

INTERNATIONAL CIVIL AVIATION ORGANIZATION



FINAL

SUMMARY OF DISCUSSIONS AND CONCLUSIONS OF

THE FIFTY-NINTH MEETING OF

THE NORTH ATLANTIC SYSTEMS PLANNING GROUP

Paris, France, 27 to 29 June 2023

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INTRODUCTION

0.1 The Fifty-Ninth Meeting of the North Atlantic Systems Planning Group (NAT SPG/59) was held in the European and North Atlantic (EUR/NAT) Office of ICAO from 27 to 29 June 2023.

0.2 The Meeting was chaired by Mrs. Hlin Holm (Iceland). Mr. Nicolas Rallo, ICAO EUR/NAT Regional Director, acted as Secretary, assisted by ICAO staff as listed in **Appendix A**.

0.3 The list of meeting participants and contacts is provided at **Appendix A**. The list of meeting documentation is included in **Appendix B**.

0.4 In the opening session, the following agenda was agreed:

- Agenda Item 1:** Election of Chairperson
- Agenda Item 2:** Review of significant international aviation developments
- Agenda Item 3:** NAT planning and implementation programmes
- Agenda Item 4:** NAT safety performance and oversight issues
- Agenda Item 5:** NAT economic, financial and forecast issues
- Agenda Item 6:** NAT Documentation updates
- Agenda Item 7:** Work programme, including sub-groups
- Agenda Item 8:** Any Other Business

0.5 The NAT SPG was informed that, further to the ICAO EUR/NAT invitation letter (reference 23-0085 of 27 February 2023) that specifically included a request for nominations to be submitted in view of the forthcoming elections of the NAT SPG Chairperson, Ms. Hlin Holm (Iceland) had been nominated by Iceland and seconded by Norway for the position of the NAT SPG Chair. The Meeting unanimously endorsed the proposed nomination and congratulated Ms. Holm on her re-election.

0.6 The Meeting also confirmed the election of:

- a) Ms. Jennifer Kileo (United States) as the new Chairperson of the North Atlantic Safety Oversight Group (NAT SOG);
- b) Mr. Paul Kennedy (Ireland) as the NAT SOG Vice-Chairperson; and
- c) Ms. Alda Miranda (Portugal), re-elected as the Chairperson of the North Atlantic Economic, Financial and Forecast Group (NAT EFFG).

0.7 It was noted that the tenure of the elected chairpersons would commence at the next meeting for the duration of 4 years and that the North Atlantic Implementation Management Group (NAT IMG) and NAT SOG Chairs would automatically become the NAT SPG Vice-chairpersons. The elections of the new NAT IMG Chair Team would take place at its next meeting in November 2023.

0.8 The Meeting thanked the outgoing NAT SOG Chair, Mr. Tom Kirkhope (United Kingdom), for his significant contributions during his tenure and wished him all the best in his future endeavours.

1. REVIEW OF SIGNIFICANT INTERNATIONAL AVIATION DEVELOPMENTS

1.1 ICAO UPDATE

1.1.1 The NAT SPG was provided with an information paper summarizing recent significant international aviation developments including the latest adopted amendments and proposals for amendment to a number of ICAO Annexes and documents, publication of new ICAO Documents and forthcoming ICAO global and NAT Region-related meetings.

1.2 STATUS OF FOLLOW UP ACTIONS ON NAT SPG CONCLUSIONS

1.2.1 The Meeting reviewed the progress of follow-up actions on NAT SPG Conclusions. It was noted that the following NAT SPG/59 Conclusions had been approved by correspondence prior to the present meeting:

NAT SPG Conclusion 59/1 –	Amendments to NAT Doc 006 Part I and new Part III
NAT SPG Conclusion 59/2 –	Amendments to NAT Doc 007 (<i>North Atlantic Operations and Airspace Manual</i>)
NAT SPG Conclusion 59/3 –	Amendments to NAT Doc 008 (<i>Application of Separation Minima - North Atlantic Region</i>) and NAT SUPPs, (ICAO Doc 7030)
NAT SPG Conclusion 59/4 –	NAT Autonomous Distress Tracking Exercise with Location of an Aircraft in Distress Repository Project Team (NAT DISTREX PT)

1.2.2 The updated list of NAT SPG Conclusions and NAT SPG follow up actions are provided in **Appendix C** and **Appendix N**.

1.3 REVIEW BY THE AIR NAVIGATION COMMISSION OF THE NAT SPG/58 REPORT

1.3.1 The Meeting was provided with an information paper on the outcome of the NAT SPG/58 report review by the Air Navigation Commission (ANC) presented to the 222th Session of the ANC.

1.4 ICAO ENVIRONMENTAL ACTIVITIES

1.4.1 The Meeting was provided with an information paper with the latest updates on the ICAO environmental activities related to the State Action Plans on CO₂ reduction, Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) and Sustainable Aviation Fuels (SAF) implementation.

1.5 COOPERATION WITH THE SOUTH ATLANTIC (SAT)

1.5.1 The Meeting noted the updates on the latest activities in the South Atlantic area, especially the first South Atlantic Safety Oversight Group (SAT SOG) and South Atlantic Implementation Management Group (SAT IMG) meetings that had been held in 2023 and the upcoming SAT IMG/2 meeting to be held on 24-27 July 2023 in Paris, France.

1.6 NAT PROJECT TEAMS STATUS

1.6.1 The NAT SPG noted the status of the ongoing NAT project teams (**Appendix D** refers).

1.7 NUUK FIR

1.7.1 The Meeting noted information provided by Denmark on the status of their project for a new Area Control Centre (ACC) in the Nuuk FIR. Further updates would be provided to the future meetings and the NAT OPS Forum in October 2023.

1.7.2 Regarding the International Air Transport Association's (IATA) information paper related to the DEN/ICE (Danish and Icelandic) Joint Financing Agreements (JFA), the meeting noted, based on the flimsy presented by Iceland, that the JFA was not a matter for discussion by the NAT SPG but rather by the States that were party to the Agreement and ICAO.

2. NAT PLANNING AND IMPLEMENTATION PROGRAMMES

2.1 NAT VISION

2.1.1 The Meeting was presented with a working paper proposing updates to the NAT Vision Statement, Goals and Objectives, as included in the *NAT Air Navigation Plan* (eANP) Volume III (NAT eANP, Doc 9634) that were developed based on the discussions of the NAT Vision Workshop in February 2023.

2.1.2 Based on the foregoing and ensuing discussion, the following was agreed:

NAT SPG Conclusion 59/5 – Update to NAT eANP Volume III (Doc 9634)

That the ICAO Regional Director, Europe and North Atlantic, take appropriate actions to publish the *NAT Air Navigation Plan* (eANP) Volume III (NAT eANP, Doc 9634) which includes the updated NAT Vision information as provided in **Appendix E**.

2.1.3 The Meeting noted that further work would be undertaken within the NAT contributory bodies to identify the impact of the amended NAT Vision on their work programmes and propose updates. During the course of the meeting, additional updates related to deletion of "RVSM (Reduced Vertical Separation Minima) above FL410" and the inclusion of "Commercial Space Operations (CSO)" in the NAT Vision were agreed (para 2.3.4 and 2.5.10 refer).

2.1.4 Furthermore, the Meeting was provided with a proposal for the establishment of a new project team (PT) with the main objective to agree on a common set of initial performance metrics to deliver on NAT Vision Goals and Objectives. It was agreed that the PT would:

- a) establish a baseline from which to measure performance;
- b) develop Key Performance Indicators (KPI) and Key Performance Areas (KPA), to include service delivery and environment;
- c) highlight possible interdependencies with current NAT safety KPIs; and
- d) determine data collection, resource and process requirements.

2.1.5 Concerning the NAT Safety KPIs (SKPIs), it was agreed that significant work had already been done under the NAT SOG to develop a set of SKPIs and annual reporting on their achievement through the NAT safety reports. The NAT SOG had recently completed a revision of the NAT SKPIs. With regard to KPIs on service delivery, it was noted that several NAT Air Navigation Service Providers (ANSP) were already developing and measuring metrics for Goal 5-4 (Cost per 100KM (\$)) within the framework of the Civil Air Navigation Services Organization (CANSO) activities. To mitigate the risk for potential duplication, the PT would ensure the necessary coordination within the NAT structure.

2.1.6 Based on the foregoing, the following was agreed:

NAT SPG Conclusion 59/6 – NAT SPG Common Metrics Project Team (CM PT)

That the NAT SPG Common Metrics Project Team (CM PT) be established with the Project Definition as outlined in **Appendix F**.

2.1.7 In order to support the launch of the PT, it was agreed that the NAT SPG members would coordinate and submit the name of the PT Lead by 14 July 2023 to the ICAO EUR/NAT Office.

2.2 DATA LINK COMMUNICATION LOGS RETENTION

2.2.1 The Meeting was presented with a proposal to extend the duration of data link communication logs retention beyond the current ICAO requirement to retain recordings for a period of at least 30 days. It was noted that 30 days might not be sufficient to ensure availability of system logs required for FANS (Future Air Navigation System) Problem Report (PR) investigations by the Data Link Monitoring Agency (DLMA) and other stakeholders.

2.2.2 In this regard, it was noted that most of the ANSPs already retained data link communication logs for a longer period than required by Annex 10 and 11.

2.2.3 Based on the above, the following was agreed:

NAT SPG Conclusion 59/7 – Data link communication log retention by ANSPs and CSPs

That, the ICAO Regional Director, Europe and North Atlantic, take appropriate action to:

- a) encourage the NAT Air Navigation Service Providers (ANSPs) and Communication Service Providers (CSPs) to retain data link communication logs for a period of at least one year to support effective investigation of data link problem reports (PR) by the Data Link Monitoring Agency (DLMA) and other stakeholders; and
- b) update the Safety-related Policy in the *NAT SPG Handbook* (NAT Doc 001) (para 5:A) to include the recommendation to retain data link communication logs for a period of at least one year.

2.3 FLIGHT LEVELS USAGE ABOVE FL410

2.3.1 The Meeting was presented with the results of the analysis of flight level (FL) usage in the NAT airspace and the associated trends from 2018 to 2022. The main conclusions from the flight level usage data collection were noted as follows:

- a) Between the years 2018 and 2022, except for FL350, there was decreased use of FL300 – FL360.
- b) Between the years 2018 and 2022 there was increased use of FL370 – FL430.
- c) Between the years 2018 and 2022 the use of FL410 and FL430 increased from 4.83% to 7.89%.
- d) Usage of FL410 in 2022 was: Airbus/Boeing 78.42% and other aircraft 21.58%.
- e) Usage of FL430 in 2022 was: Airbus/Boeing 14.62% and other aircraft 85.38%.
- f) Usage of FL450 in 2022 was: Airbus/Boeing 0.07% and other aircraft 99.93%.
- g) Usage of FL470 in 2022 was: Airbus/Boeing 0% and other aircraft 100%.

- h) There were already indications that FL420 may be a beneficial flight level.

2.3.2 Furthermore, it was noted that, according to information from aircraft manufacturers, some aircraft models could already operate above FL410 and these aircraft could benefit from operations at FL420 and FL440. It was also noted that there could be unintended consequences that needed to be analysed concerning operators that already operate in this airspace and may not be able to obtain the RVSM approval.

2.3.3 The Meeting agreed that this data and the trends should be shared with the ICAO Separation and Airspace Safety Panel (SASP) to support their work in the framework of the existing SASP job card and in cooperation with aircraft manufacturers and aircraft operators. It was emphasized that the expansion of the RVSM ceiling would have operational benefits for the NAT and would respond to the increased demand in flight level usage above FL410, and result in potential operational benefit from the availability of additional flight levels such as FL420 and FL440. The NAT could further support this initiative with potential operational trials, if deemed necessary.

2.3.4 Based on the foregoing, the following was agreed:

NAT SPG Conclusion 59/8 – Flight Level usage Above FL410

That:

- a) the NAT Vision Work item “Consider RVSM above FL410” be closed; and
- b) the ICAO Regional Director, Europe and North Atlantic, coordinate within ICAO to signal the potential operational benefit from the availability of additional flight levels such as FL420 and FL440 in order to respond to the increased demand in Flight Level usage above FL410, and invite the relevant ICAO bodies to expedite its work on this matter.

2.4 NAT OCEANIC CLEARANCE REMOVAL

2.4.1 The Meeting was informed about the updates to the task list for the NAT Oceanic Clearance Removal (OCR) implementation. It was agreed that the planned implementation date would be on 21 March 2024 for most of the ANSPs with Shanwick implementing the required Flight Data Processing Systems (FDPS) changes on 9 April 2024.

2.4.2 It was noted that prior to the implementation date each implementing State was to provide written assurance (confirmation) of completion of the national safety cases for OCR to the NAT SOG Secretariat.

2.4.3 Therefore, the following was agreed:

NAT SPG Conclusion 59/9 – The NAT OCR Implementation dates

That, subject to submission of written confirmation by implementing States to the ICAO Secretariat that national safety cases for OCR have been completed, the NAT Oceanic Clearance Removal (OCR) implementation on the AIRAC dates of 21 March 2024 for all NAT ANSPs except Shanwick, and 09 April 2024 for Shanwick, be endorsed.

2.4.4 Furthermore, it was noted that an updated version of the NAT OPS Bulletin - NAT Oceanic Clearance Removal (Serial No: 2023_001) had been developed. NAT SOG/27 had endorsed the NAT Region Safety Case for OCR. Supporting training video material was developed by the United Kingdom to be shared for wider review with other implementing ANSPs. The upcoming NAT OPS Forum to be held on 24-25 October 2023 would assist in the launch of the information material on the OCR implementation.

2.4.5 The Meeting was also provided with a proposal for amendment to the *North Atlantic Operations and Airspace Manual* (NAT Doc 007) that was focussed mainly on the OCR implementation.

2.4.6 The Meeting agreed that the publication of the updated NAT Doc 007 would be on 23 October 2023 to coincide with the planned NAT OPS Forum with the effective date of 21 March 2024. The Meeting agreed that the early publication of the documentation package in support of the OCR would enable better preparation and awareness, specifically for airspace users.

2.4.7 Furthermore, the Meeting agreed to the withdrawal of the NAT OPS Bulletin *ACARS Data Link Oceanic Clearance Flight* – Revision 1 (Serial No: 2020_001 Rev1) from 21 March 2024 as all relevant information had been integrated into the new version of NAT Doc 007.

2.4.8 Based on the above, the following was agreed:

NAT SPG Conclusion 59/10 – PfA to NAT Doc 007 related to removal of oceanic clearances

That the:

- a) proposed amendment to the *North Atlantic Operations and Airspace Manual* (NAT Doc 007, version 2024_1) be endorsed;
- b) ICAO Regional Director, Europe and North Atlantic, take appropriate action to publish the *North Atlantic Operations and Airspace Manual* (NAT Doc 007, version 2024_1) as shown in **Appendix G** on 23 October 2023 with the effective date of AIRAC 21 MAR 2024.

2.5 NAT NER PT – COMMERCIAL SPACE OPERATIONS (CSO)

2.5.1 The Meeting was presented with the progress report from the NAT New Entrant Readiness Project Team (NER PT) for the development of guidance material for CSO. It was noted that as a result of discussions since the NAT SPG/58 (June 2022) meeting, the PT agreed to split the draft guidance into the Operational Guidance and Advisory Information for Regulators.

2.5.2 The Meeting was informed that through the NER PT, NAT IMG and NAT SOG discussions, an agreement was achieved to continue working on the draft Operational Guidance Material. As for the Advisory information for Regulators, it was agreed to pause progress until such time as a global framework was determined (e.g. outcomes of an Air Navigation Conference).

2.5.3 Therefore, the Meeting agreed that, following the final editorial review by the NER PT, the Operational Guidance would be made available for review by the 16th meeting of the North Atlantic Procedures and Operations Group (NAT POG/16) and NAT IMG/63, before being presented to NAT SPG for approval by correspondence.

2.5.4 It was noted that the scope of the NER PT, per its Terms of Reference (ToR), was broader than the initially intended focus on CSO. The Meeting decided that the NER PT would be disbanded once the operational guidance was endorsed. If the need for any new activities related to new entrants was identified, appropriate proposals would be developed by the contributory bodies and submitted to the NAT SPG for consideration.

2.5.5 With regard to the economic and financial aspects of CSO, it was recalled that NAT SPG/58 agreed this issue should be dealt with at the global level. The Meeting was informed that coordination was taking place with the ICAO Airport Economics Panel and Air Navigation Services Economics Panel (AEP/ANSEP) in order to include this subject on their work programme. The Meeting strongly supported this approach and agreed that this would be also presented through the NAT SPG reporting to the ICAO ANC.

2.5.6 Furthermore, the Meeting noted concerns presented by the International Federation of Air Line Pilots Association (IFALPA) regarding CSO debris resulting from launches, uncontrolled re-entry of satellites or any other space vehicles and their potential safety hazards to civil aviation commercial traffic and advocating for harmonisation and coordination of ICAO efforts related to CSO. IFALPA further advocated for ICAO, particularly the EUR and NAT Regions, to take a leading role in addressing the safety risk associated with the integration of CSO. The Meeting noted that discussions on CSO were ongoing in several forums,

including ICAO, the United Nations (UN) Office of Space Affairs (UNOOSA) and the Committee on the Peaceful Uses of Outer Space (COPUOS) and the EUROCONTROL CSO Forum.

2.5.7 In this regard, the Meeting agreed that the ICAO Secretariat would provide regular updates to the future meetings on the ongoing initiatives and actions taken globally, including at the UNOOSA and the COPUOS levels for the safe, sustainable and manageable integration of CSO into the NAT.

2.5.8 The Meeting was provided with information on the United States' position regarding ICAO's role in supporting the safe integration of space activities into the airspace system. The paper affirmed that the development of any binding standards or guidance material relating to the space transportation industry by any international entity was premature and outside of the ICAO mandate, which was to adopt and amend Standards and Recommended Practices (SARPs) exclusively and limited to international civil aviation.

2.5.9 In this regard, the Secretariat recalled the ICAO Assembly Resolutions 41-9 and 40-26 directing ICAO to undertake certain actions with regard to new entrants.

