IFALPA
The Global Voice of Pilots

Safety Bulletin

18SAB04 **28 March 2018**

Performance Based Communications Surveillance (PBCS) in the North Atlantic Organized Track System

Effective March 29, 2018 the NAT OTS will publish PBCS tracks. (PBCS separation standards are being implemented worldwide.) PBCS replaces the existing RLatSM trials in the NAT OTS. By reducing the lateral and longitudinal separation standards, more aircraft will be able to benefit from the preferred core winds.

This provides Air Navigation Service Providers (ANSPs/aka ATC) the ability to publish up to nine tracks, with a half-degree of (lateral) separation and as little as 5 minutes in-trail separation (longitudinal), in the North Atlantic Organized Track System (NAT OTS).

By now your airline should have published training materials and Flight Operations Bulletins to international crew-members educating them of these new standards and procedures.

Please refer to your company's materials for more detailed information.

IFALPA would like to highlight the importance of a few items:

1- Review your company's Flight Operations Bulletins regarding operations in the NAT, particularly as it pertains to the use of half-degree tracks or waypoints, and the implementation of PBCS.

2- Pay close attention to strict adherence to Standard Operating Procedures (SOP) regarding re-clearances that involve a half-degree waypoint or track. Your company's NAT Oceanic Checklist should provide you with very specific procedures to mitigate the inherent risks of truncated Lat/Long waypoints in your FMC/FMS. Even the most seasoned flight crew can fall victim to display ambiguity.

3- Review CPDLC procedures and employ your company's SOP with focus on cockpit discipline. Understanding and properly complying with CPDLC clearances will help prevent Gross Navigational errors (GNEs).

4- Through your company's training materials you should be able to educate yourself regarding PBCS implementation. You should understand, among other things:

a) How to identify whether your aircraft is PBCS authorized,
b) The new separations standards laterally and longitudinally,
c) Any revised contingency procedures,
d) Monitoring of performance standards in compliance of PBCS,
e) What to do if you fail to meet PBCS requirements once on the OTS.

5- If your aircraft does NOT meet PBCS requirements, your Dispatcher should specify that in the OFP (Flight Plan).

6- PBCS airspace is from FL350 to FL390 (inclusive).

7- The most reduced separations standards are minimums available to ATC. This does not mean that all PBCS aircraft will be at these minimum standards.

8- PBCS aircraft will be paired in order to optimize the lowest separation standards.

9- NON-PBCS aircraft will not be cleared into PBCS airspace or on a PBCS track.

Attachments*:

NOTE: *The following ICAO Bulletins for the NAT are provided for your education and background. Your company will likely have detailed procedures for your specific aircraft and your specific navigation and communication equipment.*

These bulletins are reference material and do not supersede your company SOP.

*ICAO NAT OPS BULLETIN 2018-001-Rev.1 published March 2, 2018 and effective March 29, 2018. (*Implementation of PBCS Minima*)

*ICAO NAT OPS BULLETIN 2017-005 published December 7, 2017 (*Sample Oceanic Checklist*)

*ICAO NAT OPS BULLETIN 2017-002-Rev 1 published December 7, 2017 (*Oceanic Errors Safety Bulletin*)

The safe and efficient operation in the NAT is a team effort. Between air traffic controllers' and pilots' disciplined procedures, we can ensure the highest level of safety for all passengers.

NAT OPS BULLETIN

Serial Number: **2018_001**_Rev 01 **Issued: 02 March 2018**
Subject: **Implementation of Performance Based Separation Minima** **Effective: 29 March 2018**
Originator: **NAT SPG**

The purpose of this North Atlantic Operations Bulletin (NAT OPS) Bulletin is to provide guidance to North Atlantic (NAT) operators on material to be included in pilot and dispatcher training programs and operations manuals to prepare them for operations in the North Atlantic under performance based separation minima.

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Any queries about the content of the attached document should be addressed to:

ICAO EUR/NAT Office: icaoeurnat@paris.icao.int

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The NAT OPS Bulletin Checklist is available at www.icao.int/EURNAT/EUR & NAT Documents, NAT Documents, then NAT Ops Bulletins.

NAT OPERATIONS BULLETIN – PERFORMANCE BASED SEPARATION MINIMA

1. Purpose of Bulletin – Performance based separation minima. The purpose of this bulletin is to provide guidance to North Atlantic (NAT) operators on material to be included in pilot and dispatcher training programs and operations manuals to prepare them for operations in the NAT Region under performance based separation minima.

1.1 Any necessary updates will be distributed through industry organizations and posted on the ICAO EUR/NAT Website.

1.2 The following is an explanation of the terms "should", "must" and "shall" as used in this bulletin.

a) "Should" is used to indicate a recommended practice or policy that is considered as desirable for the safety of operations.

b) "Shall" and "must" are used to indicate a practice or policy that is considered necessary for the safety of operations.

2. Overview - Performance based separation minima. Performance based separation minima of 42.6km (23 NM) lateral, 5 minutes and 55.5km (30NM) / 93km (50 NM) longitudinal predicated on PBCS and PBN, in accordance with ICAO Doc 4444 Procedures for Air Navigation Services – Air Traffic Management (PANS-ATM) are planned for implementation in the ICAO NAT Region commencing 29 March 2018. Appropriate AIP/AIC publications will be issued by States in due time prior to commencement.

Application

a) The 55.5km (30NM) and 93km (50NM) longitudinal separation minima are between eligible aircraft pairs within the New York East and Santa Maria OCAs as published in their respective AIP.

b) The 5 minute longitudinal separation minimum is applied between eligible aircraft pairs within the Gander, Reykjavik, Santa Maria and Shanwick OCAs as published in their respective AIPs.

c) The 42.6km (23 NM) lateral separation minimum is applied between eligible aircraft pairs within the Gander, Reykjavik, Santa Maria, New York East (30 NM lateral applied) and Shanwick OCAs as published in their respective AIPs.

Note NAT Doc008 'Application of Separation Minima' Appendix A contains details of the separation minima applied in the North Atlantic Region.

Organized Track System (OTS)

a) The 42.6km (23 NM) lateral separation minimum is implemented by applying 42.6km (23 NM) lateral spacing through whole and half degrees of latitude between NAT Organized Track System (OTS) tracks between flight level (FL) 350-390 (inclusive), except when the OTS occurs in the New York East OCA.

b) OTS tracks spaced using 42.6km (23 NM) lateral separation minima at any point will be designated as *PBCS tracks* and will be uniquely identified in Remark 3 of the Track Message. See Section 4 (Flight Planning Provisions).

c) A *PBCS track* will either be:

- A whole degree *PBCS track* or
- A half degree *PBCS track* (e.g. 54 degrees-30 minutes NORTH latitude 20 degrees WEST longitude).

Note there will be no combination of whole and half degrees of latitude within any single OTS track.

d) A maximum of three PBCS tracks will be published until 28 March 2019 or the filing of PBCS designators reaches the 90% mark, whichever occurs first, This transition period will account for the possibility of low initial PBCS filing rates, and is intended to mitigate both the impact on controller workload and for operators awaiting State authorizations for RCP 240 and RSP 180.

3. Operator/Aircraft Eligibility. Operators should consult with the State authority responsible for their operation to obtain appropriate PBCS and PBN authorisations in order to be eligible for the performance based separation minima.

