

So, our conclusion?

PBCS is a great step forward in maximizing efficiency in a busier airspace environment thanks to the advent of better technology. If you fly the NATs often and have an aircraft capable of PBCS certification standards, then **yes – do it**! The approval process is not overly burdensome, and many modern transatlantic jets already meet most of the technical requirements.

Ultimately, reduced separation standards mean more great air-to-air views. So, pack your camera!

Did we miss something, or does something need more explaining? Let us know!

Extra Reading:

- The latest Nat Doc 007 North Atlantic Operations and Airspace Manual
- FAA-Performance-based Communication and Surveillance (PBCS) Monitoring
- FAA-PBCS FAQ
- FAA-PBCS: Operator Approvals
- FAA-Performance-based Communication and Surveillance (PBCS) Approvals and Monitoring
- FAA-PBCS Manual Doc 9869 Review
- ICAO-Operational Authorization Guide
- ICAO-PBS Overview
- NBAA -Revised Authorization Required for Performance-Based Comm, Surveillance Operations
- New Zealand -Performance Based Communication and Surveillance (PBCS) Implementation Plan