2.5.10 Furthermore, in order to enhance sharing of information on the safety risk management related to safe integration of CSO, the following was agreed:

NAT SPG Conclusion 59/11 – Coordination of safe integration of Commercial Space Operations (CSO)

That:

- a) the ICAO Regional Director, Europe and North Atlantic, take appropriate action to:
 - i) invite NAT Regulators and Air Navigation Service Providers (ANSPs) to enhance sharing of available information on safety risk management related to commercial space operations (CSO);
 - ii) highlight the urgency for ICAO to take priority actions for the safe integration of CSO with civil aviation operations;
- b) the NAT IMG and NAT SOG be tasked to:
 - i) support the sharing of available information on safety risk management related to CSO integration with civil aviation operations;
 - ii) review and enhance the proposed operational guidance material for integration of CSO with civil aviation operations in the NAT, as needed.

2.5.11 In addition, the Meeting invited the NAT provider States to raise the awareness of the Air Navigation Commissioners nominated by their States to the urgency for ICAO to take priority actions for the safe integration of CSO with civil aviation operations and support the foregoing NAT SPG endorsed Conclusion. It was also noted that the NAT service delivery roadmap contained in the NAT ANP would be updated to include safe integration of CSO with the timeline from 2023 to 2025.

2.6 VOLCANIC ASH EXERCISES (VOLCEX UPDATES)

2.6.1 The Meeting was provided with an information paper containing updates on the Volcanic Ash Exercises for the EUR and NAT Regions (VOLCEX). The Meeting noted that VOLCEX23 would take place on 21 November 2023 and simulate a volcano eruption of Snaefellsjokull in Iceland. The VOLCEX23 Preparatory Workshop would be held from 9 to 10 October 2023 in Reykjavik, Iceland.

2.7 NDB'S DECOMMISSIONING

2.7.1 The Meeting was presented with a proposal for developing a plan for decommissioning the Non-Directional Beacons (NDBs) supporting Blue Spruce routes and covered by the DEN/ICE Joint Financing

Agreements. IATA reported that its airline members had a very low dependence on NDBs. Aircraft operating in the NAT were generally highly equipped and airspace users sought to maximize their benefits from the current technology and performance-based navigation.

2.7.2 It was noted that Blue Spruce routes were established as a mechanism to support aircraft operations in the NAT High Level Airspace (NAT HLA) with a single long-range navigation system. Iceland stated its opinion that removing the NDBs might also remove the necessary navigation cross-checking against the single long-range navigation system rendering the Blue Spruce routes unusable for their purpose. As a consequence, there would be a need to conduct an analysis of the effect of removing the NDBs and to explore whether there were alternative means to achieve the purpose of the Blue Spruce routes. It was also noted that different types of users used these routes, including State aircraft, general aviation and commercial operators.

2.7.3 Based on the ensuing discussions, the following was agreed:

NAT SPG Conclusion 59/12– Review of NAT Region NDBs and Blue Spruce routes

That the NAT SPG invite concerned NAT provider States to:

- a) consider the need for the:
 - i) Blue Spruce routes containing Non-Directional Beacons (NDBs) within the NAT Region;
 - ii) Blue Spruce routes or an alternative mechanism to support aircraft operations with degraded navigation capabilities; and
 - iii) NDBs covered by the DEN/ICE Joint Financing Agreements; and
- b) provide an update to the NAT POG and NAT IMG meetings in autumn 2023.

2.7.4 Furthermore, in order to support the NAT POG and NAT IMG discussions per item b) of the above Conclusion, it was agreed that the Secretariat would contact the International Business Aviation Council (IBAC) and International Council of Aircraft Owner and Pilot Associations (IAOPA) to invite them to join the upcoming meetings.

3. NAT SAFETY PERFORMANCE AND OVERSIGHT ISSUES

3.1 ADT LADR EXERCICE (NAT DISTREX PT)

3.1.1 The Meeting was provided with an update from the NAT Autonomous Distress Tracking Exercise with Location of an Aircraft in Distress Repository Project Team (NAT DISTREX PT) that had been established (NAT SPG Conclusion 59/4 refers) to develop and conduct an exercise to test the operation of the LADR (Location of an Aircraft in Distress Repository) and the coordination between ANSPs, Search and Rescue (SAR)/Rescue Coordination Centres (RCCs), and air operators upon receipt of an ADT (Autonomous Distress Tracking) notification.

3.2 SUPERSONIC AND HYPERSONIC OPERATIONS IN THE NAT

3.2.1 The Meeting was provided with information on the development of supersonic and hypersonic aircraft for commercial passenger service by a number of manufacturers. The Meeting supported the need for coordination to ensure harmonized implementation, taking into account the environmental impact in terms of fuel consumption and noise, airspace restrictions and the ongoing research and development.

3.2.2 In this regard, the Meeting supported the European Aviation System Planning Group's (EASPG) Conclusion that the ICAO Regional Director, EUR/NAT take action to help enhance coordination on issues related to the operation of next generation supersonic/hypersonic aircraft across Regions in order to support further work on this issue (EASPG Conclusion 4/10 refers).

3.2.3 In conjunction with the foregoing, it was agreed that the ICAO Secretariat would provide regular updates to the NAT SPG on supersonic/hypersonic aircraft developments from groups such as ICAO's Committee on Aviation Environmental Protection (CAEP), the European concept for higher airspace operation (ECHO) and others.

3.3 NAT ANNUAL SAFETY REPORT (ASR) 2022

3.3.1 The Meeting was presented with the NAT Annual Safety Report (NAT ASR). It was noted that in line with the NAT Vision workshop, some environmental metrics were discussed as a first attempt to report on environmental priorities in the NAT. The Meeting noted that metrics on environmental performance would be further developed within the NAT Common Metrics Project Team (CM PT).

3.3.2 The Meeting discussed the issue of vertical and lateral Collision Risk Estimates (CRE) that were significantly impacted by isolated single long duration events. It was noted that without these events, the statistical CRE would have been much lower. The Meeting agreed it was important to continue the ongoing NAT SOG work on monitoring safety performance and scrutiny of the occurrences in order to identify and implement further improvements.

3.3.3 Consequently, the following was agreed:

NAT SPG Conclusion 59/13 – NAT Annual Safety (ASR) Report 2022

That, the:

- a) *NAT Annual Safety Report* (NAT ASR 2022) be endorsed; and
- a) ICAO Regional Director, Europe and North Atlantic, take appropriate action to publish the NAT SPG-endorsed NAT ASR 2022 (**Appendix H** refers).

3.4 MINIMUM NAVIGATION PERFORMANCE SPECIFICATION (MNPS)

3.4.1 The Meeting was presented with the report of the NAT MNPS/HLA & PBN Approval Project Team (NAT MHP PT). It was recalled that the NAT MHP PT was established by NAT SPG Conclusion 57/11 with the objectives:

- a) to determine what steps were necessary to remove the requirement for a Minimum Navigation Performance Specification (MNPS)/HLA-specific approval for operation in the NAT HLA and develop appropriate NAT *Regional Supplementary Procedures* (NAT SUPPs, Doc 7030) amendment proposals; and
- b) to clarify if there was a need to retain the NAT SUPPs provision that the aircraft and operator must be approved by the State of the Operator or the State of Registry.

3.4.2 It was reported that the NAT MHP PT could not reach a consensus on eliminating the MNPS/HLA operational approval requirement for the NAT HLA. In this regard, the Meeting discussed whether the spirit of its intent to transition from MNPS to PBN had been met and whether the outcome of the PT met its expectations in determining what conditions must be satisfied to enable the discontinuation of MNPS operational approvals.

3.4.3 In this regard, the Meeting noted that Canada, Iceland, Norway and Portugal did not support the continuation of the requirement for MNPSA approvals for operation in the NAT HLA.

3.4.4 Therefore, the Meeting agreed that the proposed amendments to the NAT SUPPs would not be pursued at this stage and the Project Team should be disbanded. It was agreed that the primary issue was of a regulatory nature and therefore the NAT SOG was tasked to re-examine, based on NAT SPG Conclusion 57/11, the requirement for States to issue MNPSA/HLA approvals pursuant to the following refreshed objectives:

NAT SPG Conclusion 59/14 – Minimum Navigation Performance Specification (MNPS)

That, the NAT SOG:

- a) determine what steps are necessary to remove the requirement for a MNPSA/HLA-specific approval for operation in the NAT High Level Airspace (NAT HLA);
 - i) consider whether there are any safety factors if MNPSA/HLA approvals are no longer required for the NAT Region; and
 - ii) identify the steps necessary to mitigate any related risks; and
- b) if the NAT SUPPs (Doc 7030) requirements are no longer required for the NAT Region as a whole, that the steps, measures, and coordinated timelines necessary to remove the NAT SUPPs (Doc 7030) requirements be identified and submitted to the NAT SPG/60 for endorsement.

4. NAT ECONOMIC, FINANCIAL AND FORECAST ISSUES**4.1 NAT HMS FINANCIAL ARRANGEMENT**

4.1.1 The Meeting noted that the new Financial Arrangement on the Joint Financing of a North Atlantic Height Monitoring System Using ADS-B Data (NAT SPG Conclusion 58/14 refers), had been finalised by the ICAO Joint Financing Section and cleared by the ICAO Legal Bureau (LEB) and the Committee on Cooperation with External Parties. It had been approved by the ICAO Secretary General in December 2022. As of 23 June 2023, the Arrangement had been signed by Canada, Iceland, Ireland, Norway, Portugal and the United Kingdom. In this context, the United States was invited to provide the names of their signatories as soon as possible.

4.2 NAT EFFG ASSESSMENT AND NAT SPG APPROVAL OF THE TRAFFIC FORECAST 2023-2027

4.2.1 The Meeting noted that the recovery from the global pandemic was still underway. Therefore, the standard model, which would use 2022 as the base year, may not accurately reflect future growth rates anticipated by NAT EFFG. Consequently, for 2023, the NAT EFFG agreed to prepare and evaluate two separate forecasts: one using the ad-hoc method and one using the standard model (i.e. the methodology utilized prior to the pandemic).

4.2.2 It was agreed that the consolidated traffic forecast using the standard model would be completed by 30 June 2023 and distributed electronically among the members. The NAT EFFG would assess the standard model forecast in conjunction with the ad-hoc forecast to determine the most appropriate forecast to present to the NAT SPG for approval by correspondence. The NAT SPG approval of the traffic forecast 2023-2027 should be obtained by 11 August 2023 to enable calculations of user charges under the DEN/ICE Joint Financing Agreements.

5. NAT DOCUMENTATION UPDATES**5.1 MINIMUM HEIGHT MONITORING REQUIREMENTS**

5.1.1 The Meeting was provided with an update from the NAT Central Monitoring Agency (NAT CMA) on recent work carried out to support the implementation of the Height Monitoring System (HMS) using Automatic Dependent Surveillance – Broadcast (ADS-B) in the NAT. It was noted that based on the comparison of the Strumble Height Monitoring Unit (HMU) and ADS-B data, there was confidence that, over the period of analysis, the ADS-B HMS produced more consistent Altimetry System Error (ASE) data than Strumble HMU. The NAT CMA's next priority was to commence further engagement with other NAT ANSPs in order to implement a suitable solution to onboard their ADS-B data.

5.1.2 The Meeting noted information on the ongoing technical issues affecting the reliability of height monitoring results obtained from Strumble HMU. Also, the recent introduction of the Free Route Airspace (FRA) over Wales and South-West England resulted in a reduction in the number of aircraft routinely overflying Strumble. This has further reduced the number of useful results achieved from Strumble HMU.

5.1.3 The Meeting recalled that the new financial arrangement for the funding of the NAT HMS was in the final stages of signing, with only one State pending. It was agreed that the simultaneous operation of the Strumble HMU and ADS-B HMS should be kept to a minimum to avoid unnecessary costs.

5.1.4 In view of the above, the following was agreed:

NAT SPG Conclusion 59/15 – Use of ADS-B data for NAT CMA Height Monitoring Activities

That:

- a) the use of ADS-B Height Monitoring data as the sole source of data for the NAT CMA height monitoring activities be endorsed;
- b) the ICAO EUR/NAT Regional Director take appropriate action to include the suggested update into the Safety Related Policies section (para. [05] Minimum Height Monitoring Requirements for the NAT Region) of the *NAT SPG Handbook* (NAT Doc 001) and publish it in the next update to the *NAT SPG Handbook* (**Appendix I** refers);
- c) all required NAT documentation be updated accordingly;
- d) the ICAO EUR/NAT Regional Director, in coordination with the United Kingdom, take appropriate action to terminate the contract of the Strumble HMU as soon as possible.

5.1.5 The Meeting expressed its sincere thanks to the NAT CMA for the progress made on implementation of the new NAT HMS.

5.2 UPDATE OF NAT DOC 001 – NAT SPG HANDBOOK

5.2.1 The Meeting was provided with a proposal for amendment to the *North Atlantic Systems Planning Group (NAT SPG) Handbook* (NAT Doc 001) to include:

- a) Update to Section 1: #18 – NAT SPG representative of Canada, Denmark and Ireland;
Update to Section 5:A [04] Definition and Components of Regional Safety Cases in support of changes to the NAT air navigation systems requiring NAT SPG approval;
- b) Update to Section 5:A, [05] Minimum Height Monitoring Requirements;
- c) New paragraph in Section 5:A, [06] Data link communication log retention by ANSPs and CSPs; and
- d) Updates to Section 6:A — Documents promulgated by the NAT SPG.

5.2.2 Therefore the following was agreed:

NAT SPG Conclusion 59/16 – PfA to the NAT SPG Handbook, NAT Doc 001

That:

- a) *North Atlantic Systems Planning Group (NAT SPG) Handbook* (NAT Doc 001) be amended as presented at **Appendix I**; and
- b) ICAO Regional Director, Europe and North Atlantic, take appropriate action to publish and promulgate the updated *North Atlantic Systems Planning Group (NAT SPG) Handbook* (NAT Doc 001).

5.3 PUBLICATION OF NAT SUPPs

5.3.1 The Meeting was informed about safety concerns raised by IATA member airlines and aeronautical charting and computer flight service providers related to the outdated NAT *Regional Supplementary Procedures* (NAT SUPPs, Doc 7030). It was noted that the current formally published NAT SUPPs was last updated in April 2014. A number of amendments since 2014 had been included only in the informal “working copy” published on the EUR/NAT website.

5.3.2 Therefore the following was agreed:

NAT SPG Conclusion 59/17 – Publication of NAT SUPPs (Doc 7030)

That, based on identified safety concerns, the ICAO Regional Director, Europe and North Atlantic, take appropriate action to:

- a) urge ICAO Headquarters to process the outstanding Proposals for Amendment (PfAs) to the NAT *Regional Supplementary Procedures* (NAT SUPPs, Doc 7030);
- b) request ICAO Headquarters to remove the current officially published NAT SUPPs from the ICAO Secure Portal website until the SUPPs have been updated; and
- c) urge ICAO Headquarters to publish a new version (with all Council approved amendments) of the NAT SUPPs without further delay and ensure that the document is kept up to date in the future on the ICAO Secure Portal website.

5.3.3 The Meeting invited the NAT provider States to raise the awareness of the Air Navigation Commissioners nominated by their States on the importance for aviation safety that the ICAO *Regional Supplementary Procedures*, (Doc 7030) be maintained updated following the approval of their amendments.

5.3.4 Furthermore, it was agreed that the NAT Document Management Office (NAT DMO) would review the NAT SUPPs “working copy” to identify potential inconsistencies that would need to be urgently highlighted to readers until such time when these inconsistencies could be rectified through the formal document amendment and approval process. The outcome of this work would be presented to the next NAT IMG and NAT SOG meetings with recommended actions for consideration.

5.4 UPDATE OF NAT DOC 008 – *APPLICATION OF SEPARATION MINIMA NORTH ATLANTIC REGION*

5.4.1 The Meeting was presented with a proposal to remove the distinction between turbojet and non-turbojet aircraft when it pertained to separation and accordingly amend the *Application of Separation Minima North Atlantic Region* (NAT Doc 008) and the NAT SUPPs (Doc 7030).

5.4.2 The United States noted that its internal air traffic standards still reflected a differentiation between turbojet and other than turbojet aircraft, and that the proposed edits to the New York Oceanic Control Area (OCA) within NAT Doc 008 would need to be edited. The United States took an action to work with the Secretariat to provide edits to the applicable New York OCA sections of NAT Doc 008.

5.4.3 The Meeting noted that due to the uncertainty around the timeliness of the NAT SUPPs amendment process, the publication of the NAT Doc 008 must be recognized as the most accurate representation of the NAT longitudinal separations which would now be aligned with the global standards in the *Procedures for Air Navigation Services – Air Traffic Management* (PANS-ATM, ICAO Doc 4444).

5.4.4 Based on the above, the following was agreed:

NAT SPG Conclusion 59/18 – PfA to NAT SUPPs and NAT Doc 008 related to longitudinal separation

That the:

- a) proposed amendment to the *NAT Regional Supplementary Procedures* (NAT SUPPs, Doc 7030) related to section 6.2.2. (Longitudinal separation) as detailed in **Appendix J** be endorsed;
- b) ICAO Regional Director, Europe and North Atlantic, take appropriate action to process the proposed amendment to the *NAT Regional Supplementary Procedures* and integrate these changes into the new version which is expected to be published by ICAO Headquarters;
- c) proposed amendment to the *Application of Separation Minima North Atlantic Region* (NAT Doc 008) as detailed in **Appendix K** be endorsed; and
- d) ICAO Regional Director, Europe and North Atlantic, take appropriate action to publish and promulgate the updated NAT Doc 008.

5.5 UPDATE OF NAT DOC 011 – *PBCS MONITORING AND REPORTING GUIDANCE*

5.5.1 The Meeting was provided with a draft amendment to the *NAT PBCS Monitoring and Reporting Guidance* (NAT Doc 011) that was prepared to offer better clarity on roles and to better reflect the actions of those involved in the Performance Based Communications and Surveillance (PBCS) non-performance reporting process.

5.5.2 Therefore, the following was agreed:

NAT SPG Conclusion 59/19 – PfA to NAT Doc 011 *PBCS Monitoring and Reporting Guidance*

That the ICAO Regional Director, Europe and North Atlantic,

- a) take appropriate action to publish the amended version of the *PBCS Monitoring and Reporting Guidance* (NAT Doc 011) as shown in **Appendix L**; and
- b) coordinate with ICAO Headquarters to arrange for the guidance to be published on the PBCS web pages as soon as possible and make it available for the use of the ICAO Operational Data Link Specific Working Group (OPDLWG).

5.6 NAT TIG ATSP ANALYST HANDBOOK

5.6.1 The Meeting was presented with a draft *NAT TIG ATSP Analyst Handbook* that was primarily intended to serve as a summary reference document describing the metrics, methods and formats that the Analysts of the North Atlantic Technology and Interoperability Group (NAT TIG) use for compiling and providing data and reports.