3.1 Eligibility for the provision of performance based minima is based on the following:

	Required Navigation Performance (RNP)		**FANS 1/A CPDLC ADS-C**	**RCP240**	**RSP180**
	10/4	**4**			
93km (50NM) longitudinal separation	✓		✓	✓	✓
55.5km (30NM) longitudinal separation		✓	✓	✓	✓
5 minute longitudinal separation	✓		✓	✓	✓
42.6km (23 NM) lateral separation		✓	✓	✓	✓

3.2 Operators are eligible to flight plan to operate on published *PBCS tracks* provided the flights are:

a) Authorised for Required Navigation Performance 4 (RNP 4);

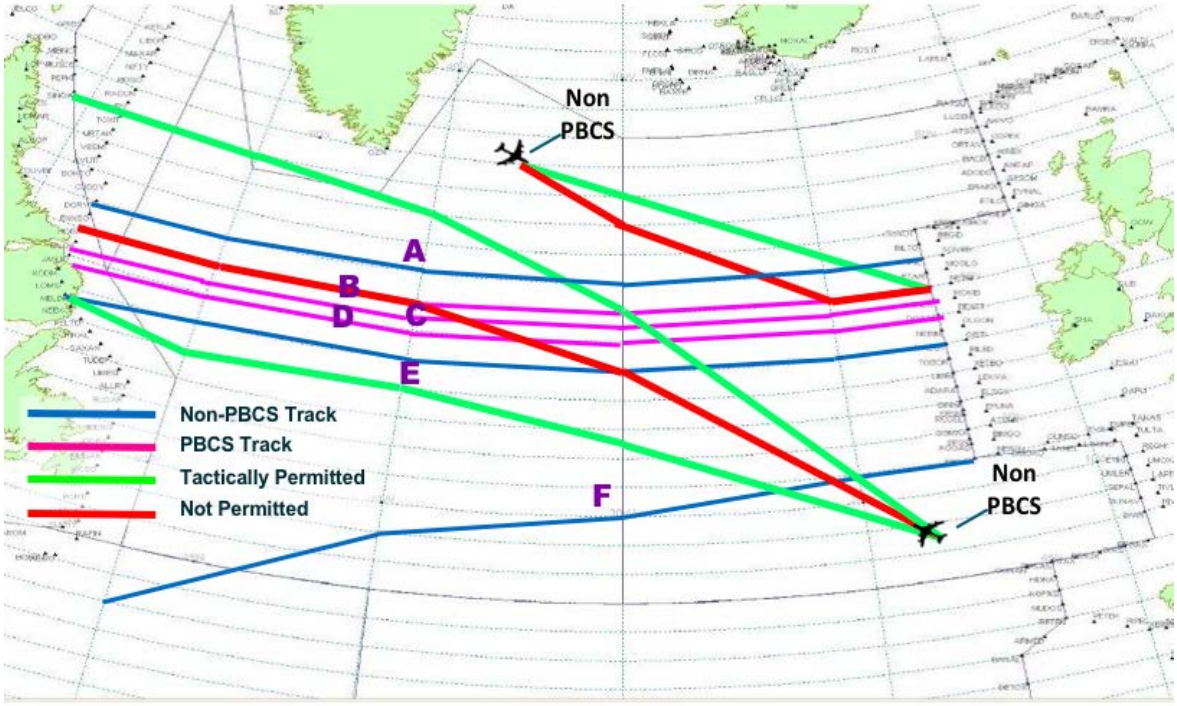
b) Fitted with and operating FANS 1/A CPDLC and ADS-C ; and

c) Authorized for RCP 240 and RSP 180.

3.3 Operators / aircraft not eligible for performance based separation may be permitted to;

- Infringe PBCS tracks at FL350 - FL390 (inclusive) at only one point (including Oceanic Entry / Exit Point) i.e. cross but not join an *OTS PBCS track*, and;
- Climb or descend through levels FL350 – FL390 on a *PBCS track* provided the climb or descent is continuous.

Note such clearances will only be permitted on a tactical basis.



3.4 In accordance with ICAO Annex 6, for operations where communication equipment is required to meet an RCP and RSP specification for PBCS, an aeroplane shall:

a) be provided with communication equipment which will enable it to operate in accordance with the prescribed RCP and RSP specification(s);

b) have information relevant to the aeroplane RCP and RSP specification capabilities listed in the flight manual or other aeroplane documentation approved by the State of Registry; and

c) have information relevant to the aeroplane RCP and RSP specification capabilities included in the Minimum Equipment List (MEL).

3.5 The State of the Operator shall, for operations where an RCP and RSP specification for PBCS has been prescribed, ensure that the operator has established and documented:

a) normal and abnormal procedures, including contingency procedures;

b) flight crew qualification and proficiency requirements, in accordance with appropriate RCP / RSP specifications;

c) a training programme for relevant personnel consistent with the intended operations; and

d) appropriate maintenance procedures to ensure continued airworthiness, in accordance with appropriate RCP and RSP specifications.

3.6 The State of the Operator shall also ensure that, in respect of the foregoing operations, adequate provisions exist for:

a) receiving the reports of observed communication performance issued by monitoring programmes established in accordance with Annex 11, Chapter 3, 3.3.5.2; and

b) taking immediate corrective action for individual aircraft, aircraft types or operators, identified in such reports as not complying with the RCP and RSP specification(s).

4. Flight Planning Provisions

4.1 Operators must file the correct ICAO Flight Plan annotations in Items 10 and 18 to indicate that required equipment and authorizations are available for the flight.

a) Item 10a (Radio communication, navigation and approach aid equipment and capabilities)

- Insert "J5" to indicate FANS 1/A Inmarsat CPDLC SATCOM and/or "J7" to indicate FANS 1/A CPDLC Iridium SATCOM data link equipage and operation;
- Insert "P2" to indicate RCP 240 authorisation;
- Insert "R" to indicate that aircraft navigation system equipage and operation meet Performance Based Navigation (PBN) levels specified in Item 18. See 4.1 c) below on the related Item 18 entry for RNP 4.

b) Item 10b (Surveillance equipment and capabilities)

- Insert "D1" to indicate FANS 1/A ADS-C equipage and operation.

c) Item 18 (Other information)

- Insert the characters "PBN/" followed by "L1" to indicate RNP 4 authorization.
- Insert the characters "SUR/" followed by "RSP180" with no spaces to indicate RSP 180 authorisation.

4.2 Only those operators/aircraft eligible for 42.6km (23 NM) operations are allowed to operate on *PBCS tracks* between FL 350-390 (inclusive). All *PBCS tracks* and flight levels are uniquely identified in "Remark 3" of the OTS Track Message as shown below:

Westbound NAT Track Message Example: PBCS Tracks

Note: See "Remark 3". Tracks B, C and D are designated as *PBCS tracks* between FL 350-390.

FF CYZZWNAT
102151 EGGXZOZX
(NAT-1/3 TRACKS FLS 310/390 INCLUSIVE
MAR 30/1130Z TO MAR30 1900Z
PART ONE OF THREE PARTS-
A PIKIL 57/20 58/30 59/40 58/50 DORYY
EAST LVLS NIL
WEST LVLS 310 320 330 340 350 360 370 380 390
EUR RTS WEST NIL
NAR NIL-
B ETARI 56/20 57/30 58/40 57/50 ENNSO
EAST LVLS NIL
WEST LVLS 310 320 330 340 350 360 370 380 390
EUR RTS WEST NIL
NAR NIL-
C RESNO 5530/20 5630/30 5730/40 5630/50 HOIST
EAST LVLS NIL
WEST LVLS 350 360 370 380 390
EUR RTS WEST NIL
NAR NIL-
END OF PART ONE OF THREE PARTS)
FF CYZZWNAT
102151 EGGXZOZX
(NAT-2/3 TRACKS FLS 310/390 INCLUSIVE
FEB 11/1130Z TO FEB 11/1900Z
PART TWO OF THREE PARTS-
D VENER 55/20 56/30 57/40 56/50 IRLOK
EAST LVLS NIL
WEST LVLS 310 320 330 340 350 360 370 380 390
EUR RTS WEST NIL
NAR NIL-
E DOGAL 54/20 55/30 56/40 55/50 JANJO
EAST LVLS NIL
WEST LVLS 310 320 330 340 350 360 370 380 390
EUR RTS WEST NIL
NAR NIL-
END OF PART TWO OF THREE PARTS)
FF CYZZWNAT
102152 EGGXZOZX
(NAT-3/3 TRACKS FLS 310/390 INCLUSIVE
MAR 30/1130Z TO MAR 301900Z
PART THREE OF THREE PARTS-
REMARKS.
1. TMI IS 089 AND OPERATORS ARE REMINDED TO INCLUDE THE
TMI NUMBER AS PART OF THE OCEANIC CLEARANCE READ BACK.
2. OPERATORS ARE REMINDED THAT ADS-C AND CPDLC IS MANDATED IN NAT AIRSPACE FL350 TO FL390.

3. PBCS OTS LEVELS 350-390. PBCS TRACKS AS FOLLOWS
TRACK B
TRACK C
TRACK D
END OF PBCS OTS**...**

5. PBCS monitoring data

5.1 Routine PBCS monitoring data can be accessed on DLMA Web portal or requested from the contact points as indicated in the AIPs:

5.2 This information can be used by operators and States in support of initial and ongoing PBCS authorisations.

5.3 PBCS monitoring data demonstrating non-conformity will be communicated in the initial period directly by the NAT ANSPs. The NAT Region is coordinating with the RMAs to implement a centralised mechanism for communicating non-conformity information. This Bulletin will be updated when the centralised system is implemented.

6. Websites

6.1 The ICAO EUR/NAT Office Website is at: **www.icao.int/eurnat**. Click on EUR & NAT Documents >> NAT Documents to obtain NAT Operations and NAT Region Update Bulletins and related project planning documents.

7. Contacts

7.1 The following individuals may be contacted for information or to provide feedback on PBCS operations:

a) icaoeurnat@paris.icao.int;

b) Iain BROWN Iain.BROWN@nats.co.uk.

- END –

NAT OPS BULLETIN

Serial Number: **2017-005**[1]
Subject: Sample Oceanic Checklist
Originator: NAT Safety Oversight Group

Issued: 07 December 2017
Effective: 07 December 2017

The purpose of North Atlantic Operations Bulletin 2017-005 is to promulgate the Sample Oceanic Checklist and the Sample Expanded Oceanic Checklist.

Any queries about the content of the attached document should be addressed to:

ICAO EUR/NAT Office: icaoeurnat@paris.icao.int

[1] *This NAT OPS Bulletin supersedes Serial Number: 2014-001.*

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The NAT OPS Bulletin Checklist is available at www.icao.int/EURNAT/, *EUR & NAT Documents*, *NAT Documents*, *then NAT Ops Bulletins*.

SAMPLE OCEANIC CHECKLIST as of 30 October 2017

Note: ICAO North Atlantic Working Groups composed of industry, ATC and state regulators have created this checklist **for reference only.** It is not intended to replace an operator's oceanic checklist. Operators should use an Oceanic Checklist as part of their Safety Management System. Operators without an oceanic checklist are encouraged to use this sample and tailor it to their specific needs and approvals. This checklist provides an orderly flow of tasks designed to assist in reducing oceanic errors. Operators should also review the **attached expanded checklist**. Headings in **BLUE** are hyperlinked to more detailed information in the expanded checklist. The Oceanic Errors Safety Bulletin (OESB) and the North Atlantic Operations and Airspace Manual (NAT Doc 007) should be used together with this checklist. The OESB and NAT Doc 007 can be found in the "NAT Documents" folder under the "EUR/NAT Documents" page at **https://www.icao.int/EURNAT/Pages/welcome.aspx**.

FLIGHT PLANNING

- Communication/Navigation/Surveillance (CNS) Flight Plan Codes and planning documents
  - Plotting/Orientation Chart – plot route coast out to coast in
- Equal Time Points (ETP) - plot
- EDTO (/ETOPS) – Complete analysis
- Track message (current copy available for all crossings)
  - Note nearest tracks on plotting chart
- Weather Analysis – Note enroute temperature and turbulence forecasts as well as divert airport weather
- Review possible navigation aids for accuracy check prior to coast out
  - Review contingency procedures and plans

PREFLIGHT

- Master Clock for all ETAs/ATAs
- Maintenance Log – check for any navigation/ communication/surveillance or RVSM issues
- RVSM Altimeter checks (tolerance)
- Operational Flight Plan (OFP) vs ATS Flight Plan (check routing, fuel load, times, groundspeeds)
- Dual Long Range NAV System (LRNS) for remote oceanic operations
- LRCS (HF, SATCOM) check (including SELCAL
- Confirm Present Position coordinates (best source)
- Master Document (symbols②, ✓, \, X)
- LRNS programming
  - Check currency and software version
  - Independently verify waypoint entries
  - Check expanded coordinates of all oceanic waypoints
  - Check course and distance (± 2˚ and ±2 NM)
  - Upload winds, if applicable
- Groundspeed check

TAXI AND PRIOR TO TAKE-OFF

- Groundspeed check
- Present Position check

CLIMB OUT

- Verify ETAs above FL180

PRIOR TO OCEANIC ENTRY

- If required, obtain oceanic clearance from appropriate agency. Verify and crosscheck independently. Confirm the ATC route clearance is properly programmed into LRNS
- Check expanded coordinates of all oceanic waypoints
- Confirm flight level, Mach and route for crossing
- If applicable, **request and receive clearance**, to comply with oceanic clearance (e.g., **higher FL**) **from domestic ATC**

  Note: Altitudes in oceanic clearances are **not** "when ready climb" instructions: coordinate with domestic ATC
- Ensure aircraft performance capabilities for maintaining assigned altitude/assigned Mach
- If clearance is not what was filed – update LRNS, OFP and plotting/ orientation chart, check course and distance for new route. Independently crosscheck and confirm new route
- Navigation Accuracy Check – record as applicable
- Confirm HF check, if not done during pre-flight
- Confirm SATCOM/SATVOICE is operational, as applicable
- Log on to CPDLC and ADS-C 10 to 25 minutes prior, if equipped
- Verify RNP value
- Altimeter checks – record readings
- Compass heading check – record

AFTER OCEANIC ENTRY

- Squawk 2000 – normally 30 minutes after entry, if applicable
- Maintain assigned Mach, if applicable
- VHF radios - set to air-to-air (123.45 MHz) and guard frequency (121.5 MHz)
- Strategic Lateral Offset Procedures (SLOP) – SOP fly centerline or 1NM or 2NM to the **right** of ATC cleared track; left offsets are **not** approved
- Altimeter checks - hourly
- Routine monitoring – assign tasks

APPROACHING WAYPOINTS

- Confirm latitude/longitude of next and subsequent points – expanded coordinates, using scratch pad of FMS if applicable

OVERHEAD WAYPOINTS

- Confirm aircraft transitions to next waypoint
  - Check track and distance against Master Document
- Confirm time to next waypoint

  Note: 3-minutes or more change requires ATC notification (NAT Region & voice reporting only)
- Position report – fuel

10-MINUTES AFTER WAYPOINT PASSAGE

- Record time and latitude/longitude on plotting/orientation chart – non steering LRNS

  - or -
- Use "nav display method" (FMS aircraft only, smallest scale)

MID POINT

- Midway between waypoints compare winds from OFP, LRNS and upper millibar wind charts
- Confirm ETA

COAST IN

- Compare ground based NAVAID to LRNS
- Remove SLOP offset prior to oceanic exit point
- Confirm routing beyond oceanic airspace

DESTINATION/BLOCK IN

- Navigation Accuracy Check
- RVSM write-ups

SAMPLE EXPANDED OCEANIC CHECKLIST as of 6 October 2017

Note: ICAO North Atlantic Working Groups composed of industry, ATC and state regulators have created this checklist **for reference only**. It is not intended to replace an operator's oceanic checklist. Operators should use an Oceanic Checklist as part of their Safety Management System. Operators without an oceanic checklist are encouraged to use this sample and tailor it to their specific needs and approvals. This checklist provides an orderly flow of tasks designed to assist in reducing oceanic errors. The Oceanic Errors Safety Bulletin (OESB) and the North Atlantic Operations and Airspace Manual (NAT Doc 007) should be used together with this checklist. The OESB and NAT Doc 007 can be found in the "NAT Documents" folder under the "EUR/NAT Documents" page at **https://www.icao.int/EURNAT/Pages/welcome.aspx**.

FLIGHT PLANNING

- Communication/Navigation/Surveillance (CNS) flight plan codes and planning documents

Review the ATS flight plan with emphasis on items 10A and B and Item 18. Ensure that the appropriate CNS and Performance-based Navigation codes are properly filed in field 10 and 18 of the flight plan. Each aircraft's MEL should be reviewed for system deferrals that may affect the CNS capabilities of the aircraft. The remarks and exceptions column should provide the specific guidance for flight plan filing. The operator's manual system should be updated if necessary to require flight plan amendments when CNS capabilities are changed during the preflight planning phase prior to departure. The manual should contain procedures for flight plan amendments and cancellations as appropriate.