5.6.2 The Meeting supported the proposal that the *NAT TIG ATSP Analyst Handbook* be published as NAT Doc 012 and agreed the following:

NAT SPG Conclusion 59/20 – *NAT TIG ATSP Analyst Handbook* (NAT Doc 012)

That the:

- a) *NAT TIG ATSP Analyst Handbook* in **Appendix M** be endorsed;
- b) ICAO Regional Director, Europe and North Atlantic take appropriate action to publish the *NAT TIG ATSP Analyst Handbook* as NAT Doc 012; and
- c) NAT IMG be delegated the responsibility for approval of future changes to the *NAT TIG ATSP Analyst Handbook* (NAT Doc 012).

6. ANY OTHER BUSINESS

6.1 FAREWELLS

6.1.1 The Meeting was informed that this was the last NAT SPG meeting for Captain Carlos Rodriguez (IFALPA) as he was retiring from September 2023 onwards. The Meeting was also informed that Antonio Rita (Portugal) and Travis Fiebelkorn (United States) were also resigning from the NAT SPG. The Meeting expressed their sincere appreciation to all three for their significant contributions and continuous support to the various NAT activities over the past years and wished them all the best in their future endeavours.

6.2 REQUEST FROM ICCAIA

6.2.1 The Meeting was informed that a request had been received from the International Coordinating Council of Aerospace Industries Associations (ICCAIA) to become an observer at the NAT SPG. It was noted that ICCAIA was an organisation endorsed by the ICAO Council to participate in ICAO meetings and some Original Equipment Manufacturers (OEM) were already actively participating in the work of the various NAT SPG contributory bodies. In this regard, it was agreed that the NAT SPG members would inform the Secretariat by 14 July 2024 about their position with regard to the ICCAIA request.

6.3 PLANNING OF THE FUTURE MEETINGS

6.3.1 The Meeting agreed that the calendar of the NAT meetings would need to be revisited to ensure sufficient time between meetings, in particular in preparation for the NAT SPG. It was agreed that this subject would be discussed by the NAT SPG Chair Team to prepare a proposal for the Group's consideration.

6.4 NEXT MEETING

6.4.1 It was agreed that the NAT SPG/60 would be held from 25 to 28 June 2024 in Paris, France. It was agreed that some promotional video material would be considered to mark the 60th anniversary of the NAT SPG. The NAT SPG Chair Team would further coordinate this initiative.

APPENDIX A — LIST OF PARTICIPANTS*(Paragraphs 0.2 and 0.3 refer)***CHAIRPERSON**

Hlin HOLM*

CANADA

Vanessa ROBERTSON*

Michael MUNRO

Noel DWYER

DENMARK

Patrick Alexander LIEBGOTT*

Christoffer Vahl BENDIXEN

FRANCE

Luc LAPENE

Christophe GUILPAIN*

ICELAND

Thordis SIGURDARDOTTIR

Bjarni STEFANSSON

Arni GUDBRANDSSON

IRELAND

Paul KENNEDY*

Sean PATRICK

NORWAY*Regrets***PORTUGAL**

Antonio RITA*

Angela ALVES

Carlos ALVES

Luis TOJAIS

UNITED KINGDOM

Stuart LINDSEY*

Martin DONNAN

Ben LIPPITT

Colin SCOTT

Rachel SOWERBY

UNITED STATES

Jeffrey SZCZYGIELSKI*

Coleen HAWRYSKO

Jennifer KILEO

Steven PINKERTON

Travis FIEBELKORN

Wendy O'CONNOR

EUROCONTROL

Philippe LENNE

International Air Transport Association (IATA)

Jeffrey MILLER

Rich STARK

Mark HURSTON

**International Federation of Air Line Pilots
Association (IFALPA)**

Carlos RODRIGUEZ

**International Federation of Air Traffic Controllers'
Associations (IFATCA)**

Silja JOHNSDOTTIR

NAT Central Monitoring Agency (NAT CMA)

David LUNAN

ICAO EUR/NAT

Nicolas RALLO (Secretary)

Elkhan NAHMADOV

Abbas NIKNEJAD

Arnaud DESJARDIN

Sarantis POULIMENAKOS

Sven HALLE

Patricia CUFF

* NAT SPG Member

Participants and Members Contact List

(Paragraph 0.3 refers)

To be included only on Restricted Website of NAT SPG

APPENDIX B — LIST OF MEETING DOCUMENTATION

(paragraph 0.3 refers)

WP / IP#	Ag item	Title	Presented by
WP01	0	Draft Agenda	Secretariat
WP02	2	Status of NAT SPG Conclusions	Secretariat
WP03	3	Data link communication log retention by ANSPs and CSPs	Secretariat
WP04	6	NAT Doc 011 updates	Secretariat
WP05	6	NAT TIG ATSP Analyst Handbook	Secretariat
WP06 REV	7	NAT Vision Workshop Outcomes: - NAT eANP Volume III Update and NAT SPG Common Metrics Project Team (CM PT)	Secretariat
WP07	3	Flight levels usage above FL410	Secretariat
WP08	6	NAT Oceanic Clearance Removal (NAT OCR) implementation package and update of NAT Doc 007	Secretariat
WP09	6	Publication of NAT SUPPs	Secretariat
WP10	6	Update of NAT Doc 008 and Doc 7030 related to longitudinal separation Update to NAT OPS Bulletin - Data Link Performance Improvement Options (Serial no: 2019_003)	Secretariat
WP11	4	Outcomes of NAT SOG/27 and NAT SOG/28	Secretariat
WP12	6	Updates to NAT SPG Handbook (NAT Doc 001)	Secretariat
WP13	5	Outcomes of NAT EFFG/43 and NAT EFFG/44	Secretariat
WP14	4	NAT MHP PT Report	Secretariat
WP15 REV	4	Minimum Navigation Performance Specification (MNPS)	Canada, Iceland, Norway, Portugal
WP16	4	NAT 2022 Annual Safety Report (ASR)	Secretariat
WP17 REV02	3, 4	Commercial Space Operations in the NAT High Level Airspace	IFALPA
WP18	3	NAT New Entrant Readiness Project Team Report	NER PT Lead & Secretary
WP19	3	Decommissioning of NDBs Supporting Blue Spruce Routes	IATA
WP20	3	IATA Position Concerning dual operation of ADS-B HMS and Strumble Height Monitoring Unit	IATA
IP01	0	Meeting schedule	Secretariat
IP02	0	Meeting documentation	Secretariat
IP03	2	ICAO Update	Secretariat
IP04	7	Status of NAT Project Teams	Secretariat
IP05	3	VOLCEX Events	Secretariat
IP06	2	Review of NAT SPG/58 Report by the ANC Working Group of the Whole for Strategic Review and Planning (WG/SRP)	Secretariat
IP07	7	Outcomes of NAT IMG/61 and NAT IMG/62	Secretariat
IP08	7	NAT DISTREX PT report	Secretariat
IP09 REV	2	ICAO Environmental Activities	Secretariat

WP / IP#	Ag item	Title	Presented by
IP10	3	ICAO's role in the safe integration of space activities into the airspace system	United States
IP11	6	Restructuring of the Irish Aviation Authority and the Establishment of AIR NAV Ireland	Ireland
IP12	7	Outcomes of SAT IMG/01 and SAT SOG/01	Secretariat
IP13	6	Timely Approval and Publishing of NAT Regional Supplementary Procedures, Doc 7030	IATA
IP14	3	IATA Concerns with the DENICE Consultation Process and Denmark's Proposal to Create a new Nuuk FIR	IATA
PR01	7	Outcome of NAT Vision Workshop	Secretariat
FL01	3	Iceland's response regarding IP14	Iceland
FL02	7	In support of WP/14 & WP/15 on MNPS: proposed language for NAT SPG/59 Report	NAT SOG Chair Team

APPENDIX C — UPDATED NAT SPG CONCLUSIONS*(paragraph 1.2.2 refers)***STATUS OF EXTANT NAT SPG CONCLUSIONS**

Reference/Title	Description	Comments	Status
C 55/08 - Implementation of the uplink latency timer function by NAT ANSPs	That: a) NAT air navigation service providers (ANSP) implement the message “SET MAX UPLINK DELAY VALUE TO [seconds] SEC” on or after 24 May 2018 to give aircraft operators two AIRAC (Aeronautical Information Regulation And Control) cycles to distribute guidance material to flight crews; b) the value in the uplink message in a) above be 300 seconds on a trial basis and the NAT IMG monitor the trial and report findings and proposals on the way forward to the NAT SPG; and c) the NAT OPS Bulletin with guidance material concerning the CPDLC Uplink Message Latency Monitor Function (NAT OPS Bulletin 2018_002) be published.	c) Published - email: "180604 - NAT OPS Bulletin 2018_002_Rev01 - CPDLC Uplink Message Latency Monitor Function" refers.	On-going Iceland, Canada, UK and Portugal implemented Further update to be provided by United States.
C 56/13 Review of NAT regional crisis response processes	That: a) the NAT SPG initiate a review of the NAT SPG crisis response processes based on experience from the COVID-19 pandemic; b) task the NAT IMG and NAT SOG to establish a specific project team led by the NAT IMG/NAT SOG Chairs; c) the NAT IMG and NAT SOG Chairs, in consultation with the Groups’ members, to prepare a draft ToR and report to the NAT SPG.	Pending the outcome of the EUR Doc 031 on crisis management framework	On-going
C 57/1 - Development of a new NAT Height Monitoring System (HMS)	That, in order to provide an ADS-B height monitoring system for the NAT Region which meets the current safety requirements, a) the lower cost option to develop a new Height Monitoring System (HMS) in collaboration with NAT ANSPs utilizing existing ADS-B data within the NAT is preferred and should be pursued; and b) the NAT Safety Oversight Group further develop implementation activities and provide a progress report at the next NAT SPG.		Closed
C 57/10 - PfA to NAT SUPPs (Doc 7030/5)	That the ICAO Regional Director, Europe and North Atlantic process the proposed amendment to the NAT Regional Supplementary Procedures (NAT SUPPs, Doc 7030/5) as detailed in Appendix H.	211126 PfA submitted to HQ for clearance to circulate.	On-going

STATUS OF NAT SPG/58 CONCLUSIONS

Reference/Title	Description	Comments	Status
C 58/01 [CORR] - Integration of NAT 2030 Vision into the NAT eANP Volume III	That the ICAO Regional Director, Europe and North Atlantic take appropriate action to publish the amended version of the NAT Air Navigation Plan (eANP) Volume III (ICAO Doc 9634) as provided in Appendix E.	220119 Publication of NAT eANP Vol III, v.2022 and removal of NAT Doc 005 (cup)	Closed
C 58/02 [CORR] - Removal of NAT Doc 005, Future ATM Concept of Operations	That the ICAO Regional Director, Europe and North Atlantic take appropriate action to discontinue and remove the document Future ATM Concept of Operations (NAT Doc 005) from publication.	220119 Publication of NAT eANP Vol III, v.2022 and removal of NAT Doc 005 (cup)	Closed
C 58/03 [CORR] - PfA to NAT Doc 006, Part I	That: a) the North Atlantic Air Traffic Management Operational Contingency Plan (NAT Doc 006, Part I) be amended as follows: i) replace the terms “Shannon Radio”, “Shannon Aeradio” and “Shanwick Aeradio” with the station identifier: “Shanwick Radio” throughout the document; ii) delete the General Office telephone number “+353 61 471199” in the published SATVOICE numbers for Shanwick Radio throughout the document; and b) ICAO Regional Director, Europe and North Atlantic, take appropriate action to publish the amended version of the NAT Doc 006, Part I.	220112 Publication of NAT Doc 006, Ed 1, Amd 16 - NAT Air Traffic Management Operational Contingency Plan (cup)	Closed
C 58/04 [CORR] - OWAFS-related and other amendments to NAT Doc 007	That the ICAO Regional Director, Europe and North Atlantic, take appropriate action to include and publish the amendments provided in Appendix G in the North Atlantic Operations and Airspace Manual (NAT Doc 007) with a subsequent withdrawal of the NAT OPS Bulletin 2019_001 [Operations Without an Assigned Fixed Speed in the NAT (OWAFS) Special Emphasis Items (SEI)].	220111 Publication of NAT Doc 007, v.2022-1 - NAT Operations and Airspace Manual (cup)	Closed
C 58/05 - NAT cybersecurity workshop 2023	That, the ICAO Regional Director, Europe and North Atlantic, take appropriate measures to organise in coordination with NAT States, international organisations and industry a NAT workshop on cybersecurity in the first half of 2023.	Postponed to 2024 due to the global event in 2023.	On-going
C 58/06 - NAT Vision workshop 2023	That, the ICAO Regional Director, Europe and North Atlantic, take appropriate measures to organise in coordination with NAT States, international organisations and industry a NAT Vision workshop in the first quarter of 2023.	Organized on 7-8 February 2023. Invitation SL Ref: EUR/NAT 22-0317.TEC of 22 September 2022 refers.	Closed

Reference/Title	Description	Comments	Status
C 58/07 - NAT ADS-B Mandate	That: a) the NAT IMG: i) explore the operational feasibility of a NAT ADS-B mandate; and ii) draft any required NAT document amendment proposals. b) the NAT SOG explore the regulatory feasibility of a NAT ADS-B mandate. c) the NAT EFFG explore the economic feasibility of a NAT ADS-B mandate.		Closed
C 58/08 - Operational trial of 15 NM Target to Target separation minimum	That, subject to the endorsement of the NAT IMG and the NAT SOG, an operational trial of a 15 NM Target to Target separation minimum in the Reykjavik CTA is approved.	Approved: NAT IMG Decision 61/1 – 15 NM Operational Trial in Reykjavik CTA and NAT SOG/27 SoD para 3.2 e) refer.	Closed
C 58/09 - Adequate resources for the NAT TIG data link analysts' work	That, the NAT provider States be urged to ensure that adequate resources are made available to support the work of the data link analysts in the NAT Technology and Interoperability Group (NAT TIG).	SL EUR/NAT 22-0249.TEC of 4 August 2022 refers.	Closed
C 58/10 - Support to NAT CMA for ADS-B HMS implementation	That, the ICAO Regional Director, Europe and North Atlantic, take appropriate measure to invite: a) The NAARMO team to ensure the necessary resources are available to provide the ADS-B HMS software, supporting documentation and any associated training to the NAT CMA at the earliest opportunity; and b) NAT ANSPs to provide all necessary support to the NAT CMA to ensure an effective implementation of the ADS-B HMS.	SL EUR/NAT 22-0301.TEC of 25 August 2022 refers.	Closed
C 58/11 - NAT MWG Access to ADS-B data	That, the ICAO Regional Director, Europe and North Atlantic, invite NAT provider States and their ANSPs to ensure access to ADS-B position data or sampled ADS-B positions for NAT MWG members.	SL EUR/NAT 22-0302.TEC of 25 August 2022 refers.	Closed
C 58/12 - NAT Annual Safety (ASR) Report 2021	That: a) the NAT Annual Safety Report (NAT ASR 2021) be endorsed; and b) the ICAO Regional Director, Europe and North Atlantic take appropriate action to publish the NAT SPG-endorsed NAT ASR 2021 (Appendix H refers).	Published on EUR/NAT website SL EUR/NAT 22-0274.TEC of 4 August 2022 refers.	Closed
C 58/13 - Approval of the NAT Traffic Forecast (2022-2026)	That, the ICAO Regional Director, Europe and North Atlantic, take appropriate measures to publish the NAT traffic forecast for the period 2022-2026 as provided in Appendix I.		Closed

Reference/Title	Description	Comments	Status
C 58/14 - Financial Arrangement on the Joint Financing of a North Atlantic Height Monitoring System Using ADS-B Data	That: a) the following principles be applied for the Financial Arrangement on the Joint Financing of a North Atlantic Height Monitoring System Using ADS-B Data: i) All ANSP costs, both set-up costs and operating costs, be recovered through each ANSP Oceanic Route Charges; and ii) all NAT CMA costs be recovered through the RVSM charge, based on the current charging system, i.e., collected for each crossing over the Atlantic, in conjunction with the DEN/ICE charges; b) the Joint Financing Section of ICAO be invited to finalize the financial arrangement as shown in Appendix J for the NAT height monitoring system using ADS-B data; and c) NAT SPG/59 to be provided with a progress report on the above.	b) completed. Arrangement being circulated to States for signature. United States pending	On-going
C 58/15 - PfA to the NAT SPG Handbook, NAT Doc 001	That, the: a) NAT SPG Terms of Reference (ToRs) be amended in order to be aligned with the Generic Terms of Reference for Planning and Implementation Groups and Regional Aviation Safety Groups (PIRGs/RASGs), approved by the ICAO Council on 21 August 2020; b) proposed set of SKPIs for the NAT as reflected in Section 5:A SAFETY RELATED POLICIES at Appendix K be adopted; c) North Atlantic Systems Planning Group (NAT SPG) Handbook (NAT Doc 001) be amended as presented at Appendix K; and d) ICAO Regional Director, Europe and North Atlantic, take appropriate action to publish and promulgate the updated North Atlantic Systems Planning Group (NAT SPG) Handbook (NAT Doc 001).	Published on EUR/NAT website SL EUR/NAT 22-0274.TEC of 4 August 2022 refers.	Closed
C 58/16 - PfA to NAT Doc 006, Part I	That the ICAO Regional Director, Europe and North Atlantic, take appropriate action to publish the new edition of Air Traffic Management Operational Contingency Plan – North Atlantic Region (NAT Doc 006, Part I) as provided at Appendix L.	Published on EUR/NAT website SL EUR/NAT 22-0274.TEC of 4 August 2022 refers.	Closed

Reference/Title	Description	Comments	Status
C 58/17- PfA to NAT SUPPs and NAT Doc 007 related to NAT communication failure procedures	That, a) proposed amendment to the NAT Regional Supplementary Procedures (NAT SUPPs, Doc 7030/5) related to communication failure procedures as detailed in Appendix M be endorsed; b) proposed amendment to the North Atlantic Operations and Airspace Manual (NAT Doc 007) related to communication failure procedures as detailed in Appendix N be endorsed; and c) ICAO Regional Director, Europe and North Atlantic, take appropriate action to process the proposed amendment to the NAT Regional Supplementary Procedures and publish and promulgate the updated NAT Doc 007.	a) IOM EUR/NAT 22-286.TEC of 9 August 2022 refers. b) Update Doc 007 after SUPPs PfA approved or on date of OCR implementation (whichever comes first).	On-going
C 58/18 - Amendment to the PBCS Monitoring and Reporting Guidance (NAT Doc 011)	That: a) the PBCS Monitoring and Reporting Guidance (NAT Doc 011) be amended to remove the guidance concerning inclusion of aircraft with insufficient data from the monthly non-compliance reports, as at Appendix O; b) the NAT IMG be included in the list of groups responsible for updates of the NAT Doc 011 in Section 6:A [Documents promulgated by the NAT SPG] of the NAT SPG Handbook (NAT Doc 001); and c) the ICAO Regional Director, Europe and North Atlantic take appropriate action to publish the amended version of NAT Doc 011, as soon as practical.	Published on EUR/NAT website SL EUR/NAT 22-0274.TEC of 4 August 2022 refers.	Closed