- Oceanic documents

Operators are encouraged to develop a flight planning checklist, specific to the aircraft/ fleet, to ensure they have the necessary documents before departure. The checklist should include, but is not limited to, the following:

- ❖ Master Document (i.e., master operational flight plan)
- ❖ NOTAMs for departure, destination, alternate(s), Extended Diversion Time Operations (EDTO) alternates (as applicable) and oceanic FIRs
- ❖ Weather for departure, destination, alternate(s), EDTO alternates (as applicable)
- ❖ Track Message(s)
- ❖ SIG WX Chart
- ❖ ETP(s) Wind Tables or Millibar Charts for flight levels or altitudes
- ❖ GPS NOTAMs (as applicable)
- ❖ Volcanic Ash Information
- ❖ PIREPs
- ❖ Plotting/Orientation Charts
- ❖ AIREP Form (as applicable) for position report

***NOTE**: Items 10 and 18 of the ICAO Flight plan require more detail to indicate the operator's communication/navigation/surveillance capabilities and authorizations. These additional codes are necessary to meet performance based requirements and are noted in the ICAO PANS ATM (Doc 4444).*

- Plotting/Orientation chart

A plotting/orientation chart of appropriate scale should be used for oceanic operations. This includes using a plotting/orientation chart for published oceanic routes and tracks. ICAO groups who review oceanic errors have determined that the routine use of a plotting/orientation chart is an excellent aid to reduce lateral errors. A chart can also serve as a critical aid in case of partial or total navigation failure. It should be noted that the pilot should read from the chart back to the Master Document when verifying data. To read from the Master Document to the chart has led to errors based on "seeing what we expect to see" (expectation bias). Plot your *currently effective route clearance* from coast out to coast in. Be sure to update this whenever your route clearance changes.

- Equal Time Point (ETP)

ETPs should be computed for contingencies such as medical divert, engine loss or rapid depressurization. Performance with a simultaneous engine loss and rapid depressurization should also be calculated. It is advisable to note the ETPs on the plotting/orientation chart. Crewmembers should review with each other the appropriate diversion airport(s) when crossing ETPs. Pilot procedures should also include a manual method for computing ETPs. Crews should not enter

ETPs in the active route of the Long Range Navigation System (LRNS) as this could create spurious out-of-conformance alerts on ground-based monitoring systems, and could create confusion in the event of a revised route clearance.

- Extended Diversion Time Operations (EDTO) [see also Extended Twin Operations (ETOPS)]

Complete EDTO analysis. Verify EDTO alternates meet the appropriate limitations (120, 180, etc.). Identify EDTO entry and exit points.

- Contingency procedures and plans

Operators and flight crews should ensure they have the airspace-specific contingency procedures (for weather deviations and in-flight contingencies) as well as consider plans if any enroute diversion is required.

NOTE: Crews should make diligent attempts to comply with ATC clearances. If a given contingency requires deviation from the current clearance, timely and effective coordination can help reestablish a new ATC clearance for the changed flight profile.

- Track message

Crews shall[2] have a current track message even if filed for a random route or filed above North Atlantic High Level Airspace. Reviewing the date, effective Zulu time and Track Message Identifier (TMI) ensures having a current track message on board. The TMI is linked to the Julian Date. Operators must also ensure that their flight planning and operational control process notify crewmembers in a timely manner of any amendments to the daily track message. Plotting adjacent tracks and/or crossing tracks whilst on a random route can help situational awareness in case the crew needs to execute a contingency procedure.

- Weather analysis

Crews must note enroute temperature and turbulence forecasts as well as diversion/emergency airport weather, volcanic activity, magnetic storms, and solar flares affecting the route of flight.

- Review possible navigation aids for accuracy check prior to coast out

It is good practice to discuss in advance a primary and secondary ground based navigational aid that will be used to verify the accuracy of the LRNS. This planning may help to identify intended navigation aids that are limited or NOTAMed unusable and is helpful when departing airports close to oceanic airspace. Examples include Shannon (EINN), Lisbon (LPPT), Boston (KBOS), etc.

PREFLIGHT

- Master clock

It is a requirement to have a master clock on board synchronized to UTC or GPS. This time source, which is typically the Flight Management System (FMS), must be used for all ETAs and ATAs. The use of multiple time sources on the aircraft has led to inconsistencies in reporting times to ATC and resulted in a loss of longitudinal separation.

- Maintenance log

Before entering a special area of operation, crews should focus on any write-ups that affect communication, navigation, surveillance, EDTO, or RVSM requirements. Any discrepancies noted in the maintenance log or during the walk-around may require delays or rerouting.

- RVSM

Required equipment includes two primary independent altimetry sources, one altitude alert system and one automatic altitude control system. In most cases a functioning transponder that can be linked to the primary altimetry source is also required. Crews should note any issues that can affect accurate altimetry.

- Altimeter checks

Before taxi, crews should set their altimeters to the airport QNH. Both primary altimeters must agree within ± 75 feet of field elevation. The two primary altimeters must also agree within the limits noted in the aircraft operating manual.

[2] *Regional Supplementary Procedures* (Doc 7030) – NAT 6.4.1.2

- Wind shear or turbulence forecast

The Master Document with projected wind shear or the turbulence forecast documents for flights in RVSM airspace. Forecast severe turbulence could lead to RVSM suspension. Operators are cautioned against flight planning through areas of forecast greater than moderate turbulence.

- Flight plan

The document designated as the Master Document should be carefully checked for date, type aircraft, fuel load and performance requirements. Crosschecks should also be done for routing and forecast groundspeeds. The Master Document should be carefully checked against the filed flight plan to ensure the routing is in agreement with both documents. The enroute time on the Master Document should be compared against the distance to destination for a reasonable groundspeed. The enroute time should also be compared against the total distance for a reasonable fuel load.

- Dual Long Range NAV System (LRNS)

Two operational LRNSs are required for remote oceanic operations. A single FMS receiving inputs from two navigation sensors is not considered to be two LRNSs.

- Long Range Communication Systems (LRCS)
  - ❖ High Frequency (HF) Radio. An HF check should be conducted on the primary and secondary HF radios in areas where dual HF radios are required. If possible, the HF checks should be done on the ground or before entering oceanic airspace. A SELCAL check should also be accomplished at each Oceanic Control Area (OCA) boundary even if datalink equipped.
  - ❖ SATCOM/ SATVOICE. Ensure SATCOM pre-flight complete to comply with FANS/CPDLC requirements.

- Confirm Present Position coordinates

Both pilots should independently verify the Present Position coordinates using either published ramp coordinates or determine position from the airfield diagram. They should not rely solely on the Present Position when the LRNS was shut down from the previous flight. A master source such as an enroute chart should also be used to confirm accuracy of coordinates at the oceanic boundaries.

- Master Document symbols

Operators are encouraged to use consistent symbols on the Master Document. For example, a circled number (②) means the second crewmember has independently verified the coordinates entered or crosschecked by the first crewmember. A checkmark (✓) may indicate that the track and distances have been confirmed. A diagonal line (\ ) may indicate that the crew has confirmed the coordinates of the approaching and next waypoint. An X-symbol (X) may indicate having flown overhead the waypoint.

- LRNS programming
  - ❖ Check currency and software version

    It is important to check the effective date of the database. Crews should note if the database is projected to expire during their trip. Crews are discouraged from flying with expired databases. MELs may allow relief to fly with an expired database but require the crews to manually crosscheck all data. The software version of the database should also be confirmed in case there has been a change.

  - ❖ Independently verify waypoint entries

    It is critical that one crewmember enters waypoint coordinates and that these are independently checked by another crewmember. It should be noted that the pilot should read from the FMS back to the Master Document when verifying data. Reading from the Master Document to the FMS has led to errors based on “seeing what we expect to see” (expectation bias). Both the pilot loading and the pilot verifying the waypoint coordinates should use an independent means, such as checking the course and distance between waypoints against the Master Document, to verify the accuracy of the route loading.

  - ❖ Check expanded coordinates of waypoints

    Most FMSs allow entering abbreviated oceanic coordinates. There have been cases when there was an error in the expanded waypoint coordinate, but crews only checked the abbreviated coordinate. Verifying only the abbreviated coordinate could lead to a lateral error. In a reduced separation environment, it’s imperative that crews check the expanded coordinates of all oceanic waypoints. Flight crews should conduct a magnetic course and distance check between waypoints to further verify waypoint coordinates.

- ❖ Check course and distance

  To minimize oceanic errors, it is important to conduct a magnetic course and distance check from oceanic entry to oceanic exit. Operators should establish a tolerance such as ± 2˚ and ± 2NM. The course and distance check comparing the Master Document against the LRNS are critical in detecting errors that may not have been noticed by simply checking coordinates. A difference of more than 2˚ between waypoints may be due to a difference of the magnetic variation in the database versus the variation used in the Master Document. Any difference outside the ± 2˚ or ± 2NM should be rechecked and verified.

- ❖ Upload winds

  LRNS units generally allow the crew to upload projected winds. This procedure allows more accurate reporting of ETAs.

- Groundspeed check

The groundspeed should be noted before taxiing the aircraft. Crews should expect the groundspeed to read zero (0) knots. This procedure is a good practice to detect an error that may be developing in the LRNS.

TAXI AND PRIOR TO TAKE-OFF

- Groundspeed check

During taxi to the active runway, pilots should check the groundspeed to see if it is reasonable.

- Present Position check

This Present Position check is conducted after leaving the gate. Check for gross difference between this Present Position and the gate coordinates. This check will alert the crew to possible error in the navigation database that can be investigated/corrected prior to take-off.

CLIMB OUT

- Verify ETAs

After climbing above the sterile altitude and time permitting crews should verify ETAs from departure to destination. These should be noted on the Master Document. This is an excellent crosscheck against ETAs computed by the LRNS.

PRIOR TO OCEANIC ENTRY

- Obtain oceanic clearance

Both pilots must obtain the oceanic clearance from the appropriate clearance delivery. (Clearance via voice should be obtained at least 40 minutes prior to oceanic entry and via data link 30 to 90 minutes prior to oceanic entry). Oceanic clearances from Reykjavik centre shall be obtained 15-45 minutes prior to oceanic entry. The pilots should confirm among themselves the assigned routing, flight level and Mach number. Contact the ATS provider for clarification in the event of differences. Read back all waypoint coordinates to the ATS provider, and ensure a correct read-back is acknowledged. Verify the route clearance is properly loaded into the navigation system. It is important that both pilots confirm and ensure the aircraft enters the ocean at the altitude assigned in the oceanic clearance. The flight level in the oceanic clearance may be different than the domestic cleared flight level. If it is different, **crews should request a climb (or descent) from domestic ATC to comply with the oceanic clearance**. Crews should include their requested flight level in their initial oceanic clearance request, and the highest acceptable level which can be attained at the oceanic entry point. Crews should be confident that they are able to maintain requested flight levels based on aircraft performance capabilities.

***NOTE**: Altitudes in oceanic clearances are not "when ready climb" instructions and need to be coordinated with domestic ATC.*

- Navigation Accuracy Check

Before oceanic entry, the accuracy of the LRNS should be checked against a ground-based NAVAID. The results of the accuracy check should be recorded with the time and position. A large difference between the ground-based NAVAID and the LRNS may require immediate corrective action. Operators should establish a navigation accuracy check tolerance based on the type LRNS. It is not advisable for crews to attempt to correct an error by doing an air alignment or by manually updating the LRNS since this has often contributed to a Gross Navigation Error. A latitude/longitude radar fix from ATC can also support a navigation accuracy check in lieu of a NAVAID. Select the most accurate navigation system for auto-coupling as appropriate.

- HF checks

If the crew was unable to accomplish the HF and SELCAL checks on the ground, these checks should be accomplished before oceanic entry. Additional SELCAL checks should be conducted at each control area boundary, regardless whether CPDLC is working normally.

- SATCOM data communication

Flight crews should check that SATCOM data link is operational, if applicable, before oceanic entry if SATCOM data link is planned on being used.

- Log on to CPDLC or ADS-C

Operators approved to use Controller Pilot Data Link Communications (CPDLC) and/or Automatic Dependent Surveillance Contract (ADS-C) should log on to the appropriate FIR 10 to 25 minutes prior to the boundary.

- Verify RNP value.

Pilots should verify that the RNP value set in the FMS is at least as stringent as that required for the route of flight and reflects the RNP capability indicated in the filed ATS flight plan.

- Revised clearance

A re-clearance (that is different from the oceanic route requested with the filed flight plan) is the number one scenario which leads to a Gross Navigation Error. Crews must be particularly cautious when receiving a re-clearance. Both pilots should receive and confirm the new routing and conduct independent crosschecks after the LRNS, Master Document and plotting/orientation chart are updated. Ensure the expanded coordinates for new waypoints are checked and confirmed. It is critical that crews check the magnetic course and distance between the new waypoints as noted in PREFLIGHT under the paragraph "LRNS Programming." Brief all relief pilots on the new clearance prior to them assuming cockpit duties. It is also good practice for relief pilots to independently check the currently effective route clearance against the flight management computer, Master Document and chart.

NOTE: If *the oceanic clearance differs from the flight planned/filed route, the new oceanic clearance must be activated in the FMS/LRNS for the entire length of the oceanic crossing, prior to responding to a "CONFIRM ASSIGNED ROUTE" CPDLC message, which is typically sent shortly after passing the oceanic entry point.*

NOTE*: Track and distance tables are available commercially for every ten degrees of longitude.*

- Altimeter checks

Crews are required to check the two primary altimeters which must be within 200 ft of each other. This check is conducted while at level flight. The stand-by altimeter should also be noted. The altimeter readings should be recorded along with the time.

- Compass heading check (Inertial Navigation Systems)

It is recommended to conduct a compass heading check and record the results when inertial systems are the only means of long range navigation. The check can also aid in determining the most accurate compass if a problem develops over water.

AFTER OCEANIC ENTRY

- Squawk 2000

Normally, thirty minutes after oceanic entry crews should squawk 2000, if applicable. There are some regional differences—for details, see the relevant AIP and/or NAT Doc 007.

- Maintain assigned Mach

Most oceanic clearances include a specific Mach. The increased emphasis on longitudinal separation requires crew vigilance in a separation based on assigned Mach. The requirement is to maintain the true Mach which has been assigned by ATC.

NOTE*: Crews must ensure they fly the assigned fixed Mach (not "COST INDEX," or "LONG RANGE CRUISE" modes, which are variable Mach profiles).*

- VHF radios

After going beyond the range of the assigned VHF frequency, crews should set their radios to air-to-air (123.45) and guard frequency (121.5).

- Strategic Lateral Offset Procedures (SLOP)

The SLOP should be Standard Operating Procedure for all oceanic crossings. This procedure was developed to reduce the risk from highly accurate navigation systems or operational errors involving the ATC clearance. SLOP also replaced the contingency procedure developed for aircraft encountering wake turbulence. Depending upon winds aloft, coordination between aircraft to avoid wake turbulence may be necessary. This procedure, which distributes traffic between flying centerline, 1 NM or 2 NM right of centerline, greatly reduces collision risk in the airspace by virtue of the randomness, which operators ensure by diligent application of SLOP. Operators that have an automatic offset capability should fly up to 2 NM right of the centerline. Aircraft that do not have an automatic offset capability (that can be programmed in the LRNS) should fly the centerline only. Left offsets are **not authorized.**

***NOTE**: Crews should make sure the "TO" waypoint is correct after entering SLOP. With some avionics, when executing an offset near the active "TO" waypoint, the FMS can sequence to the "next + 1" waypoint—skipping a point. Some GNEs have resulted.*

- Hourly altimeter checks

Crews are required to observe the primary and stand-by altimeters each hour. It is recommended that these hourly checks be recorded with the readings and times. This documentation can aid crews in determining the most accurate altimeter if an altimetry problem develops.

- Routine monitoring

Specify which FMS pages, or other appropriate displays of the navigation system are assigned to specific flight crew for monitoring (e.g. cross-track error or time/distance). The non-steering navigation system should be used to display cross-track error and track angle error, if available. If the FMS provides a predicted ETA capability, pilots should take advantage of that function in order to track the accuracy of ETAs and provide reminders for performing the "approaching waypoint" and "10 minute after" procedures. Ensure there is an active CPDLC connection with the proper current data authority.

APPROACHING WAYPOINTS

- Confirm next latitude/longitude

Within a few minutes of crossing an oceanic waypoint crews should crosscheck the coordinates of the next and subsequent ("next + 1") oceanic waypoints. This check should be done by comparing the expanded coordinates against the Master Document based on the currently effective ATC clearance. Verify the course/heading and distance in the FMS to the next waypoint matches the Master Document. Confirm autopilot steering is engaged in the proper mode.

OVERHEAD WAYPOINTS

- Confirm aircraft transitions to next waypoint

When overhead an oceanic waypoint, crews should ensure that the aircraft transitions to the next leg. This is confirmed by noting the magnetic heading and distance to the next waypoint compared against the Master Document (as updated based on the currently effective route clearance).

- Confirm time to next waypoint

Crews must be vigilant in passing an accurate ETA to ATC for the next waypoint. When transmitting waypoint position reports via voice, a change of three (3) minutes or more (for the NAT Region) requires that ATC be notified in a timely manner. Inaccurate position reports adversely affect ATC's ability to safely separate aircraft.