APPENDIX D — STATUS OF ONGOING NAT PROJECT TEAMS AS OF 12 JUNE 2023

(paragraph 1.6.1 refers)

Created at	Project Team	Parent Group	Supervisor	Project Title	Start date	End date	Lead	Report	Progress Status
NAT SOG Dec 28/06	NAT TBCRM PT	NAT SOG	NAT MWG	NAT Trajectory-based Collision Risk Modelling	15/6/2023	31/06/2024	Nabil AFODJO (Canada)	NAT SOG/30	On-going
NAT EFFG Dec 44/01	NAT TFMR PT	NAT EFFG	NAT EFFG	NAT EFFG Traffic Forecast Methodology Review Project Team	10/10/2023	30/04/2024	Jonathan Corning (USA)	NAT EFFG/46	On-going
NAT IMG Dec 61/02	NAT GANP Transition PT	NAT IMG	NAT IMG	NAT IMG GANP Transition Project Team	TBD	TBD	Sven Halle (ICAO EUR/NAT)	TBD	On-going
NAT SPG Con 59/04	NAT DISTREX PT	NAT SPG	NAT SOG /NAT IMG	NAT Autonomous Distress Tracking Exercise with Location of an Aircraft in Distress Repository Project Team	1/1/2023	1/1/2024	Steven Pinkerton (US FAA)	NAT SPG/60	On-going
NAT SPG/57	NER PT	NAT SPG	NAT SPG	New Entrant Readiness Project Team	01/12/2021	30/06/2023	Colin Scott (UK CAA)	NAT SPG/59	On-going
NAT POG/06	OCR PT	NAT POG	NAT POG	NAT Oceanic Clearance Removal (OCR) PT	01/09/2018	30/04/2023	Shelley BAILEY, Canada	NAT IMG/63	On-going
NAT SOG Dec 27/01	NAT Doc011 REV PT	NAT SOG	NAT SOG	NAT Doc 011 Revision Project Team	01/12/2022	30/03/2023	Thomas Kirkhope (UK)	NAT SOG/28	COMPLETED
NAT SOG Dec 26/02	NMOM PT	NAT SOG	NAT MWG	NAT MWG Occupancy Methods PT	09/01/2022	30/06/2023	Nabil Afodjo (Canada)	NAT SOG/28	COMPLETED
NAT SOG Dec 25/03	OCR RSCR PT	NAT SOG	NAT SOG	Review of Oceanic Clearance Removal NAT Regional Safety Case	18/02/2022	15/12/2022	Danielle Crudden (US FAA)	NAT SOG/27	COMPLETED
NAT SPG Con 57/11	MHP PT	NAT SPG	NAT SOG	NAT MNPS/HLA&PBN Approval Project Team	01/06/2021	15/12/2022	Madison Walton (US FAA)	NAT SOG/27	COMPLETED
NAT IMG Dec 52/9	NODAR PT	NAT TIG	NAT TIG	NAT Network Outage Detection and Reporting (NODAR)	01/04/2018	04/11/2022	Theresa Brewer, United States	NAT IMG/61	COMPLETED

**APPENDIX E — PROPOSED AMENDMENTS TO NAT AIR NAVIGATION PLAN VOLUME III (NAT
EANP, DOC 9634)**

(paragraph 2.1.2 refers)

Starts on next page

NORTH ATLANTIC (NAT) AIR NAVIGATION PLAN

VOLUME III

~~XX19 June~~ ~~January~~ 2023~~2~~

ENDORSED BY NAT SPG/598*

Secretariat Note: An update of Parts 0 and I is being coordinated with ICAO Headquarters and Regional Offices.

* ~~Endorsed by correspondence~~ (NAT SPG Conclusion 58/159/5 refers)

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NAT ANP, VOLUME III

PART 0 – INTRODUCTION

1. INTRODUCTION

1.1 The background to the publication of ANPs in three volumes is explained in the Introduction in Volume I. The procedure for amendment of Volume III is also described in Volume I. Volume III contains dynamic/flexible plan elements related to the implementation of the air navigation system and its modernization in line with the ICAO Aviation System Block Upgrades (ASBUs) and associated technology roadmaps described in the Global Air Navigation Plan (GANP).

1.2 The information contained in Volume III is related mainly to:

- Planning: objectives set, priorities and targets planned at regional or sub-regional levels;
- Implementation monitoring and reporting: monitoring of the progress of implementation towards targets planned. This information should be used as the basis for reporting purposes (i.e.: global and regional air navigation reports and performance dashboards); and/or
- Guidance: providing regional guidance material for the implementation of specific system/procedures in a harmonized manner.

1.3 The management of Volume III is the responsibility of the North Atlantic Systems Planning Group (NAT SPG).

1.4 Volume III should be used as a tool for monitoring and reporting the status of implementation of the elements planned here above, through the use of tables/databases and/or references to online monitoring tools, as endorsed by NAT SPG. The status of implementation is updated on a regular basis as endorsed by the NAT SPG.

2. AVIATION SYSTEM BLOCK UPGRADES (ASBUs), MODULES AND ROADMAPS

2.1. The ASBU Modules and Roadmaps form a key component to the GANP, noting that they will continue to evolve as more work is done on refining and updating their content and in subsequent development of related provisions, support material and training.

2.2. Although the GANP has a worldwide perspective, it is not intended that all Block Upgrade Modules are required to be applied in every State, sub-region and/or region. Many of the Block Upgrade Modules contained in the GANP are specialized packages that should be applied only where the specific operational requirement exists or corresponding benefits can be realistically projected. Accordingly, the Block Upgrade methodology establishes an important flexibility in the implementation of its various Modules depending on a region, sub-region and/or State's specific operational requirements. Guided by the GANP, ICAO NAT regional, sub-regional and State planning should identify Modules which best provide the needed operational improvements.

NAT ANP, VOLUME III

PART I - GENERAL PLANNING ASPECTS (GEN)

1. PLANNING METHODOLOGY

1.1 Guided by the GANP, the regional planning process starts by identifying the homogeneous ATM areas, major traffic flows and international aerodromes. An analysis of this data leads to the identification of opportunities for performance improvement. Modules from the Aviation System Block Upgrades (ASBUs) are evaluated to identify which of those modules best provide the needed operational improvements. Depending on the complexity of the module, additional planning steps may need to be undertaken including financing and training needs. Finally, regional plans would be developed for the deployment of modules by drawing on supporting technology requirements. This is an iterative planning process which may require repeating several steps until a final plan with specific regional targets is in place. This planning methodology requires full involvement of States, service providers, airspace users and other stakeholders, thus ensuring commitment by all for implementation.

1.2 Block 0 features Modules characterized by technologies and capabilities which have already been developed and implemented in many parts of the world today. It therefore features a near-term availability milestone, or Initial Operating Capability (IOC), of 2013 for high density based on regional, sub-regional and State operational need. Blocks 1 through 3 are characterized by both existing and projected performance area solutions, with availability milestones beginning in 2018, 2023 and 2028 respectively.

2. REVIEW AND EVALUATION OF AIR NAVIGATION PLANNING

2.1. The progress and effectiveness against the priorities set out in the regional air navigation plans should be annually reported, using a consistent reporting format, to ICAO.

2.2. Performance monitoring requires a measurement strategy. Data collection, processing, storage and reporting activities supporting the identified global/regional performance metrics are fundamental to the success of performance-based approaches.

2.3. The air navigation planning and implementation performance framework prescribes reporting, monitoring, analysis and review activities being conducted on a cyclical, annual basis. An Air Navigation Reporting Form (ANRF) reflecting selected key performance areas as defined in the Manual on Global Performance of the Air Navigation System (ICAO Doc 9883) has been developed for each ASBU Module. The ANRF is a customized tool which is recommended for the application of setting planning targets, monitoring implementation, and identifying challenges, measuring implementation/performance and reporting. If necessary, other reporting formats that provide more details may be used but should contain as a minimum the elements described in the ANRF template. A sample of the ANRF is provided in **Appendix A**. A sample Template of a planning table which may be used to show the elements planned in an ICAO region is provided in **Appendix B**.

3. REPORTING AND MONITORING RESULTS

3.1 Reporting and monitoring results will be analyzed by the PIRGs, States and ICAO Secretariat to steer the air navigation improvements, take corrective actions and review the allocated objectives, priorities and targets if needed. The results will also be used by ICAO and aviation partner stakeholders to develop the annual Global Air Navigation Report. The report results will provide an opportunity for the international civil aviation community to compare progress across different ICAO regions in the establishment of air navigation infrastructure and performance-based procedures.

3.2 The reports will also provide the ICAO Council with detailed annual results on the basis of which tactical adjustments will be made to the performance framework work programme, as well as triennial policy adjustments to the GANP and the Block Upgrade Modules.

3.3 **Table GEN III-1** contains a minimum set of Implementation Indicator(s) for each of the eighteen ASBU Block 0 Modules necessary for the monitoring of these Modules (if identified as a priority for implementation at regional or sub-regional level). These indicators are intended to enable comparison between ICAO Regions with respect to ASBU Block 0 Modules and will apply only to commonly selected ASBU Modules. All regions/PIRGs reserve the right to select the ASBU Modules relevant to their needs and to endorse additional indicators, as deemed necessary. No reporting is required for ASBU Block 0 Modules that have not been selected.

Note: The priority for implementation as well as the applicability area of each selected ASBU Block 0 Module is to be defined by the NAT SPG. This should be reflected in Part II – Air Navigation System Implementation.

TABLE GEN III-1 – IMPLEMENTATION INDICATOR(S) FOR EACH ASBU BLOCK 0 MODULE**Explanation of the Table**

- 1 Block 0 Module Code
 2 Block 0 Module Title
 3 High level Implementation Indicator
 4 Remarks *Additional information as deemed necessary.*

Module Code	Module Title	Implementation Indicator	Remarks
1	2	3	4
B0-APTA	Optimization of Approach Procedures including vertical guidance	% of international aerodromes having at least one runway end provided with APV Baro-VNAV or LPV procedures	
B0-WAKE	Increased Runway Throughput through Optimized Wake Turbulence Separation	% of applicable international aerodromes having implemented increased runway throughput through optimized wake turbulence separation	1. Not to be considered for the first reporting cycles due to lack of maturity. 2. List of Ads to be established through regional air navigation agreement.
B0-RSEQ	Improve Traffic flow through Runway Sequencing (AMAN/DMAN)	% of applicable international aerodromes having implemented AMAN / DMAN	1. Not to be considered for the first reporting cycles due to lack of maturity. 2. List of Ads to be established through regional air navigation agreement.
B0-SURF	Safety and Efficiency of Surface Operations (A-SMGCS Level 1-2)	% of applicable international aerodromes having implemented A-SMGCS Level 2	List of Ads to be established through regional air navigation agreement.
B0-ACDM	Improved Airport Operations through Airport-CDM	% of applicable international aerodromes having implemented improved airport operations through airport-CDM	List of Ads to be established through regional air navigation agreement.
B0-FICE	Increased Interoperability, Efficiency and Capacity through Ground-Ground Integration	% of FIRs within which all applicable ACCs have implemented at least one interface to use AIDC / OLDI with neighbouring ACCs	
B0-DATM	Service Improvement through Digital Aeronautical Information Management	- % of States having implemented an AIXM based AIS database - % of States having implemented QMS	

Module Code	Module Title	Implementation Indicator	Remarks
1	2	3	4
B0-AMET	Meteorological information supporting enhanced operational efficiency and safety	- % of States having implemented SADIS / WIFS - % of States having implemented QMS	
B0-FRTO	Improved Operations through Enhanced En-Route Trajectories	% of FIRs in which FUA is implemented	
B0-NOPS	Improved Flow Performance through Planning based on a Network-Wide view	% of FIRs within which all ACCs utilize ATFM systems	
B0-ASUR	Initial capability for ground surveillance	% of FIRs where ADS-B OUT and/or MLAT are implemented for the provision of surveillance services in identified areas.	1. Not to be considered for the first reporting cycles due to lack of maturity.
B0-ASEP	Air Traffic Situational Awareness (ATSA)	% of States having implemented air traffic situational awareness	1. Not to be considered for the first reporting cycles due to lack of maturity.
B0-OPFL	Improved access to optimum flight levels through climb/descent procedures using ADS-B	% of FIRs having implemented in-trail procedures	1. Not to be considered for the first reporting cycles due to lack of maturity.
B0-ACAS	ACAS Improvements	% of States requiring carriage of ACAS (with TCAS 7.1 evolution)	
B0-SNET	Increased Effectiveness of Ground-Based Safety Nets	% of States having implemented ground-based safety-nets (STCA, APW, MSAW, etc.)	
B0-CDO	Improved Flexibility and Efficiency in Descent Profiles (CDO)	- % of international aerodromes / TMAs with PBN STAR implemented - % of international aerodromes/TMA where CDO is implemented	
B0-TBO	Improved Safety and Efficiency through the initial application of Data Link En-Route	% of FIRs utilising data link en-route in applicable airspace	
B0-CCO	Improved Flexibility and Efficiency Departure Profiles - Continuous Climb Operations (CCO)	- % of international aerodromes / TMAs with PBN SID implemented - % of international aerodromes/TMA where CCO is implemented	

Appendix A

SAMPLE TEMPLATE

1. AIR NAVIGATION REPORT FORM (ANRF)

(This template demonstrates how ANRF to be used.

The data inserted here refers to ASBU B0-05/CDO as an example only)

Regional and National planning for ASBU Modules

2. REGIONAL/NATIONAL PERFORMANCE OBJECTIVE – B0-05/CDO: Improved Flexibility and Efficiency in Descent Profiles Performance Improvement Area 4: Efficient Flight Path – Through Trajectory-based Operations					
3. ASBU B0-05/CDO: Impact on Main Key Performance Areas (J & A)					
	Access & Equity	Capacity	Efficiency	Environment	Safety
Applicable	N	N	Y	Y	Y
4. ASBU B0-05/CDO: Planning Targets and Implementation Progress					
5. Elements			6. Targets and implementation progress (Ground and Air)		
1. CDO					
2. PBN STARs					
7. ASBU B0-05/CDO: Implementation Challenges					
Elements	Implementation Area				
	Ground system Implementation	Avionics Implementation	Procedures Availability	Operational Approvals	
1. CDO					
2. PBN STARs					

8. Performance Monitoring and Measurement 8A. ASBU B0-05/CDO: Implementation Monitoring	
Elements	Performance Indicators/Supporting Metrics
1. CDO	Indicator: Percentage of international aerodromes/TMAs with CDO implemented Supporting metric: Number of international aerodromes/TMAs with CDO implemented
2. PBN STARs	Indicator: Percentage of international aerodromes/TMAs with PBN STARs implemented Supporting metric: Number of international aerodromes/TMAs with PBN STARs implemented

8. Performance Monitoring and Measurement 8 B. ASBU B0-05/CDO: Performance Monitoring	
Key Performance Areas (Out of eleven KPAs, for the present until experienced gained, only five have been selected for reporting through ANRF)	Where applicable, indicate qualitative Benefits,
Access & Equity	No applicable
Capacity	Not applicable
Efficiency	Cost savings through reduced fuel burn. Reduction in the number of required radio transmissions.
Environment	Reduced emissions as a result of reduced fuel burn
Safety	More consistent flight paths and stabilized approach paths. Reduction in the incidence of controlled flight into terrain (CFIT).
9. Identification of performance metrics: It is not necessary that every module contributes to all of the five KPAs. Consequently, a limited number of metrics per type of KPA, serving as an example to measure the module(s)' implementation benefits, without trying to apportion these benefits between module, have been identified on page 5. For the family of ASBU modules selected for air navigation implementation, States/Region to choose the applicable performance (benefit) metrics from the list available on page 5. This approach would facilitate States in collecting data for the chosen performance metrics. States/Region, however, could add new metrics for different KPAs based on maturity of the system and ability to collect relevant data.	

AIR NAVIGATION REPORT FORM HOW TO USE - EXPLANATORY NOTES

1. **Air Navigation Report Form (ANRF):** This form is nothing but the revised version of Performance Framework Form that was being used by Planning and Implementation Regional Groups (PIRGs)/States until now. The ANRF is a customized tool for Aviation System Block Upgrades (ASBU) Modules which is recommended for application for setting planning targets, monitoring implementation, identifying challenges, measuring implementation/performance and reporting. Also, the PIRGs and States could use this report format for any other air navigation improvement programmes such as Search and Rescue. If necessary, other reporting formats that provide more details may be used but should contain as a minimum the elements described in this ANRF template. The results will be analysed by ICAO and aviation partners and utilized in the Regional Performance Dashboards and the Annual Air Navigation Report. The conclusions from the Air Navigation Report will serve as the basis for future policy adjustments, aiding safety practicality, affordability and global harmonization, amongst other concerns.
2. **Regional/National Performance objective:** In the ASBU methodology, the performance objective will be the title of the ASBU module itself. Furthermore, indicate alongside the corresponding Performance Improvement area (PIA).
3. **Impact on Main Key Performance Areas:** Key to the achievement of a globally interoperable ATM system is a clear statement of the expectations/benefits to the ATM community. The expectations/benefits are referred to eleven Key Performance Areas (KPA) and are interrelated and cannot be considered in isolation since they are necessary for the achievement of the objectives established for the system as a whole. It should be noted that since safety is the highest priority, the eleven KPAs shown below are in alphabetical order as they should appear in English. They are access/equity; capacity; cost effectiveness; efficiency; environment; flexibility; global interoperability; participation of ATM community; predictability; safety; security. However, out of these eleven KPAs, for the present, only five have been selected for reporting through ANRF, which are Access & Equity, Capacity, Efficiency, Environment and Safety. The KPAs applicable to respective ASBU module are to be identified by marking (Yes) or No (No). The impact assessment could be extended to more than five KPAs mentioned above if the capacity of the national system allows and the process is available within the State to collect the data.
4. **Planning and Implementation Progress:** This section indicates planning targets and status of progress in the implementation of different elements of the ASBU Module for both air and ground segments.
5. **Elements related to ASBU module:** Under this section list elements that are needed to implement the respective ASBU Module. Furthermore, should there be elements that are not reflected in the ASBU Module (example: In ASBU B0-80/ACDM, Aerodrome certification and data link applications D-VOLMET, D-ATIS, D-FIS are not included; Similarly in ASBU B0-30/DAIM, note that WGS-84 and eTOD are not included) but at the same time if they are closely linked to the module, ANRF should specify those elements. As a part of guidance to PIRGs/States, every Regional ANP will have the complete list of all 18 Modules of ASBU Block 0 along with corresponding elements, equipage required on the ground and in the air as well as metrics specific to both implementation and performance (benefits).
6. **Targets and implementation progress (Ground and Air):** Planned implementation date (month/year) and the current status/responsibility for each element are to be reported in this section. Please provide as much details as possible and should cover both avionics and ground systems. This ANRF being high level document, develop necessary detailed action plan separately for each element/equipage.