- Position report

After passing over the oceanic waypoint, crews that give a position report to ATC must use the standard format. Crews should also note and record their fuel status at each oceanic waypoint. This is especially important if the cleared route and flight level differ significantly from the filed flight plan.

10-MINUTES AFTER WAYPOINT PASSAGE

- Cross-check navigational performance and course compliance

Plot the latitude/longitude on the chart being used to track flight progress. Confirm the chart. It is advisable to plot the non-steering LRNS. A 10-minute plot can alert the crew to any lateral deviation from their ATC clearance prior to it becoming a Gross Navigation Error. A good crosscheck for the position of the 10-minute plot is that it is approximately 2˚ of longitude past the oceanic waypoint.

In FMS-equipped aircraft the flight crew may, alternatively, use the "nav display" method of navigation cross-checking, as described here: confirm the aircraft symbol is ON the programmed route on the navigation display (at smallest scale). Check system-generated cross-track deviation or similar indication to confirm there is NO deviation from the programmed route of flight (e.g, XTRK is 0.0NM). Using the steering LRNS, verify the "TO" waypoint is consistent with the currently effective route clearance. Investigate/take corrective action to address ANY anomalies or unexpected deviations. Verify the autopilot is in the desired steering mode.

Other methods of navigation cross-checking may be used subject to State aviation authority approval.

MIDWAY BETWEEN WAYPOINTS

- Cross-check winds

It is good practice to crosscheck winds midway between oceanic waypoints by comparing the Master Document, LRNS and upper millibar wind chart. This crosscheck will also aid crews in case there is a need for a contingency procedure such as dead reckoning (DR).

- Confirm ETA

It is recommended that during a wind check the crews also confirm the ETA to the next waypoint. When transmitting waypoint position reports via voice, a change of three (3) minutes or more requires that ATC be notified in a timely manner.

COAST IN

- Compare ground based NAVAID to LRNS

When departing oceanic airspace and acquiring ground based NAVAIDs, crews should note the accuracy of the LRNS by comparing it to those NAVAIDs. Any discrepancy should be noted in the maintenance log.

- Remove Strategic Lateral Offset

Any lateral offset used during the oceanic crossing must be removed prior to exiting oceanic airspace. It is advisable to include this as a checklist item.

- Confirm routing beyond oceanic airspace

Before entering the domestic route structure, crews must confirm their routing to include aircraft speed assignment.

NOTE*: Crews experiencing loss of communications leaving oceanic airspace should follow State guidance as published in AIPs.*

DESTINATION/BLOCK IN

- Navigation accuracy check

When arriving at the destination gate, crews should note any drift or circular error in the LRNS. A GPS Primary Means system normally should not exceed 0.27 NM for the flight. Some inertial systems may drift as much as 2 NM per hour. Because the present generation of LRNSs is highly accurate, operators should establish a drift tolerance which if exceeded would require a write-up in the Maintenance Log. RNP requirements demand that drift be closely monitored.

- RVSM write-ups

Problems noted in the altimetry system, altitude alert or altitude hold must be noted in the maintenance log.

- END -

NAT OPS BULLETIN

Serial Number: **2017-002_Revision 01**[1]
Subject: OESB – Oceanic Errors
Originator: NAT SOG

Issued: 07 December 2017
Effective: 07 December 2017

The purpose of North Atlantic Operations Bulletin **2017-002_Revision 01** is to promulgate the Oceanic Errors Safety Bulletin (OESB).

Any queries about the content of the attached document should be addressed to:
ICAO EUR/NAT Office: icaoeurnat@paris.icao.int

[1] *This NAT OPS Bulletin supersedes Serial Number: 2017-002.*

NOTICE

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This OESB is intended for distribution to industry and training centers. The OESB will also be posted on various websites to enable broad distribution and rapid updates. In addition, the OESB should be used in conjunction with the guidance detailed in the current edition of North Atlantic Operations and Airspace Manual (NAT Doc 007). This manual can be found at http://www.icao.int/EURNAT/Pages/welcome.aspx under: "EUR & NAT Documents >NAT Documents > NAT Doc 007." Operators should consult http://www.icao.int/EURNAT/Pages/welcome.aspx for the most current version of the OESB under "EUR & NAT Documents > NAT Documents > NAT OPS Bulletins." A ***sample oceanic checklist*** *has been developed using many of the recommendations found in this OESB and can be downloaded via the same links. The OESB is promulgated by the NAT Safety Oversight Group (NAT SOG). Questions or comments regarding this Bulletin may be directed to The European and North Atlantic Office of ICAO: icaoeurnat@paris.icao.int.*

The NAT OPS Bulletin Checklist is available at www.icao.int/EURNAT/EUR & NAT Documents, NAT Documents, then NAT Ops Bulletins.

Safety Snapshot

The OESB is intended to help air operators transiting North Atlantic oceanic airspace avoid making commonly observed operational errors. These include **Gross Navigation Errors** (lateral deviations of 10 NM or more in the North Atlantic, previously 25 NM or more), **Large Height Deviations** (300 feet or more) and **Erosion of Longitudinal Separation**. Repeated errors present a recurring hazard and pose a threat not only to overall flight safety but also planned reductions in separation. The following recommendations, resources, and tips may be useful in preventing these errors and should be addressed in initial and recurrent ground training. Additional recommendations address General considerations when operating in the North Atlantic, Flight Planning, and SLOP.

	Vertical	Lateral	Longitudinal
Focus Areas	Conditional Clearances	Route Amendments	CPDLC
Quick Links	NAT Doc 007, OESB LHD para. 1	Sample Oceanic Checklist, OESB GNE para. 3	GOLD, OESB CPDLC

Top Tips for Operators
➢ Crews should be familiar with CPDLC messages, to include how to "LOAD," "ACCEPT/WILCO" and "EXECUTE/INSERT" route clearance uplinks, and how to respond to "CONFIRM ASSIGNED ROUTE" messages.
➢ With conditional climb and descent clearances, if the instruction starts with "Maintain FL XX," the condition follows. Also, be sure to understand the meaning of "AT" and "BY".
➢ Coordinate with ATC early for weather deviations to reduce the need to execute published weather deviation procedure.
➢ Carefully manage the Master Document, especially when there is a route amendment. Many errors involve flying the operator-filed route, rather than the ATC-cleared route.
➢ Ensure all flight crew members are briefed on details of route amendments.

LARGE HEIGHT DEVIATIONS

1. Conditional clearances, especially climb clearances with delayed execution, are associated with a disproportionately high error rate. 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 UTC time or a specific geographic position. The following is an example of a conditional clearance given to a crew:

   Maintain FL330. After passing 20W climb to FL350. Cross 25W level. Report leaving. Report reaching.
   NOTE *– in this example, FL330 is the present FL.*

   The main part of this clearance is that after 20W the aircraft starts the climb and is maintaining the cleared level prior to 25W.

2. In oceanic, non-surveillance airspace, crews must report to ATC when vacating any previously assigned altitude or flight level and when reaching the newly assigned altitude or a flight level (for CPDLC aircraft, these reports are only required when ATC uplinks "REPORT LEAVING" or "REPORT REACHING").

3. Each flight level change must be specifically approved by ATC. A filed flight plan with a requested change in flight level (step climb) is not a clearance to initiate the change in altitude.

4. The phrases "expect FLxx" or "are you able FLxx" are NOT clearances. Correct phraseology for clearances is: "ATC clears…."

5. Crews must know when a climb or descent should be initiated or completed. Conditional clearances usually use the prepositions "by" or "at."

   5.1 "BY" means:

   5.1.1. "Before passing" when referring to a position, or
   5.1.2. "Not later than" when referring to a **time**.

   5.2 "AT" means:

   5.2.1. "After passing" when referring to a **position**, or
   5.2.2. "Not before" when referring to a **time**.

   NOTE: *The following are examples of conditions or restrictions given to crews when the terms AT or BY are used in a conditional clearance.*

EXAMPLES: Restriction	What is Expected
VOICE CLIMB TO REACH FLIGHT LEVEL 390 AT OR BEFORE 1325 REPORT LEAVING REPORT REACHING **CPDLC** CLIMB TO REACH FL390 BY 1325 REPORT LEVEL FL390	**Arrange the climb so that the aircraft is at FL390 at or before 1325 UTC.** If it will not be possible to be level at FL390 at or before 1325 UTC, then: **VOICE:** Do not commence climb and advise ATC "unable" with a short explanation. **CPDLC:** Do not select "ACCEPT/ WILCO." Select "REJECT /UNABLE" and do not climb.
VOICE DESCEND TO REACH FLIGHT LEVEL 320 BEFORE PASSING 63 NORTH 030 WEST REPORT LEAVING REPORT REACHING **CPDLC** DESCEND TO REACH FL320 BY 63N030W REPORT LEVEL FL320	**Arrange the descent so that the aircraft is at FL320 before it crosses 63 North 30 West.** If it will not be possible to be level before crossing 63 North 30 West, then: **VOICE:** Do not commence descent and advise ATC "unable" with a short explanation. **CPDLC:** Do not select "ACCEPT/ WILCO." Select "REJECT/ UNABLE" and do not descend.

EXAMPLES: Restriction	What is Expected
(In this example the aircraft is initially at FL350) **VOICE** AT OR AFTER TIME 1403 DESCEND TO AND MAINTAIN FLIGHT LEVEL 330 REPORT LEAVING REPORT REACHING **CPDLC** MAINTAIN FL350 AT 1403 DESCEND TO AND MAINTAIN FL330 REPORT LEVEL FL330	**The aircraft shall maintain FL350 until time 1403 UTC. At or after time 1403 UTC a descent to FL330 is to commence and once reached, FL330 is to be maintained.** If it will not be possible to meet this restriction, then: **VOICE:** Do not commence descent and advise ATC "unable" with a short explanation. **CPDLC:** Do not select "ACCEPT/ WILCO." Select "REJECT/ UNABLE" and do not descend.
(In this example the aircraft is initially at FL350) **VOICE** AFTER PASSING 58 NORTH 040 WEST CLIMB TO AND MAINTAIN FLIGHT LEVEL 360 REPORT LEAVING REPORT REACHING **CPDLC** MAINTAIN FL350 AT 58N040W CLIMB TO AND MAINTAIN FL360 REPORT LEVEL FL360	**The aircraft shall maintain FL350 until passing 58N040W. After passing 58N040W a climb to FL360 is to commence and once reached, FL360 is to be maintained.** If it will not be possible to meet this restriction, then: **VOICE:** Do not commence a climb and advise ATC "unable" with a short explanation. **CPDLC:** Do not select "ACCEPT/ WILCO." Select "REJECT/ UNABLE" and do not climb.

6. Crews must be diligent in reviewing performance data for their particular aircraft, so as to avoid either requesting or accepting clearance to flight levels outside of the performance envelope of the aircraft.

> ***NOTE**: Crews must carefully consider in their performance planning the significant temperature inversions that can occur over the Atlantic Ocean. This is particularly important with aircraft operating near maximum gross weight and when requesting flight levels approaching oceanic entry points.*

7. Crews should be aware that failure to attain flight levels as assigned can result in a loss of planned separation between aircraft. In addition, making a last-minute request for a lower flight level and/or amended routing can create unnecessary challenges for ATC, and should be avoided if at all possible.

> ***NOTE**: If there has been a significant change affecting the aircraft weight after the operational flight plan has been computed, obtain an updated operational flight plan, which should have a more realistic altitude profile.*

8. If a crew finds itself at a flight level that becomes unsustainable due to degrading performance (e.g., when encountering low temperatures affecting fuel, or high temperatures affecting aerodynamics), it is imperative to coordinate a flight level change with ATC as soon as possible. If a climb or descent must be made without ATC clearance, applying the 15 NM lateral offset contingency procedure (as referenced below) will mitigate some of the risk. Crews should then diligently work to reestablish an ATC clearance.

9. Crews must be alert for situations when ATC issues clearances that have only a latitude OR a longitude (e.g., "at/ after passing 30W") rather than a latitude AND a longitude. The clearance should be clearly understood as to when to make a flight level change.

10. Crews must ensure they are following the correct contingency procedure in case of lost communications. Unlike other oceans, the NAT lost communications procedure is to maintain the last assigned flight level. ATC approval is required for all flight level changes.

11. Crews must ensure they obtain an OCEANIC clearance level prior to oceanic entry, enter the ocean at the cleared flight level and cross-check altimeters in accordance with flight manual procedures.

***NOTE**: Crews must coordinate with domestic ATC to ensure they are maintaining their cleared oceanic flight level prior to the oceanic entry point. The altitude specified in the oceanic clearance **is not** a "when ready climb" instruction and needs to be coordinated with domestic ATC.*

GROSS NAVIGATION ERRORS (GNEs)

1. Fly the route received in the OCEANIC clearance – **which may differ from the filed flight plan**.
2. A route amendment is often a contributing factor for navigational errors. Crews must ensure they correctly copy the route amendment, reprogram (and execute) the FMS (or Long Range Navigation System, LRNS), update the Master Document and update the plotting chart. The FMS route verification should include track and distance checks on legs with new waypoints in the amended route.

   ***NOTES**:*

   1. NAT Doc 007, Chapter 8, contains guidance on use of a Master Document.
   2. Track and distance tables are available commercially for every ten degrees of longitude. Alternatively, it may be possible to obtain (from dispatch) or create (using an Electronic Flight Bag application) an updated operational flight plan, to verify new tracks and distances in the FMS.

3. Crews must fly the route amendment (and not the filed flight plan). The pilot in command should ensure that details of the route amendment are recorded on the Master Document, and that all flight crew members are aware of any changes. With augmented crews, a disciplined and detailed changeover briefing with reference to the Master Document is vital.
4. For route amendments which change the oceanic exit point, crews should confirm domestic routing with ATC. ATC normally expects flights to re-join the originally filed ATC flight plan route at the significant point which immediately follows the original oceanic exit point.
5. Pre-flight route verification of the LRNS should include track and distance checks between oceanic waypoints. Enroute procedures should also include track and distance checks prior to reaching an oceanic waypoint.
6. The crosscheck of the FMS oceanic coordinates should include comparing the expanded coordinates for the next and subsequent ("next +1") points against the flight plan, to mitigate against waypoint insertion errors. Crews should fully understand how to enter waypoints using full latitude and longitude, and/or using the ARINC 424 paragraph 7.2.5 naming convention (e.g., 5850N = N58°/W050°). Crews must understand FMS display behavior with the chosen entry method, and that waypoints may have truncated minutes (e.g., N58°30'/W050° loaded, "N58W050" displayed) and/or generic display names (e.g., N58°30'/W050° loaded, "WPT01" displayed).

   ***NOTE**: In NAT airspace where unnamed, half-degree of latitude waypoints are used, waypoint display labels can be misleading (minutes can be truncated or rounded) and/or the FMC can create a generic label). It's imperative that crews check the expanded coordinates of all oceanic waypoints. Custom waypoints in aircraft navigation databases for half-degree of latitude points should NOT use "Nxxyy" naming, but instead "Hxxyy" See NAT OPS Bulletin, "Reduced Lateral Separation Minima (RLatSM) Special Emphasis Items – Phase 2 Update Revision 5."*

7. It is strongly recommended that a plotting/orientation chart be used and procedures include a position check 10 minutes after each waypoint. Compare all waypoints on the chart against the Master Document.
8. Standard Operating Procedures (SOPs) for LRNS's should be focused on verification of the clearance and of the route of flight. SOPs should promote an attitude of constant verification through independent crosschecks to verify that the clearance is correctly programmed. These procedures must also be used with route amendments.

9. There should only be one Master Document on the flight deck. It should be labeled "Master" and should always reflect the current cleared route of flight.
10. Crews must be alert for similar sounding named oceanic waypoints (e.g. PITAX versus BERUX). Also, crews should note that oceanic routes often contain two subsequent named waypoints (e.g., DOGAL BEXIT).
11. Crews should know that ATC coordination is necessary when transiting FIR boundaries. Pilots must give controllers adequate lead time when making requests for track deviations or altitude changes, especially in areas where multiple FIRs (e.g., Brest, Madrid and Shanwick) are in close proximity. ATC coordination in such areas can become quite complex.

EROSION OF LONGITUDINAL SEPARATION

1. When providing position reports via voice, crews must notify a revised estimate to ATC if a previously notified estimate is found to be in error by 3 minutes or more, except when ADS-C is used (see Annex 2 and Doc 7030). Accurate position reports are essential to procedural air traffic control.