7. **Implementation challenges:** Any challenges/problems that are foreseen for the implementation of elements of the Module are to be reported in this section. The purpose of the section is to identify in advance any issues that will delay the implementation and if so, corrective action is to be initiated by the concerned person/entity. The four areas, under which implementation issues, if any, for the ASBU Module to be identified, are as follows:

- Ground System Implementation:
- Avionics Implementation:
- Procedures Availability:
- Operational Approvals:

Should be there no challenges to be resolved for the implementation of ASBU Module, indicate as “NIL”.

8. **Performance Monitoring and Measurement:** Performance monitoring and measurement is done through the collection of data for the supporting metrics. In other words, metrics are quantitative measure of system performance – how well the system is functioning. The metrics fulfil three functions. They form a basis for assessing and monitoring the provision of ATM services, they define what ATM services user value and they can provide common criteria for cost benefit analysis for air navigation systems development. The Metrics are of two types:

- A. **Implementation Monitoring:** Under this section, the indicator supported by the data collected for the metric reflects the status of implementation of elements of the Module. For example- Percentage of international aerodromes with CDO implemented. This indicator requires data for the metric “number of international aerodromes with CDO”.
- B. **Performance Monitoring:** The metrics in this section allows to assess benefits accrued as a result of implementation of the module. The benefits or expectations, also known as Key Performance Areas (KPAs), are inter-related and cannot be considered in isolation since all are necessary for the achievement of the objective established for the system as a whole. It should be noted that while safety is the highest priority, the eleven KPAs shown below are in alphabetical order as they would appear in English. They are access/equity; capacity; cost effectiveness; efficiency; environment; flexibility; global interoperability; participation of ATM community; predictability; safety; and security. However, out of these eleven KPAs, for the present until experienced gained, only five have been selected for reporting through ANRF, which are Access & Equity, Capacity, Efficiency, Environment and Safety. Where applicable, mention qualitative benefits under this section.

9. **Identification of performance metrics:** It is not necessary that every module contributes to all of the five KPAs. Consequently, a limited number of metrics per type of KPA, serving as an example to measure the module(s)’ implementation benefits, without trying to apportion these benefits between module, have been identified on page 6. For the family of ASBU modules selected for air navigation implementation, States/Region to choose the applicable performance (benefit) metrics from the list available on page 6. This approach would facilitate States in collecting data for the chosen performance metrics. States/Region, however, could add new metrics for different KPAs based on maturity of the system and ability to collect relevant data.

SAMPLE

NAT ANP, VOLUME III

PART II – NAT ~~2030~~ VISION

1. NAT ~~2030~~ VISION STATEMENT

1.1 Through collaboration and by leveraging innovation, the NAT SPG~~North Atlantic Region~~ leads the way for~~in the provision of safe, secure, efficient, sustainable and resilient Oceanic Air Traffic Management Services by leveraging emerging technologies in the North Atlantic in order to ensure~~ realize maximum efficiencies and ensure an optimized seamless service~~airspace provision~~.

2 NAT ~~2030~~ VISION HIGH LEVEL PRINCIPLES

2.1 Following are the agreed NAT ~~2030~~ Vision High Level Principles:

- a) Respond to changing traffic profiles in a safe, efficient and sustainable manner based on agreed performance based measurable criteria. Meet, and where possible, exceed the NAT Safety Targets.
- b) Enhance and develop the NAT airspace to safely and effectively integrate all anticipated airspace users, while aligning with the Global Air Navigation Plan (GANP) and Global Aviation Safety Plan (GASP), as required.
- c) Utilise operational and technological developments to improve safety, service delivery and efficiency of operations.
- d) Implementations should be based on business analysis encompassing safety, service and environmental benefits, cost and practicality.
- e) Include all stakeholders, and, when relevant, military authorities, in a collaborative decision making process to effect change.”

2.2 Following are the agreed NAT ~~2030~~ Vision Goals and Objectives:

	Goal	Objective
1	Ensure as far as possible that all NAT developments are implemented in cooperation with all adjacent regions and industry wide stakeholders to achieve ~~the~~ context of “seamless boundaries.” ²²	All stakeholders, including other regional environments, will be engaged in the development and implementation of the NAT Vision to ensure all operational and technical capabilities are appropriately exploited ~~Take full account of the other regional environments~~ such that we have seamless operational boundaries.
2	Enhanced resilience and predictability of the NAT wide operations.	1. Weather and other operational impacting events are managed through appropriate and agreed plans with minimum of operational impact. 2. That operations consistently adopt across the NAT, new advanced tools to enhance proactive management of potentially operational impacting events. 3. The NAT Contingency procedures shall be continually reviewed to take account of the developing understanding of advancements in aircraft/new entrants technical resilience. 4. Resilience of communications infrastructure is ensured.

	Goal	Objective
3	~~Continued cooperation with all adjacent regions and industry wide stakeholders to achieve seamless boundaries.~~	~~All stakeholders will be engaged in the development and implementation of the Development Roadmap to ensure all operational and technical capabilities are appropriately exploited.~~
34	The NAT operations takes account of both the prevailing and forecast operational and stakeholders' capabilities and implements proportionate performance based outcomes.	1. New technology will be supported by an agreed Concept of Operations and a safe and cost-effective solution. 2. The NAT will optimizse utilisation of current capabilities whilst ensuring all new developments do not inadvertently impact prevailing capabilities. 3. The development roadmap will be continually validated to ensure it remains relevant.
45	The NAT technology roadmap is aligned to the practical capabilities that will exist to 2030.	Maximised benefits from available technologies.
56	Safety, Service, Value and Environment benefits are measurable using representative metrics and are part of not only the business case for all developments but are used to monitor the NAT performance.	Performance based metrics and meeting the NAT safety targets, including TLS, as well as any other future performance targets.

3 GOALS, OBJECTIVES AND POTENTIAL IMPROVEMENT AREAS

3.1 Following is the agreed list of NAT 2030-Vision goals, objectives and potential improvement areas:

NAT 2030-Vision Matrix					
	• Prioritisation: (1 to 5): One (Essential/Benefit); Two (Preferred) Three (Enhancement) Four (New); Five (Desirable but not 1 - 4) • Feasibility/Timeline: (1-3): One (2021 -2023), Two (2023 – 2026), Three (2026 – 2031) • Sub-Group: (IMG, SOG, POG, TIG etc.).				
Goal-1	Ensure as far as possible that all NAT developments are implemented in cooperation with all adjacent regions and industry wide stakeholders to achieve the context of “seamless boundaries.				
Objective	Take full account of the other regional environments such that we have seamless operational boundaries.				
	Potential Improvement	Prioritisation	Feasibility Timeline	NAT Sub-Group	Linked to Goal
1-1	Ensure optimal use of the currently available technology as this will continue to be in use by 2030. Pursue further improvements to FANS 1/A.	2	2023-2026	TIG/IMG	(Goal 4)
1-2	Consider Prepare for ATSN B2 introduction	4	2026-2031	TIG	(Goal 4)
1-3	Reduce the footprint of the OTS (lateral, vertical and time period)	2	20223-2026	POG/TIG IMG/SOG	(Goal 4)
1-4	EnhanceConsider the use of User Preferred Routings (UPR)	2	20223-2026	POG/TIG IMG/SOG	(Goal 4)
1-5	Only apply speed restrictions when needed for separation (OWAFS) (work already in progress);	1	2021-20243	POG/SOG/IMG	(Goal 4)
1-6	Discontinue oceanic clearances;	1	2021-20243	POG/SOG/IMG	(Goal 4)
1-7	Strategic vs Tactical control/Reduced conflict probe horizon (The use of reliable communications and surveillance to eliminate the need for clearances to define conflict free profiles which extend all the way to landfall. Rather, conflicts will be progressively resolved over the duration of the flight.);	2	2021-2023	POG/IMG	(Goal 4)
1-8	Dynamic Airborne Rerouting Procedure DARP;	1	2021-2023	POG/TIG/IMG	(Goal 4)
1-79	Consider RVSM above FL410;	3	2021-2023	OPDLWG ATMOPS POG/TIG IMG/SOG/SASP	(Goal 4)
1-10	Consider formation flights;	5	2026-2031	POG/TIG	(Goal 4)

NAT 2030-Vision Matrix					
	• Prioritisation: (1 to 5): One (Essential/Benefit); Two (Preferred) Three (Enhancement) Four (New); Five (Desirable but not 1 - 4) • Feasibility/Timeline: (1-3): One (2021 -2023), Two (2023 – 2026), Three (2026 – 2031) • Sub-Group: (IMG, SOG, POG, TIG etc.).				
Goal-1	Ensure as far as possible that all NAT developments are implemented in cooperation with all adjacent regions and industry wide stakeholders to achieve the context of “seamless boundaries.				
Objective	Take full account of the other regional environments such that we have seamless operational boundaries.				
	Potential Improvement	Prioritisation	Feasibility Timeline	NAT Sub-Group	Linked to Goal
				IMG/SOG	
1-11	Self Separation	4	2026-2031	POG	(Goal 4)
1-7812	Accommodation of new entrants – supersonic aircraft	3	2026-2031	POG/IMG/SOG	(Goal 4)
1-8913	Drive and develop standard procedures for Accommodation of new entrants – UAS, UTM, and balloons and operations above FL460.	3	2026-2031	POG/IMG/SOG	(Goal 4)
1-14	Accommodation of new entrants – operations above FL460.	3	2026-2031	POG/IMG/SOG	(Goal 4)
1-9	Safe integration of Commercial Space Operations (CSO)	2	2023-2025	POG/IMG/SOG	(Goal 4)

NAT 2030-Vision Matrix					
• Prioritisation: (1 to 5): One (Essential/Benefit); Two (Preferred) Three (Enhancement) Four (New); Five (Desirable but not 1 - 4) • Feasibility/Timeline: (1-3): One (2021 -2023), Two (2023 – 2026), Three (2026 – 2031) • Sub-Group: (IMG, SOG, POG, TIG etc.).					
Goal-2	Enhanced resilience and predictability of the NAT wide operations.				
Objective	1. Weather and other operational impacting events are managed through appropriate and agreed plans with minimum of operational impact. 2. We consistently adopt across the NAT, new advanced tools to enhance our proactive management of potentially operational impacting events. 3. The NAT Contingency procedures shall be continually reviewed to take account of the developing understanding of advancements in aircraft/new entrants technical resilience. 4. Resilience of communications infrastructure is ensured.				
	Potential Improvement	Prioritisation	Feasibility Timeline	NAT Sub-Group	Linked to Goal
2-1	~~Communication systems resilience – SATVOICE Migration from HF Voice to SATVOICE as backup to FANS~~	2	2023-2026	POG/TIG/IMG	(Goal 4)
2-12	Communication systems resilience – Digital HF developments	3	2026-2031	POG/TIG/IMG	(Goal 4)
2-23	Communication systems resilience – Space Based VHF	3	2021-2023	POG/TIG/IMG	(Goal 4)
2-4	~~Improvements to end to end performance to meet at least RCP 240 and including their associated SRs~~	4	2021-2023	POG	(Goal 4)
2-5	~~Improvements to end to end performance to meet at least RSP 180, including their associated SRs~~	4	2021-2023	TIG	(Goal 4)
2-6	~~NAT Contingency procedures shall be continually reviewed (every Spring).~~	4	2021-2031	POG	(Goal 4)
2-7	~~Ensure systems cybersecurity and resilience.~~	4	2021-2031	POG/TIG/IMG/SOG	(Goal 4)
2-8	~~Consider space weather factors as part of contingency procedures.~~	2	2021-2023	POG	(Goal 4)

NAT 2030 Vision Matrix					
• Prioritisation: (1 to 5): One (Essential/Benefit); Two (Preferred) Three (Enhancement) Four (New); Five (Desirable but not 1 – 4) • Feasibility/Timeline: (1-3): One (2021 – 2023), Two (2023 – 2026), Three (2026 – 2031) • Sub-Group: (IMG, SOG, POG, TIG etc.).					
Goal-3	Continued cooperation with all adjacent regions and industry wide stakeholders to achieve seamless boundaries.				
Objective	All stakeholders will be engaged in the development and implementation of the Development Roadmap to ensure all operational and technical capabilities are appropriately exploited.				
	Potential Improvement	Prioritisation	Feasibility Timeline	NAT Sub-Group	Linked to Goal
3-1	The ICAO Aviation System Block Upgrades (ASBU) document will be reviewed at every Spring IMG.	1	2021-2031	IMG	(Goal 4) & (Goal 5)

NAT 2030 Vision Matrix					
• Prioritisation: (1 to 5): One (Essential/Benefit); Two (Preferred) Three (Enhancement) Four (New); Five (Desirable but not 1 - 4) • Feasibility/Timeline: (1-3): One (2021 -2023), Two (2023 – 2026), Three (2026 – 2031) • Sub-Group: (IMG, SOG, POG, TIG etc.).					
Goal-34	The NAT operations takes account of both the prevailing and forecast operational and stakeholders' capabilities and implements proportionate performance-based outcomes.				
Objective	1. New technology will be supported by an agreed Concept of Operations and a safe and cost-effective solution. 2. We will optimise utilisation of current capabilities whilst ensure all new developments do not inadvertently impact prevailing capabilities. 3. The development roadmap will be continually validated to ensure it remains relevant.				
	Potential Improvement	Prioritisation	Feasibility Timeline	NAT Sub-Group	Linked to Goal
34-1	Space-based ADS-B surveillance (work already in progress);	1	2021-2023	POG/TIG	(Goal 1)
4-2	Use of aircraft downlink parameters (i.e. pilot selected level);	2	2023-2026	POG / TIG/IMG	(Goal 1)
34-23	Support implementation of SWIM and FF-ICE;	3	2026-2031	ALL	(Goal 1)
4-4	Address the regulatory oversight of CSPs and SSPs;	4	2021-2023	TIG OPDLWG IMG/SOG	(Goal 1)

NAT 2030-Vision Matrix					
• Prioritisation: (1 to 5): One (Essential/Benefit); Two (Preferred) Three (Enhancement) Four (New); Five (Desirable but not 1 - 4) • Feasibility/Timeline: (1-3): One (2021 -2023), Two (2023 – 2026), Three (2026 – 2031) • Sub-Group: (IMG, SOG, POG, TIG etc.).					
Goal-45	The NAT ~~Our~~ technology roadmap is aligned to the practical capabilities that will exist to 2030.				
Objective	~~Maximised benefits from available technologies.~~				
	Potential Improvement	Prioritisation	Feasibility Timeline	NAT Sub-Group	Linked to Goal
45-1	The ICAO Aviation System Block Upgrades (ASBU) document will be reviewed at every Spring IMG.	1	2023-2031 ~~23~~	All Groups	(Goal 3) and (Goal 4)

NAT 2030-Vision Matrix					
• Prioritisation: (1 to 5): One (Essential/Benefit); Two (Preferred) Three (Enhancement) Four (New); Five (Desirable but not 1 - 4) • Feasibility/Timeline: (1-3): One (2021 -2023), Two (2023 – 2026), Three (2026 – 2031) • Sub-Group: (IMG, SOG, POG, TIG etc.).					
Goal-56	Safety, Service, Value and Environment benefits are measurable using representative metrics and are part of not only the business case for all developments but are used to monitor the NAT performance.				
Objective	~~Performance based metrics and meeting the NAT safety targets, including TLS, as well as any other future performance targets.~~				
	Potential Improvement	Prioritisation	Feasibility Timeline	NAT Sub-Group	Linked to Goal
56-1	NAT Safety Targets;	1	2023-2025 ~~3~~	All Groups	
56-2	Horizontal Flight Efficiency;	1	2023-2025 ~~3~~	All Groups New Group Required	
56-3	Vertical Flight Efficiency;	1	2023-2025 ~~3~~	All Groups New Group Required	
56-4	Cost per 100KM (\$);	1	2023-2025 ~~3~~	All Groups New Group	
56-5	Monitoring, reporting and verification of CO ² emissions in accordance with Annex 16, Volume IV, and the Environmental Technical Manual (Doc 9501), Volume IV.	1	2023-2025 ~~3~~	All Groups New Group	

3.2 Following is a status summary of those NAT Vision improvement areas that are already in progress:

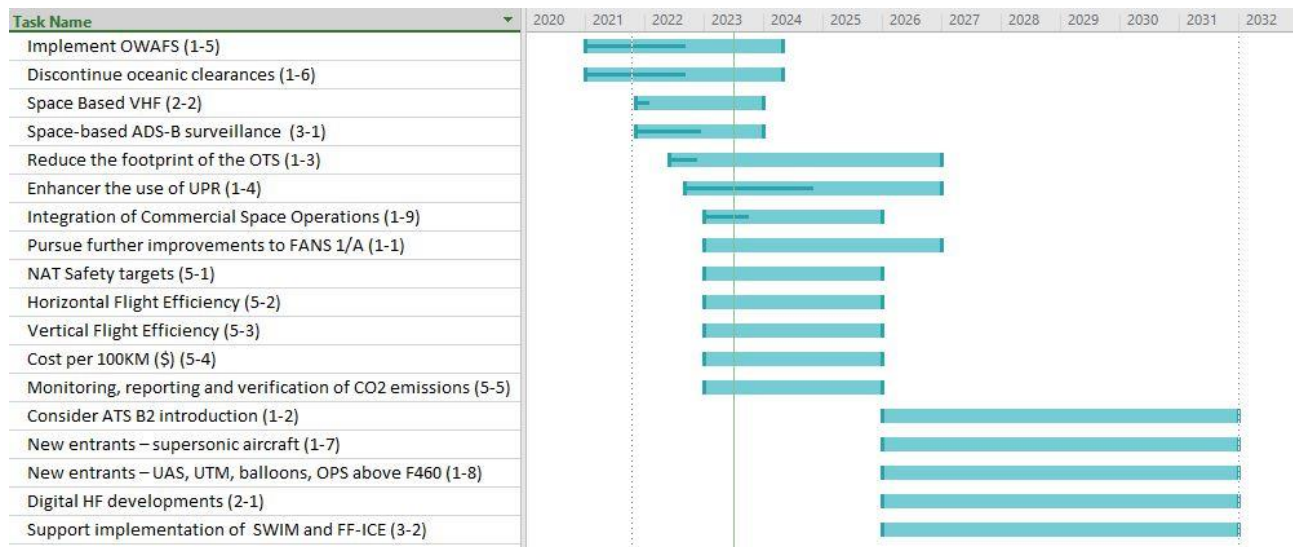
1-3	Reduce the footprint of the OTS (lateral, vertical and time period)
	• 2022: The vertical footprint of the OTS has been reduced by removing FL310, FL320 and FL330. • 2022: The NAT OTS Focus Group (NOD FG) continues its work on NAT OTS re-evaluation.
1-4	Enhance the use of User Preferred Routings (UPR)
	• 2022: NAT POG proposal to amend NAT Doc 007 with UPR guidance for Bodo, Shanwick and Santa Maria.
1-5	Only apply speed restrictions when needed for separation (OWAFS);
	• 2021: Oceanic clearances still include assigned Mach number and ATC issues a clearance to RESUME NORMAL SPEED after oceanic entry whenever possible. • The final step in OWAFS implementation will take place in Q2 2024 when oceanic clearances are discontinued, and the norm becomes that aircraft enter the NAT Region on normal speed.
1-6	Discontinue oceanic clearances;
	• 2021: Concept of operations is complete. • 2022: Documentation changes have been drafted and agreed in POG (Doc 7030, Doc 007, new OPS Bulletin). • NAT Regional safety case approved by NAT SOG in December 2022. • Implementation is expected in Q2 2024.

1-79	Consider RVSM above FL410;
	• 2022: NAT POG/14 Statistics on flight level usage were presented. • 2023 POG/15 provided a comprehensive statistics package of flight level usage for the NAT and proposed that any further investigation of this issue should be done at a global level. • 2023 NAT SPG/59 Approved the completion of this work and closure of this action.
2-2	Communication systems resilience – Space Based VHF
	• 2022: Initial information material discussed at NAT TIG/14.
4-1	The ICAO Aviation System Block Upgrades (ASBU) document will be reviewed at every Spring IMG.
	• 2024~~3~~: First review will be done in spring 2024~~3~~.

3-1	Space-based ADS-B surveillance
Implementation status: Bodo: • All of Bodo FIR. Iceland: • All of Reykjavik OCA except below FL255 south of 70N within Reykjavik FIR. Shanwick: • All of Shanwick OCA from 100 to 60.000 feet Gander: • All of Gander OCA from 5500 to 60.000 feet. Santa Maria: • All of Santa Maria FIR. New York OCA East • None.	

4 NAT Service Development Roadmap

4.1 The following is the NAT Service Development Roadmap in accordance with section 3 above.



NAT ANP, VOLUME III
PART III – AIR NAVIGATION SYSTEM/ASBU IMPLEMENTATION

Published as part of the NAT GANP/ASBU annual implementation status report
(<https://www.icao.int/EURNAT/Pages/EUR-and-NAT-Document.aspx>)

NAT ANP, VOLUME III
PART IV - AIR NAVIGATION SYSTEM/REGIONAL AVIATION SYSTEM
IMPROVEMENT (RASI) IMPLEMENTATION

Published as part of the NAT GANP/ASBU annual implementation status report
(<https://www.icao.int/EURNAT/Pages/EUR-and-NAT-Document.aspx>)

- END -

APPENDIX F — PROJECT DEFINITION OF NAT SPG COMMON METRICS PROJECT TEAM

(paragraph 2.1.6 refers)

NAT SPG Common Metrics Project Team (CM PT)	
Project Title	Common Metrics Project Team
Parent Group	NAT SPG
Project Supervisory Body	NAT IMG/NAT SOG
Project Period	July 2023-June 2024
Project Objective	To deliver on NAT Vision Goals and Objectives (in particular Goal 5), the Project Team is to agree on a common set of initial performance metrics across NAT Member States, including ANSPs and operators. To achieve this, the PT will: 1. Establish a baseline from which to measure performance. 2. Develop Key Performance Indicators (KPI) and Key Performance Areas (KPA), to include service delivery and environment. 3. Highlight possible interdependencies with current NAT safety KPIs. 4. Determine data collection, resource and process requirements.
Project Outcomes	A working paper presented to NAT SPG/60 containing: • Agreement on common reporting performance metrics and format; • Recommendations on how the output could be routinely presented; • Recommendations for further relevant safety KPIs, if required.
Membership	NAT SPG members, IATA, IFALPA. <i>Note: Other subject matter experts may also participate, as deemed appropriate by the Project Team.</i>
Coordination Requirements	Coordination may be required with subject matter experts, ICAO, EUR and NAM.
Project High Level Tasks	The PT should align, to the extent possible, with global ICAO initiatives, such as the GANP Performance Expert Group (GANP-PEG). For each metric chosen, there needs to be a rationale for why it should be measured.
Project Lead	TBD
Project Secretariat Support	Yes

**APPENDIX G — PROPOSED AMENDMENT TO THE NORTH ATLANTIC OPERATIONS AND AIRSPACE
MANUAL (NAT DOC 007, VERSION 2024_1)**

(paragraph 2.4.8 refers)

Starts on next page



European and North
Atlantic Office

NAT Doc 007

NORTH ATLANTIC OPERATIONS AND AIRSPACE MANUAL

***~~V.2023-1 (Applicable from January 2023)~~ V.2024-1 (Applicable
from March 2024)***

*Prepared by the ICAO European and North Atlantic Office
on behalf of the North Atlantic Systems Planning Group (NAT SPG)*

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NOTICE

The following significant changes have been made in NAT operations:

The requirement for oceanic clearances has been removed.

Refer to section 6.2.26 – 6.2.39

NAT communication failure procedures have been amended.

Refer to sections 5.6.9 – 5.6.11

The oceanic clearance removal is scheduled for the AIRAC date
21 March 2024.

All NAT Air Traffic Service Providers will strive to implement the change
on this date.

Refer to NOTAMs to confirm the final implementation date for each NAT
State.

Figure 1 – The ICAO North Atlantic Region High Level Airspace (NAT HLA)



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FOREWORD

This Document has been produced with the approval and on behalf of the North Atlantic (NAT) Systems Planning Group (SPG); the North Atlantic regional planning body established under the auspices of the International Civil Aviation Organisation (ICAO). This Group is responsible for developing the required operational procedures; specifying the necessary services and facilities; and defining the aircraft and operator approval standards employed in the NAT region.

Further information on the functions and working methods of the NAT SPG, together with the NAT Regional Safety Policy Statement, are contained in the NAT SPG Handbook (NAT Doc 001) which is available in the European and North Atlantic (EUR/NAT) Office public pages on the ICAO website (www.icao.int/EURNAT/).

This Document is for guidance only. Regulatory material relating to North Atlantic aircraft operations is contained in relevant ICAO Annexes, PANS-ATM (Doc 4444), *Regional Supplementary Procedures* (Doc 7030), State AIPs and current NOTAMs, which should be read in conjunction with the material contained in this Document.

The airspace of the North Atlantic which links Europe and North America is the busiest oceanic airspace in the world. In 2017 approximately 730,000 flights crossed the North Atlantic (*ref NAT SPG/54 – WP/08 - OUTCOMES OF NAT EFFG/33 AND NAT EFFG/34*). For the most part in the North Atlantic, Direct Controller Pilot VHF voice Communications (DCPC VHF) and radar surveillance are unavailable. Communications via CPDLC are available to FANS equipped aircraft and ADS-B surveillance is available through most of the airspace. Aircraft separation assurance and hence safety is ensured by demanding the highest standards of horizontal and vertical navigation performance/accuracy and of operating discipline.

The vast majority of North Atlantic flights are performed by commercial jet transport aircraft in the band of levels FL 290 – FL 410. To ensure adequate airspace capacity and provide for safe vertical separations, Reduced Vertical Separation Minima (RVSM) is applied throughout the ICAO NAT region.

A large portion of the airspace of the NAT, which, incidentally, contains the majority of these NAT crossings routes, is designated as the NAT High Level Airspace (NAT HLA) between FL 285 and FL 420 inclusive. Within this airspace a formal approval process by the State of Registry of the aircraft or the State of the operator ensures that aircraft meet defined NAT HLA Standards and that appropriate flight crew procedures and training have been adopted. The lateral dimensions of the NAT HLA include the following Oceanic Control Areas (OCAETAs):

REYKJAVIK, SHANWICK (excluding SOTA & BOTA), GANDER, SANTA MARIA OCEANIC, BODO OCEANIC and NEW YORK OCEANIC EAST north of 27N.

Some idea of these dimensions can be obtained from the maps at Figure 1 and those in Chapter 2 and Chapter 3. However, for specific dimensions, reference should be made to the ICAO North Atlantic Regional Air Navigation Plan (NAT eANP, Doc 9634) and Doc 7030 – NAT (available at www.icao.int/EURNAT/).

Although aircraft and flight crews may fly above the NAT HLA without the requisite of a NAT HLA approval, it is important that flight crews of such aircraft have both an understanding of the operational procedures and systems employed in the NAT HLA and specific knowledge of any active organized route structures.

The bulk of this Document provides information for Aircraft Operating Agencies, flight crews and Dispatchers planning and conducting operations in or above the NAT HLA and it also offers guidance to the State Regulators responsible for the approval/certification/or licensing of such aircraft operators, flight crews or dispatchers.

Aircraft without NAT HLA or RVSM approvals may, of course, also fly across the North Atlantic below FL 285. However, due consideration should be given to the particular operating environment. Especially by pilots/operators of single and twin engine aircraft. Weather conditions can be harsh; there are limited VHF radio communications and ground-based navigation aids; and the terrain can be rugged and sparsely populated. International General Aviation (IGA) flights at these lower levels constitute a very small percentage of the

overall NAT traffic but they account for the vast majority of Search and Rescue operations. Specific guidance for the pilots and operators of such flights is contained in Chapter 17.

The guidance document provided herewith is included in the ICAO NAT Regional Library and is designated as NAT Document 007 (NAT Doc 007). The Document can be accessed/downloaded from the [European and North Atlantic \(EUR/NAT\) Office public pages on the ICAO website](#), following “[EUR & NAT Documents](#)”, then “[NAT Documents](#)”, in folder “[NAT Doc 007](#)”.

This website will also include, any noted post publication errata (changes) or addenda (additions) to the current edition.

A separate document, “NAT Region Updates Bulletin”, is also available from the website. This advises operators of any recent changes to procedures or associated operational information which may affect their conduct and planning of operations in the ICAO North Atlantic (NAT) region.

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To assist with the editing of this Manual and to ensure the currency and accuracy of future editions it would be appreciated if readers would submit their comments/suggestions for possible amendments/additions, to the ICAO EUR/NAT Office at the above Email address.

As part of the continuing development within the operating environment of NAT HLA, trials take place in the NAT from time to time, in support of various separation reduction and safety initiatives. Some of these trials require the assistance of operators and flight crews. For a listing of current initiatives and trials (if any) and participation details etc., reference should be made to the AIP of NAT ATS provider States. Information on some of these trials may also be found by looking for “[NAT Documents](#)” in the European and North Atlantic (EUR/NAT) Office public pages on the ICAO website (www.icao.int/EURNAT/).

EXPLANATION OF CHANGES

Edition 20243-v1 - Content Modifications/Additions Incorporated

This modification includes:

- Editorial and minor amendments throughout the document;
- Some hyperlinks were updated;

Material changes:

- List of abbreviations: HLA and OAC were added, CTA and OACC were deleted, RCL was amended.
- Definitions: Cost Index (ECON), Current Flight Plan and RCL were added, OWAFS was deleted.
- Chapter 1: amendments/deletions in 1.4.2, 1.6.3 and 1.8.5 c). A note was added to paragraph 1.8.5. a) and the figure was corrected.
- Chapter 2: amendments/deletions in 2.3.4, 2.4.3 and 2.5.
- Chapter 3: amendments/deletions in 3.3.6, 3.3.8 and 3.3.9.
- Chapter 4: new paragraphs 4.1.13 and 4.1.14 were added containing information regarding speed.
- Chapter 5: previous Chapter 5 “Oceanic ATC Clearances” was deleted due to the removal of oceanic clearances. Material relating to oceanic clearances was deleted and other material was moved to other chapters, mostly to Chapter 6. Section 5.6 regarding communication failure procedures was completely re-written.
- Chapter 6: this chapter was previously Chapter 8. Some material was moved to this chapter from deleted Chapter 5 “Oceanic ATC Clearances” and deleted Chapter 7 “Mach Number”. There is new, amended and/or moved material in 6.2.26 – 6.2.39, 6.2.46 – 6.2.48, 6.2.61 and 6.3.3 – 6.3.6. This chapter contains the new procedures applicable after the removal of oceanic clearances.
- Chapter 7: this chapter was previously Chapter 9. No material changes.
- Chapter 8: this chapter was previously Chapter 10. Amendment to section 8.2 regarding operation of SSR transponders. Figure 10-1 of NAT ATS surveillance coverage was updated.
- Chapter 9: this chapter was previously Chapter 11. No material changes.
- Chapter 10: this chapter was previously Chapter 12. No material changes.
- Chapter 11: this chapter was previously Chapter 13. Minor changes due to removal of oceanic clearances. New section 11.8 concerning space weather was added.
- Chapter 12: this chapter was previously Chapter 14. Paragraph 12.2.1 e) was deleted. Minor changes to 14.4 due to removal of oceanic clearances.
- Chapter 13: this chapter was previously Chapter 15. Section 13.1 was amended. Minor changes to section 13.2 due to removal of oceanic clearances.
- Chapter 14: this chapter was previously Chapter 16. Paragraphs 14.6.25 and 14.6.28 were deleted.
- Chapter 15: this chapter was previously Chapter 17. Section 17.8 was amended due to removal of oceanic clearances.
- Attachments 4, 6, 8 and 9 were amended due to removal of oceanic clearances.
- Attachment 10, reference amendments.

~~Insertion of EFB, ETP, INF, OEP, OXP, RCL, RCP, RSP and UPR in in list of Abbreviations;~~

- ~~Chapter 1: amendments/deletions in 1.1.2 Note, 1.1.3, 1.3.6 Notes 2, 3 and 4. 1.8.4 was updated with processing of requests for special operations in DLM airspace. Paragraph 1.8.5 was added with information on airspace excluded from the DLM;~~
- ~~Chapter 2: 2.1.2 amended to reflect that NAT track levels are now FL340 to FL400. Deletion of text from 2.2.1 and 2.2.6. NAT track examples were updated;~~
- ~~Chapter 3: figures of Northern routes and Tango routes were updated in 3.2.1. figures of NOTA, SOTA, BOTA and GOTA were updated in 3.3.5 – 3.3.12;~~
- ~~Chapter 4: amendment to 4.1.3 regarding free route airspace operations. Amendment to 4.1.5 regarding routings. Amendment to 4.2.3 regarding planned Mach number and flight level. Amendment to 4.2.5 regarding EET;~~
- ~~Chapter 5: amendment to section 5.5 regarding cruise climb and block of flight levels;~~
- ~~Chapter 6: Figure 6-1 Reykjavik Control Direct Controller Pilot VHF Coverage was updated. Section~~

- ~~6.4 regarding when able higher reports was updated. Section 6.7 concerning contingency situations affection ATM provision in the NAT region was amended and moved to section 13.7; Section 6.8 regarding operation of transponders was merged with section 10.2. Section 6.9 regarding ACAS was moved to section 10.4;~~
- ~~— Chapter 8; most of this chapter was re-written;~~
 - ~~— Chapter 10: insert new paragraph 10.1.3 regarding identification of ADS-B equipped aircraft. Section 10.2 regarding operation of SSR transponders was amended. Section 10.4 was moved from section 6.9. Section 10.5 was added depicting NAT HLA ATS surveillance and DCPC VHF coverage;~~
 - ~~— Chapter 13: amendment to paragraph 13.5.1 regarding wake turbulence. insert new section 13.7 regarding loss or sudden withdrawal of air traffic control services in the NAT region;~~
 - ~~— Chapter 14: deletion of text from 14.1.4 and 14.1.5 because the DVD “Track Wise – Targeting Risk within the Shanwick OCA” has been withdrawn;~~
 - ~~— Chapter 16: Deletion of text from 16.3.1. adding reference to half degrees in 16.3.2. amendment to 16.3.8 regarding random routings. Amended flight planning guidance in 16.5.3 – 16.5.6. Deletion of text from 16.6.6 regarding EET. Amended text in 16.6.21 regarding MEL;~~
 - ~~— Chapter 17: reference to charts in section 10.5 added in 17.11.2 due to deletion in Attachment 4, addition of communication channels when in difficulty in 17.14.3;~~
 - ~~— Attachment 4: information on VHF coverage was deleted. Sample oceanic checklist was added;~~
 - ~~— Attachment 8: information on NAT ATS surveillance coverage was moved to section 10.5 and subsequent attachments were re-numbered;~~
 - ~~— Attachment 9: The checklist for dispatchers was updated.~~
 - ~~— Attachment 10: Bibliography and reference list was updated.~~
-

ABBREVIATIONS

ACARS	Aircraft Communications Addressing and Reporting System
ACAS	Airborne Collision Avoidance System
ACC	Area Control Centre
ADF	Automatic Direction Finding
ADS	Automatic Dependent Surveillance
ADS-B	Automatic Dependent Surveillance - Broadcast
ADS-C	Automatic Dependent Surveillance - Contract
AFTN	Aeronautical Fixed Telecommunication Network
AIC	Aeronautical Information Circular
AIP	Aeronautical Information Publication
AIRAC	Aeronautical Information Regulation and Control
AIS	Aeronautical Information Service
ARINC	ARINC - formerly Aeronautical Radio Incorporated
ATA	Actual Time of Arrival
ATC	Air Traffic Control
ATM	Air Traffic Management
ATS	Air Traffic Services
BOTA	Brest Oceanic Transition Area
CAR	Caribbean
CDL	Configuration Deviation List
CDM	Collaborative Decision Making
CDR	Conditional Route
CDU	Control Display Unit
CMA	Central Monitoring Agency
CPDLC	Controller Pilot Data Link Communications
CTA	~~Control Area~~
DCL	Departure Clearance (via Data Link)
DCPC	Direct Controller/Pilot Communications
DME	Distance Measuring Equipment
DR	Dead Reckoning
EDTO	Extended Diversion Time Operations
EFB	Electronic Flight Bag
ELT	Emergency Locator Transmitter
ETA	Estimated Time of Arrival
ETOPS	Extended Operations
ETP	Equal Time Point