> ***NOTE**: While there is a 3-minute tolerance with position reports, time restrictions issued by ATC must be strictly adhered to. A restriction is issued to ensure required spacing between two aircraft is maintained.*

2. Crews must adhere to the assigned (True) Mach. Operators selecting "Long Range Cruise" or "ECON" modes in fact are flying variable Mach, which negatively affects ATC's ability to independently calculate projected position. As needed, crews can request speed adjustments with ATC (preferably via CPDLC).
3. Crews must ensure that the aircraft master clock (typically the FMS) is set to UTC, and is used for all ETAs and ATAs. Where possible, clocks should be in GNSS-synchronized mode.

CONTROLLER PILOT DATA LINK COMMUNICATIONS (CPDLC)[2]

1. Crews should understand proper responses for CPDLC messages, especially ones being used more frequently in the NAT, such as:
    a. "CONFIRM ASSIGNED ROUTE." Ensure the entire oceanic route is loaded before responding to this message. Use the automated response, not a free-text.
    b. "CLEARED ROUTE CLEARANCE" or "CLEARED VIA ROUTE CLEARANCE." Some installations display the uplinked points only when "LOAD" is selected. Crews then need to "ACCEPT/ INSERT" and, if applicable, "EXECUTE/ INSERT" the uplinked route after confirming it is acceptable. It is vital to understand the menu hierarchy and how to load CPDLC clearances.
2. Conditional clearances[1] sent via CPDLC require special attention. The following is typical scenario where a CPDLC "future execution" conditional clearance is misapplied.

    At approximately 1133Z the following CPDLC message was sent to the flight:

    MAINTAIN FL370
    AT 1205 CLIMB TO AND MAINTAIN FL390
    CLIMB TO REACH FL390 BY 1215
    REPORT LEVEL FL390

[2] Guidance for CPDLC communications can be found in the Global Operational Data Link Manual (GOLD, ICAO Doc 10037). Chapter 3 contains guidance for the controller and Chapter 4 contains guidance for the flight crew.

The expected WILCO response was received by the controller.

At approximately 1134Z, the controller received a Level Range Deviation Event ADS-C notification, indicating a climb inconsistent with the clearance. Shortly thereafter, the controller received a "LEVEL FL390" message.

This scenario often results in violating the minimum standard separation between aircraft.

3. Upon receipt of a CPDLC uplink message, it is important for both pilots to independently and silently read, then verify with each other correct understanding of the clearance.
4. It is important to note that the CPDLC uplink message may be more than 1 page in length (requires "paging" through the display). Review the entire message carefully before taking any action. It may be helpful to print the message (and thereafter confirm the printout is complete/ not corrupt).

> ***NOTES***:
>
> *1. Page acknowledgements may be unique to the avionics installed in a particular aircraft. For example, on some installations, crews cannot ACCEPT/ WILCO until the last page of a message is reviewed, while in other installations, ACCEPT/ WILCO may be allowed on the first page.*
>
> *2. Corruptions of the CPDLC message could occur when printed. Crews should confirm CPDLC printouts are consistent with displayed messages.*

5. Both pilots should resolve any questions that they have regarding the clearance prior to initiating any action. If pilots do not fully understand the CPDLC clearance, they should revert to backup voice communication.
6. Crews should be cautious with CPDLC messages that appear to be old (delayed).
7. Dialogues with ATC that are initiated with CPDLC should be completed using CPDLC and dialogues begun with voice should be completed by voice. Crews should make every effort not to mix the two media.
8. Crews should avoid using free-text messages when standard messages are available and appropriate. Free-text messages are not machine-read, which can complicate processing of information. For example, when receiving the CPDLC uplink "CONFIRM ASSIGNED ROUTE," crews should follow CPDLC menu prompts to send the active route. A free-text reply would defeat automated conformance checking.

> ***NOTE***: *Follow flight manual procedures, which specifically describe how to send standard message (non free-text) replies to CPDLC uplinks. Some aircraft/ FMS combinations are experiencing a sporadic anomaly where the "SEND" prompt for down-linking a standard response to the "CONFIRM ASSIGNED ROUTE" is not displayed on the FMS.*

9. Crews should be sure that HF SELCAL is working even when CPDLC is functioning properly – do a SELCAL check at oceanic entry and at each Oceanic Control Area (OCA) boundary.

CONTINGENCIES

1. The 15 NM lateral offset contingency procedure is a global procedure published in ICAO Doc 4444, *Procedures for Air Navigation – Air Traffic Management* (PANS-ATM), Chapter 15. Details of the 15 NM contingency procedure can also be viewed in NAT Doc 007, chapter 13.
2. The Weather Deviation Procedure utilizing a vertical displacement of ± 300 feet is likewise a global procedure, published in ICAO Doc 4444. It is important for pilots to understand that the ICAO published Weather Deviation Procedure is a contingency and should only be flown when an ATC clearance cannot be obtained. It is also important that pilots understand that any ATC clearance to deviate for weather should be done at the ATC cleared altitude, without any vertical displacement. Details of the weather deviation procedure can also be viewed in in NAT Doc 007, chapter 13.

***NOTE**: For weather deviations, even less than 10 NM, the pilot must request clearance from ATC. However, if ATC clearance cannot be obtained and a deviation becomes necessary, pilots must follow published ICAO Weather Deviation Procedures.*

GENERAL

1. Dual checking of the oceanic clearance MUST be SOP (avoid physiological breaks or distractions near the oceanic boundary or when copying and reprogramming route amendments). Route amendments must be communicated clearly in changeover briefings.
2. All HF oceanic communications such as position reports or flight crew requests go through a radio operator. The radio operator is not an air traffic controller. Radio operators must relay all reports and requests to ATC for approval and processing.
3. Relays of ATC instructions between aircraft MUST be accurate. Ensure a correct readback is received from every communication link in the relay.
4. Always read the route loaded in the FMS first and then compare it to the Master Document. This mitigates against "expectation bias," where a pilot sees what he/she expects to see.
5. Crews must immediately clarify any confusion about the clearance.

FLIGHT PLANNING

1. Dispatchers and flight planners should make every effort to file realistic routes which ATC will not need to amend. Named oceanic points, particularly at 15W and 10W, are frequently omitted from the flight plan when they should be included, or vice versa, either of which may cause ATC to amend the route.

***NOTE**: Shanwick publishes "Oceanic Tracks - Westbound Traffic Brief" on its website (https://www.customer.nats.co.uk/shanwick/, requires login) daily at approximately 8:30 AM London time. Crews not filing the preferred altitudes are more likely to receive an amended clearance.*

2. Dispatchers, flight followers, flight operations officers, flight planners and crews should ensure that Items 10 and 18 of the ATC flight plan (normally reproduced on the operational flight plan) correctly reflect capabilities and authorizations. ATC uses these codes in the application of separation standards.
3. Pilots and dispatchers should use all available resources to learn about metrological phenomena affecting the route (e.g. turbulence, volcanic ash, non-standard temperatures, convective activity, and weather at alternates). In addition, pilots should be knowledgeable about information on operational flight plans and do basic crosschecks of fuel, winds and groundspeeds.

SLOP – STRATEGIC LATERAL OFFSET PROCEDURES

(Only RIGHT offsets are authorized)

1. Crews should use SLOP in all oceanic and remote airspace. SLOP should be a SOP, not a contingency, and operators should be endorsing the use of lateral offsets for safety reasons on all oceanic and remote airspace flights, to reduce the risk of collision and to avoid wake turbulence.

***NOTE 1**: SLOP should also be used on random routes due to the high density of traffic and limitations of aids such as TCAS/ACAS.*

***NOTE 2**: Air Operators should include in the standard operating procedures clear guidance to the flight crews to ensure a different offset is used on each occasion a specific airframe enters NAT airspace.*

2. The key to maximizing the effectiveness of SLOP is judiciously selecting from the available options of centerline, 1 NM right or 2 NM right, on a **random** basis. In a bi-directional environment, maintaining centerline incurs more risk than offsetting.
3. Pilots may apply an offset outbound at the oceanic entry point and must return to centerline prior to the oceanic exit point unless otherwise authorized by the appropriate ATS authority or directed by the appropriate ATC unit.
4. Offsets to the left of centerline are NOT authorized under SLOP and should not be flown.
5. Crews should use sound management of automated flight guidance systems when establishing offsets, i.e., avoid the use of "HDG" mode due to the risk associated with neglecting to re-select "LNAV/NAV" mode.
6. Crews should make sure the "TO" waypoint is correct after entering SLOP. With some avionics, when executing an offset near the active "TO" waypoint, the FMS can sequence to the "next + 1" waypoint—**skipping a point**. Some GNEs have resulted.

- END -