EUR	Europe
FAA	Federal Aviation Administration
FANS 1/A	Future Air Navigation System 1 or A. (Respectively, Boeing and Airbus Proprietary Air-Ground ATC Data Link Communications Systems)
FDE	Fault Detection and Exclusion
FDR	Flight Data Records
FIR	Flight Information Region
FL	Flight Level
FLAS	Flight Level Allocation Scheme
FMC	Flight Management Computer
FMS	Flight Management System
GLONASS	Global Orbiting Navigation Satellite System
GMU	GPS (Height) Monitoring Unit
GNE	Gross Navigation Error
GNSS	Global Navigation Satellite System
GP	General Purpose
GPS	Global Positioning System
HF	High Frequency
HLA	High Level Airspace
HMU	Height Monitoring Unit
HSI	Horizontal Situation Indicator
ICAO	International Civil Aviation Organisation
IFR	Instrument Flight Rules
INF	Inland Navigation Fix
INS	Inertial Navigation System
IRS	Inertial Reference System
JAA	Joint Aviation Authorities
kHz	Kilohertz
LAT	Latitude
LEO	Low Earth Orbit (in reference to satellites e.g Iridium Constellation)
LONG	Longitude
LRNS	Long Range Navigation System
MASPS	Minimum Aircraft System Performance Specifications
MEL	Minimum Equipment List
MET	Meteorological
MHz	Megahertz
MMEL	Master Minimum Equipment List
MNPS	Minimum Navigation Performance Specifications

MNT	Mach Number Technique
NAM	North America
NAR	North American Route
NAT	North Atlantic
~~NAT HLA~~	~~North Atlantic High Level Airspace~~
NAT SPG	North Atlantic Systems Planning Group
NDB	Non Directional Beacon
NM	Nautical Miles
NOAA	National Oceanic and Atmospheric Administration
NOTA	Northern Oceanic Transition Area
NOTAM	Notice to Airmen
OACG	Oceanic Area Control Centre
OCA	Oceanic Control Area
OEP	Oceanic Entry Point
OESB	Oceanic Errors Safety Bulletin
OTS	Organized Track System
OWAFS	Operations Without an Assigned Fixed Speed
OXP	Oceanic Exit Point
PBCS	Performance-Based Communication and Surveillance
PDC	Pre Departure Clearance
PRM	Preferred Route Message
RA	Resolution Advisory (per ACAS/TCAS)
RAIM	Receiver Autonomous Integrity Monitoring
RCL	~~Request Clearance message~~ Voice, or data link message via ACARS, used to provide ETA at OEP, requested flight level, and Mach.
RCP	Required Communication Performance
RMI	Radio Magnetic Indicator
RNP	Required Navigation Performance
RSP	Required Surveillance Performance
R/T	Radio Telephony
RVSM	Reduced Vertical Separation Minimum
SAM	South America
SELCAL	Selective Calling
SID	Standard Instrument Departure
SLOP	Strategic Lateral Offset Procedures
SMS	Safety Management System
SOTA	Shannon Oceanic Transition Area
SSB	Single Sideband

SSR	Secondary Surveillance Radar
TAS	True Airspeed
TCAS	Traffic (Alert and) Collision Avoidance System
TLS	Target Level of Safety
TMI	Track Message Identification
UPR	User Preferred Route
UTC	Co-ordinated Universal Time
VHF	Very High Frequency
VOR	VHF Omni-directional Range
WAH	When Able Higher
WATRS	West Atlantic Route System
WPR	Waypoint Position Report

DEFINITIONS

ATS Surveillance service	Term used to indicate a service provided directly by means of an ATS Surveillance system.
ATS Surveillance system	Generic term meaning variously, ADS-B, PSR, SSR or any comparable ground-based system that enables the identification of aircraft.
Conflict	A situation that occurs when it is predicted that the spacing between aircraft, an aircraft and a defined airspace, or an aircraft and terrain, may or will reduce below the prescribed minimum.
Cost Index (ECON)	Operators can flight plan Cost Index (ECON) provided that the planned true Mach number for any portion of the flight within the NAT is specified in Item 15 of the ICAO FPL. Flight crews can fly Cost Index (ECON). ATC will assign a fixed Mach number if required due to traffic.
Current Flight Plan	The flight plan, including changes, if any, brought about by subsequent clearances. From a flight crew perspective this means what is loaded in the FMS.
Doc 7030	North Atlantic (NAT) Regional Supplementary Procedures (AKA NAT Supps)
Multilateration	A group of equipment configured to provide position derived from the secondary surveillance radar (SSR) transponder signals (replies or squitters) primarily using time difference of arrival (TDOA) techniques. Additional information, including identification, can be extracted from the received signals.
North Atlantic Operations Bulletin (NAT OPS Bulletin)	NAT Ops Bulletins are used to distribute information on behalf of the North Atlantic Systems Planning Group (NAT SPG) for the purpose of providing guidance to North Atlantic (NAT) operators on material relevant to their operations.
Oceanic Entry Point	The Oceanic Entry point is generally a “named” waypoint, on or close to the FIR boundary where the aircraft enters an oceanic control area. Note: For aircraft entering the Reykjavik OCA~~CTA~~ from Edmonton, at or north of 82N, the Oceanic Entry Point can be a LAT/LONG position on the boundary.
Oceanic Exit Point	The Oceanic Exit point is generally a “named” waypoint, on or close to the FIR boundary where the aircraft leaves the last oceanic control area. Note: Routes involving more than one OCA may result in multiple Oceanic Entry and Exit Points.
~~OWAFS~~	~~The requirement to issue an assigned fixed Mach number to flights in the NAT has been removed. All aircraft are eligible for the application of cost index (ECON) with an ATC clearance of RESUME NORMAL SPEED in both ATS surveillance and non-surveillance airspace. Oceanic clearance procedures will remain unchanged and a fixed Mach number will continue to be part of the oceanic clearance.~~
Procedural Control	Term used to indicate that information derived from an ATS Surveillance system is not required for the provision of air traffic control service. (PANS-ATM)
RCL	Voice, or data link message via ACARS, used to provide ETA at OEP, requested flight level, and Mach.

RESUME NORMAL SPEED

An ATC clearance that allows the flight crew to select cost index (ECON) speed instead of the assigned fixed Mach number with the condition that ATC must be advised if the speed changes by plus or minus Mach .02 or more from the last assigned Mach number.

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CHAPTER 1

OPERATIONAL APPROVAL AND AIRCRAFT SYSTEM REQUIREMENTS FOR FLIGHT IN THE NAT HLA

Flight crews may fly across the North Atlantic within NAT High Level Airspace (HLA) only if they are in possession of the appropriate NAT HLA and RVSM approvals issued by the State of Registry of the aircraft or by the State of the operator. The Minimum Equipment List (MEL) for operations must be strictly observed.

1.1 GENERAL

1.1.1 NAT HLA is that volume of airspace between flight level (FL) 285 and FL 420 within the oceanic control areas of Bodo Oceanic, Gander Oceanic, New York Oceanic East north of 27N, Reykjavik, Santa Maria and Shanwick, excluding the Shannon and Brest Ocean Transition Areas.

1.1.2 It is implicit in the concept of the NAT HLA that all flights within the airspace achieve the highest standards of horizontal and vertical navigation performance and accuracy. Formal monitoring programmes are undertaken to quantify the achieved performances and to compare them with standards required to ensure that established Target Levels of Safety (TLS) are met.

Note: *Collision Risk Modelling is used to estimate risk in each of the three dimensions (i.e. lateral, longitudinal and vertical). The target maxima set for these estimates is 5×10^{-9} fatal accidents per flight hour and is known as the “Target Levels of Safety (TLSs)”.*

1.1.3 Aircraft operating within the NAT HLA are required to meet the RNAV 10 (RNP 10) or RNP 4 navigation performance in the horizontal plane through the carriage and proper use of navigation equipment that meets the identified standards and has been approved as such by the State of Registry or State of the operator for the purpose. Such approvals encompass all aspects affecting the expected navigation performance of the aircraft, including the designation of appropriate cockpit/flight deck operating procedures.

1.1.4 All aircraft intending to operate within the NAT HLA must be equipped with altimetry and height-keeping systems which meet RVSM Minimum Aircraft System Performance Specifications (MASPS). RVSM MASPS are contained in the *Manual on Implementation Vertical Separation* (Doc 9574) and detailed in designated FAA document, AC91-85 (latest edition). These documents can be downloaded from:

- https://www.faa.gov/regulations_policies/advisory_circulars/index.cfm/go/document.information/documentID/1035328
- <https://skybrary.aero/bookshelf/ac-91-85-authorization-aircraft-and-operators-flight-rvsm-airspace>

1.1.5 The ultimate responsibility for checking that a NAT HLA/RVSM flight has the necessary approval(s) rests with the pilot in command. In the case of most regular scheduled flights this check is a matter of simple routine but flight crews of special charter flights, private flights, ferry and delivery flights are advised to pay particular attention to this matter. Routine monitoring of NAT traffic regularly reveals examples of flight crews of non-approved flights, from within these user groups, flight planning or requesting clearance within the NAT HLA. All such instances are prejudicial to safety and are referred to relevant State Authorities for further action.

1.1.6 While not a specific element of NAT HLA approval, flight crews and operators are reminded that for flights over the NAT, *ICAO SARPS in Annex 6 (Operation of Aircraft), Part I, Chapter 6 and Part II, Chapter 2* requires carriage of Emergency Locator Transmitters (ELTs) by all commercial and IGA aircraft, respectively.

Exceptions - Special Operations

1.1.7 NAT ATS providers may approve moving or stationary temporary airspace reservations within the NAT HLA, for the benefit of State or Military Aircraft Operating Agencies to accommodate Military Exercises, Formation Flights, Missile Firing or Unmanned Aircraft Systems (UAS) Activities. Procedures are established in respect of the requests for and management of such reservations. Whenever such reservations might impinge upon other flights in the NAT region, relevant AIS is published, including, if appropriate, annotations on the NAT track message.

1.1.8 Manned Balloon flights can be operated in or through the NAT region. They are, however, required to avoid the NAT HLA and must be meticulously co-ordinated with affected ATS Authorities in advance allowing sufficient time for all parties involved to properly plan for the flight.

1.2 APPROVAL

1.2.1 All flights within the NAT HLA must have the approval of either the State of Registry of the aircraft, or the State of the operator. Aircraft operating in RVSM airspace are required to be compliant with the altimetry Minimum Aircraft System Performance Specifications (MASPS) and hold an issued approval. Approval for NAT HLA operations will require the checking by the State of Registry or State of the operator, of various aspects affecting navigation performance. These aspects include: the navigation equipment used, together with its installation and maintenance procedures; plus the flight crew navigation procedures employed and the flight crew training requirements.

1.2.2 Since the NAT HLA is designated as RVSM airspace at all levels, all NAT flight crews/operators must be State approved specifically for NAT RVSM operations and each aircraft intended to be flown in the NAT HLA must have State RVSM Airworthiness approval.

1.2.3 There are times when NAT HLA and/or RVSM approval documentation may need to be shown to “suitably authorised persons”, e.g. during a ramp inspection or on similar occasions.

1.2.4 In order to adequately monitor the NAT HLA, State aviation authorities should maintain a database of all NAT HLA and RVSM approvals that they have granted. States must also provide data on RVSM approved airframes to the North Atlantic Regional Monitoring Agency (RMA), which is maintained by the North Atlantic Central Monitoring Agency (NAT CMA). The CMA database facilitates the tactical monitoring of aircraft approval status and the exclusion of non-approved users.

1.2.5 In the case of approvals for IGA operations, the following points are emphasised:

- a) aircraft NAT HLA and RVSM approvals constitute a package covering equipment standards, installation, maintenance procedures and flight crew training;
- b) State aviation authorities should consider limiting the validity period of approvals; and
- c) State aviation authorities should maintain detailed records of all NAT HLA and RVSM approvals.

1.3 HORIZONTAL NAVIGATION REQUIREMENTS FOR UNRESTRICTED NAT HLA OPERATIONS

Longitudinal Navigation

1.3.1 Time-based longitudinal separations between subsequent aircraft following the same track (in-trail) and between aircraft on intersecting tracks in the NAT HLA are assessed in terms of differences in ATAs/ETAs at common points. The time-based longitudinal separation minima currently used in the NAT HLA are thus expressed in clock minutes. The maintenance of in-trail separations is aided by the application

of the Mach Number Technique (MNT) (See Chapter 7). However, aircraft clock errors resulting in waypoint ATA errors in position reports can lead to an erosion of actual longitudinal separations between aircraft. It is thus vitally important that the time-keeping device intended to be used to indicate waypoint passing times is accurate and synchronised to an acceptable UTC time signal before commencing flight in the NAT HLA. In many modern aircraft, the Master Clock can only be reset while the aircraft is on the ground. Thus the pre-flight procedures for any NAT HLA operation must include a UTC time check and resynchronisation of the aircraft Master Clock (typically the FMS). Lists of acceptable time sources for this purpose have been promulgated by NAT ATS provider States. A non-exhaustive list is shown in Chapter 8 of this Document.

1.3.2 Operations without an assigned fixed speed (OWAFS) were implemented in July 2019. This implementation allows ATC to issue the clearance RESUME NORMAL SPEED after oceanic entry that allows the flight crew to select a cost index (ECON) speed instead of a fixed Mach number with the condition that ATC must be advised if the speed changes by plus or minus Mach .02 or more from the last assigned Mach number.

Lateral Navigation

Equipment

1.3.3 There are two navigational equipment requirements for aircraft planning to operate in the NAT HLA. One refers to the navigation performance that should be achieved, in terms of accuracy. The second refers to the need to carry standby equipment with comparable performance characteristics (ICAO Annex 6 (Operation of Aircraft) refers).

1.3.4 The navigation system accuracy requirements for NAT HLA operation should only be based on the PBN specifications, RNP 10 (PBN application of RNAV 10) or RNP 4. Although when granting consequent approval for operations in NAT HLA, States should take account of the RNP 10 time limits for aircraft equipped with dual INS or inertial reference unit (IRU) systems. All approvals issued after 04 February 2016 must be designated as “NAT HLA” approvals.

*Note 1: With respect to RNAV 10/RNP 10 operations and approvals the nomenclature “RNAV 10 (RNP 10)” is now used throughout this document for consistency with ICAO PBN Manual Doc 9613. As indicated in the PBN Manual RNAV 10 has, and is being, designated and authorized as “RNP 10” irrespective of the fact that such “RNP 10” designation is inconsistent with formal PBN RNP and RNAV specifications, since “RNP 10” already issued operational approvals and “RNP 10” currently designated airspaces in fact **do not** include any requirements for on-board performance monitoring and alerting. The justification for continuing to use this “RNP 10” nomenclature being that renaming current “RNP 10” routes and/or operational approvals, etc., to an “RNAV 10” designation would be an extensive and expensive task, which is not cost-effective. Consequently, any existing or new RNAV 10 operational approvals will continue to be designated “RNP 10”, and any charting annotations will be depicted as “RNP 10”.*

Note 2: RNP 10 time limits are discussed in Doc 9613, Part B, Volume II, Chapter 1.

1.3.5 When granting approval for operations in the NAT HLA, States of Registry should also ensure that in-flight operating drills are approved which include mandatory navigation crosschecking procedures aimed at identifying navigation errors in sufficient time to prevent the aircraft inadvertently deviating from the ATC-cleared route.

1.3.6 Long Range Navigation Systems, namely INS, IRS or GNSS, have demonstrated the requisite navigation accuracy required for operations in the NAT HLA. Consequently, State approval of unrestricted operation in the NAT HLA may presently be granted to an aircraft equipped as follows:

- a) **with at least two** fully serviceable Long Range Navigation Systems (LRNSs). A LRNS may be one of the following:

- one Inertial Navigation System (INS);
- one Global Navigation Satellite System (GNSS); or
- one navigation system using the inputs from one or more Inertial Reference System (IRS) or any other sensor system complying with the NAT HLA requirement.

*Note 1: Currently the only GNSS system fully operational and for which **approval material** is available, is GPS.*

Note 2: In USA, FAA Advisory Circular (AC) 20-138() provides guidance on airworthiness approval for positioning and navigation systems, to include GPS. AC 90-105() provides guidance on operational approval for RNP operations in oceanic airspace, to include the requirements for RNP 10 (RNAV 10) and RNP 4 applicable to NAT HLA operations. Equivalent EASA documents are provided in Easy Access Rules for Airborne Communications, Navigation and Surveillance (CS-ACNS).

Note 3: While GLONASS SARPs are included in the latest edition of ICAO Aeronautical Telecommunications, Annex 10, Volume 1, there is no equivalent approval material for GLONASS under development. That will need to be available prior to approval of any GLONASS equipped aircraft for NAT HLA operations.

Note 4: SARPs for the Galileo satellite-based radio navigation system are anticipated to be included in the next update to Annex 10, Volume 1. However, at publication date, no equivalent approval material is available.

- b) each LRNS shall be capable of providing to the flight crew a continuous indication of the aircraft position relative to desired track.
- c) it is also highly desirable that the navigation system employed for the provision of steering guidance is capable of being coupled to the autopilot.

Note: Some aircraft may carry two independent LRNS but only one FMCS. Such an arrangement may meet track keeping parameters but does not provide the required redundancy (in terms of continuous indication of position relative to track or of automatic steering guidance) should the FMCS fail; therefore, in order to obtain NAT HLA certification, dual FMCS is required to be carried. For example: a single INS is considered to be one LRNS; and an FMCS with inputs from one or more IRS/ISS is also considered to be a single LRNS.

Flight Crew Training

1.3.7 It is essential that flight crews obtain proper training for NAT HLA and RVSM operations in line with procedures described in other chapters of this document.

1.4 ROUTES FOR USE BY AIRCRAFT NOT EQUIPPED WITH TWO LRNS

Routes for Aircraft with Only One LRNS

1.4.1 A number of special routes have been developed for aircraft equipped with only one LRNS and carrying normal short-range navigation equipment (VOR, DME, ADF), which require to cross the North Atlantic between Europe and North America (or vice versa). It should be recognised that these routes are within the NAT HLA, and that State approval must be obtained prior to flying along them. These routes are also available for interim use by aircraft normally approved for unrestricted NAT HLA operations that have suffered a partial loss of navigation capability and have only a single remaining functional LRNS. Detailed descriptions of the special routes known as 'Blue Spruce Routes' are included in Chapter 3 of this Document. Other routes also exist within the NAT HLA that may be flown by aircraft equipped with only a single functioning LRNS. These include routings between the Azores and the Portuguese mainland and/or the Madeira Archipelago and also routes between Northern Europe and Spain/Canarias/Lisboa FIR to the east of

longitude 009° 01' W (viz.T9). Other routes available for single LRNS use are also established in the NAT HLA, including a route between Iceland and the east coast of Greenland and two routes between Kook Islands on the west coast of Greenland and Canada.

1.4.2 If this single LRNS is a GPS it must be approved in accordance with FAA/EASA (E)TSO-C129, (E)TSO-C145~~29~~, (E)TSO-C146 or (E)TSO-C196 ~~or later standard~~ as Class A1, A2, B1, B2, C1 or C2, ~~or later standard with equivalent EASA documentation ETSO-C129a~~. (Note: (E)TSO-C129 is currently superseded and no new C-129 equipped aircraft will enter into service). Some States may have additional requirements regarding the carriage and use of GPS (e.g. a requirement for FDE RAIM) and flight crews should check with their own State of Registry to ascertain what, if any, they are. These above mentioned documents can be found at:

- <https://drs.faa.gov> and
- <https://www.easa.europa.eu/en/certification-specifications/cs-etsa-european-technical-standard-orders>

Routes for Aircraft with Short-Range Navigation Equipment Only

1.4.3 Aircraft that are equipped only with short-range navigation equipment (VOR, DME, ADF) may operate through the NAT HLA but only along routes G3 or G11. However, once again formal State approval must be obtained. (See Chapter 3 for details of these routes.)

1.4.4 The letter 'X' shall be inserted in Item 10 of the ATS flight plan to denote that a flight is approved to operate in NAT HLA. The filed ATS flight plan does not convey information to the controller on any NAT HLA approval limitations. Therefore, it is the responsibility of the pilot in command to take account of aircraft or flight crew limitations and if appropriate, decline any unsanctioned ATC clearances.

1.5 SPECIAL ARRANGEMENTS FOR OPERATION IN NAT HLA BY NON-NAT HLA CERTIFIED AIRCRAFT

1.5.1 Aircraft that do not meet NAT HLA requirements may be allowed to operate in NAT HLA if the following conditions are satisfied:

- a) The aircraft is being provided with ATS surveillance service;
- b) Direct controller-pilot VHF voice communication is maintained; and
- c) The aircraft has a certified installation of equipment providing it the ability to navigate along the cleared track.

Note 1: Flight crews operating in the NAT HLA under these provisions should familiarize themselves with NAT HLA operations and procedures as well as ATS Surveillance and VHF service areas as published in State AIPs. They should also have a current copy of the OTS message that is in effect for the time of their flight for situational awareness.

Note 2: See section 1.8 for data link requirements.

1.5.2 Aircraft not approved to operate in NAT HLA and not meeting the provisions in 1.5.1 may be cleared to climb or descend through NAT HLA, traffic permitting.

1.5.3 Details of other special arrangements may be found in AIP of each ATS provider State.

1.6 SPECIAL ARRANGEMENTS FOR NON-RVSM APPROVED AIRCRAFT

To Climb/Descend Through RVSM Levels

1.6.1 NAT HLA approved aircraft that are not approved for RVSM operation will be permitted, subject to traffic, to climb/descend through RVSM levels in order to attain cruising levels above or below RVSM airspace. Flights should climb/descend continuously through the RVSM levels without stopping at any intermediate level and should “Report leaving” current level and “Report reaching” cleared level (N.B. this provision contrasts with the regulations applicable for RVSM airspace operations in Europe, where aircraft not approved for RVSM operations are not permitted to effect such climbs or descents through RVSM levels.). Such aircraft are also permitted to flight plan and operate at FL 430 either Eastbound or Westbound above the NAT HLA.

To Operate at RVSM Levels

1.6.2 ATC may provide special approval for a NAT HLA approved aircraft that is not approved for RVSM operation to fly in the NAT HLA provided that the aircraft:

- a) is on a delivery flight; or
- b) was RVSM approved but has suffered an equipment failure and is being returned to its base for repair and/or re-approval; or
- c) is on a mercy or humanitarian flight.

1.6.3 Operators requiring such special approval should request prior approval by contacting the initial Oceanic Area Control Centre (OACC), normally not more than 12 hours and not less than 4 hours prior to the intended departure time, giving as much detail as possible regarding acceptable flight levels and routings. Operators should be aware, due to the requirements to provide non-RVSM separation, that requested levels and/or routes may not always be available (especially when infringing active OTS systems). The special approval, if and when received, should be clearly indicated in Item 18 of the ICAO flight plan. ~~Operators must appreciate that the granting of any such approval does not constitute an oceanic clearance, which must be obtained from ATC, by the flight crew, in the normal manner.~~

1.6.4 This service, as explained above, will not be provided to aircraft without approval for NAT HLA operations. It must be noted that the provision of this service is intended exclusively for the purposes listed above and is not the means for an operator or flight crew to circumvent the RVSM approval process. Operators or flight crews are required to provide written justification for the request, upon completion of the flight plan, to the NAT Central Monitoring Agency (CMA). Any suspected misuse of the exceptions rule above, regarding RVSM operation, will be reported and will therefore be subject to follow-up action by the State of Registry or State of the operator as applicable.

1.6.5 Some flight planning systems cannot generate a flight plan through RVSM airspace unless the “W” designator is inserted in Item 10 (equipment). For a flight which has received this special approval, it is of utmost importance that the “W” is removed prior to transmitting the ICAO flight plan to ATC. ATC will use the equipment block information to apply either 1000 ft or 2000 ft separation. Additionally, flight crews of any such non-RVSM flights operating in RVSM airspace should include the phraseology “Negative RVSM” in all initial calls on ATC frequencies, requests for flight level changes, read-backs of flight level clearances within RVSM airspace and read-back of climb or descent clearances through RVSM airspace.

1.7 ATS SURVEILLANCE SERVICE AREAS IN THE NAT REGION

1.7.1 ATS Surveillance services (radar, ADS-B and Multilateration) are provided within some portions of the NAT HLA, where radar- and/or ADS-B and/or Multilateration coverage exists. The ATS Surveillance services are provided in accordance with the ATS Surveillance services procedures in the PANS-ATM (Doc 4444).

1.7.2 All aircraft operating as IFR flights anywhere within the NAT region are required to be equipped with a pressure-altitude reporting SSR transponder and may therefore benefit from such radar and multilateration air traffic services, currently offered in parts of the NAT region.

1.7.3 ADS-B services are provided within portions of the NAT region (see Chapter 10). Eligibility and procedures for ADS-B service in the NAT are based upon the provisions in the Doc 7030 section 5.5.

1.7.4 North Atlantic States providing ADS-B Air Traffic Services maintain a common exclusion list of aircraft that are known to not satisfy the conditions promulgated by Doc 7030. The purpose of the exclusion list is to ensure that ADS-B reports received from such aircraft are not utilized by the air traffic control system for separation services.

1.7.5 Aircraft operators wishing to receive an exemption from the procedures specified in Doc 7030 for an individual flight shall apply for an exemption to the ATS unit(s) in accordance with AIP directives. Any approvals for such exemptions may be contingent on specific conditions such as routing, flight level and time of day.

1.8 DATA LINK REQUIREMENTS

1.8.1 The NAT Data Link Mandate (DLM) requires aircraft to be equipped with, and operating, CPDLC and ADS-C in the NAT region. Currently, the mandate incorporates FL 290 to FL 410 inclusive.

1.8.2 The DLM is not applicable to aircraft operating in:

- a) Airspace north of 80° North;
- b) New York Oceanic East flight information region (FIR);
- c) Airspace where an ATS surveillance service is provided by means of radar, multilateration and/or ADS-B, coupled with VHF voice communications as depicted in State Aeronautical Information Publications (AIP), provided the aircraft is suitably equipped (transponder/ADS-B extended squitter transmitter) (refer to paragraph 1.8.5 below).

1.8.3 Certain categories of flights may be allowed to plan and operate through the mandated airspace with non-equipped aircraft, namely non-equipped flights that file STS/FFR, HOSP, HUM, MEDEVAC SAR, or STATE in Item 18 of the flight plan. (Depending on the tactical situation at the time of flight, however, such flights may not receive an ATC clearance which fully corresponds to the requested flight profile).

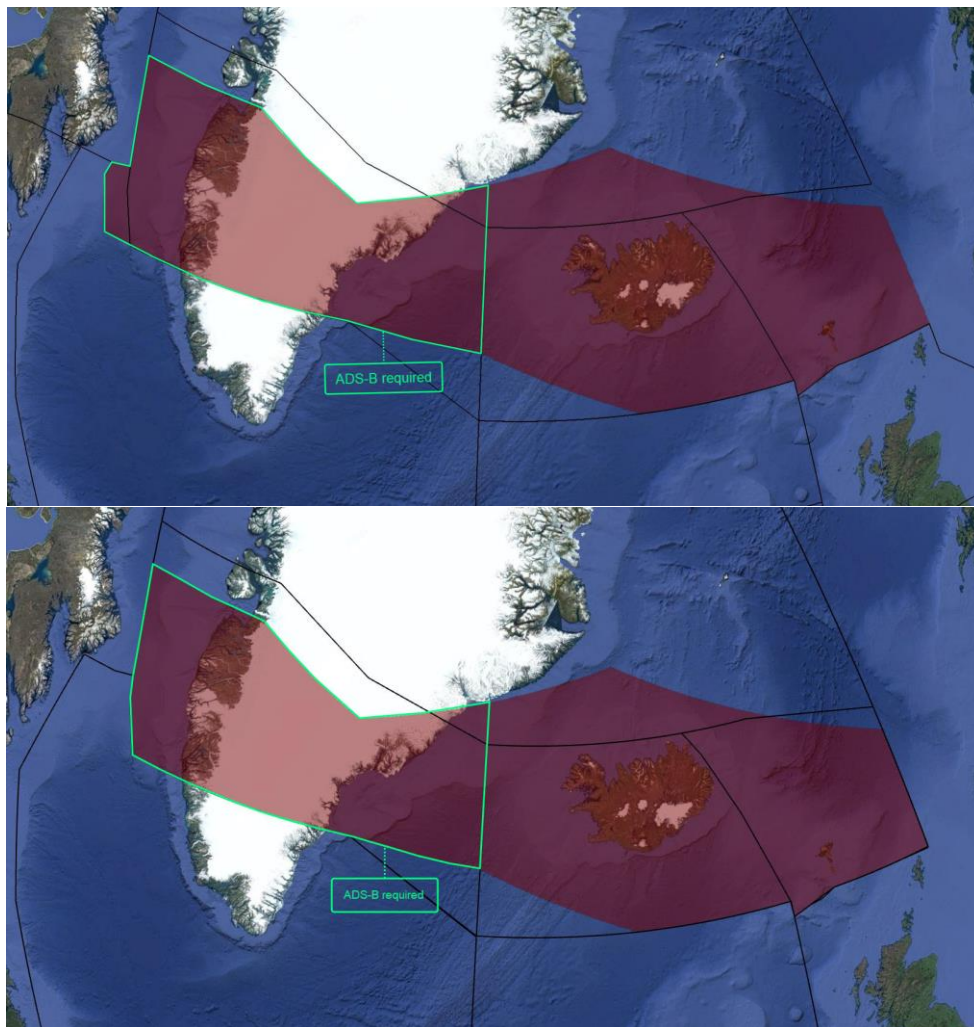
1.8.4 Any aircraft not equipped with FANS 1/A (or equivalent) systems may request to climb or descend through the NAT DLM airspace. Other requests for operation of non-DLM equipped aircraft in the NAT DLM airspace will be considered on a tactical basis, as outlined below:

- a) Altitude reservation (ALTRV) requests and requests for “special operations” (e.g., for scientific research or weather observations) will be considered on a case-by-case basis, irrespective of the equipment status of the participating aircraft.
- b) If a flight experiences an equipment failure AFTER DEPARTURE which renders the aircraft unable to operate FANS 1/A (or equivalent) CPDLC and/or ADS-C systems, requests to operate in the NAT DLM airspace will be considered on a tactical basis. Such flights must notify ATC of their status PRIOR TO ENTERING the airspace.
- c) If a FANS 1/A data link equipment failure occurs while the flight is OPERATING WITHIN NAT DLM AIRSPACE, ATC must be immediately advised. Such flights may be re-cleared so as to avoid the airspace, but consideration will be given to allowing the flight to remain in the airspace, based on tactical considerations.

- d) If a flight experiences an equipment failure PRIOR to departure which renders the aircraft non-DLM compliant, the flight should re-submit a flight plan so as to remain clear of the NAT regional DLM airspace.

1.8.5 Airspace excluded from the DLM in accordance with 1.8.2c) above is as follows:

a) Iceland – Greenland corridor



ADS-B is required west of 30W.

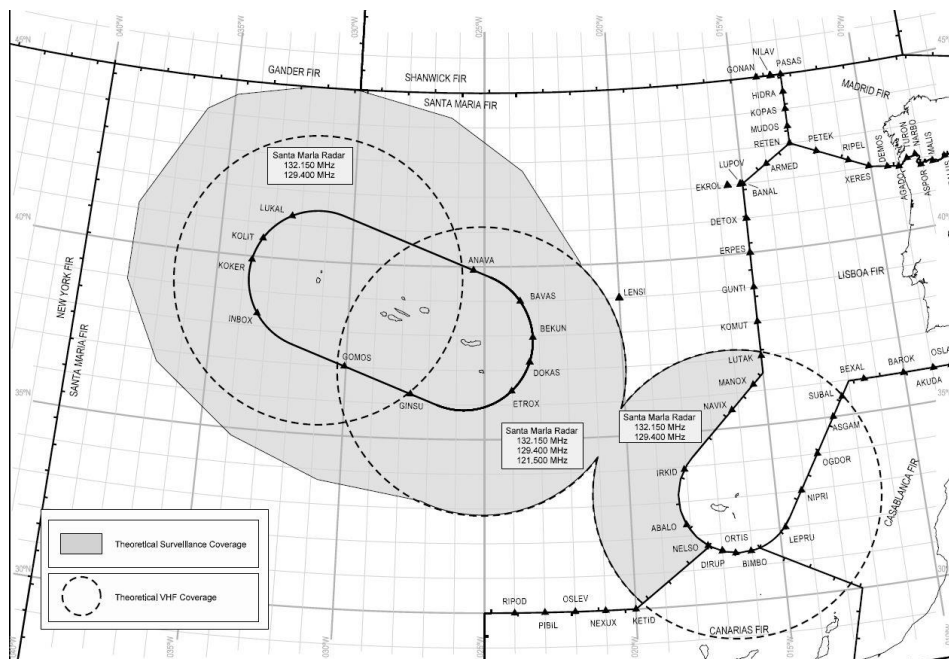
For planning purposes, this area is bounded by the following:

Northern boundary: 65N000W - 67N010W - 69N020W - 68N030W - 67N040W - 69N050W - 69N060W - BOPUT.

Southern boundary: GUNPA (61N000W) - 61N007W - 6040N010W - RATSU (61N010W) - 61N020W - 63N030W - 6330N040W - 6330N050W – EMBOK.

Note: This area, which is within direct controller pilot VHF voice coverage, offers a solution for suitably equipped aircraft (transponder with ADS-B extended squitter transmitter) that are equipped with a single or no Long Range Communication System, to cross the North Atlantic at or above FL290.

b) Azores corridor



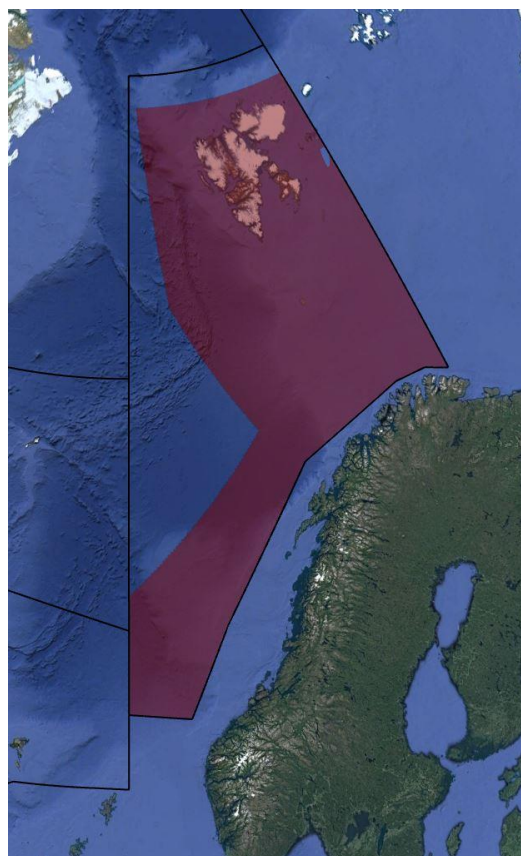
Traffic flying to/from Azores Islands is allowed to operate in the NAT HLA, when the oceanic portion of the planned route is contained inside the Santa Maria FIR ATS Surveillance airspace and VHF coverage, typically via MANOX, NAVIX or IRKID direct 350000N 0200000W or 360000N 0200000W direct Azores Islands, for aircraft equipped with SSR Mode S/ADS-B transponders.

c) Bodo corridor

Aircraft need to be equipped with transponder with ADS-B extended squitter transmitter.

For flight planning purposes, the following coordinates can be used to define the ATS surveillance airspace within Bodø OCA:

6645N 00000E - 7110N 01140E - 7500N 00430E - 8100N 00130E - 8100N 03000E - 7100N 03000E - 7120N 02800E - 7120N 02500E - 7000N 01500E - 6545N 00700E - 6303N 00403E - 6315N 00000E - (6645N 00000E).



Note: Details in State Aeronautical Information Publications (AIP).

1.9 PERFORMANCE MONITORING

1.9.1 The horizontal (i.e. latitudinal and longitudinal) and vertical navigation performance of operators within the NAT HLA is monitored on a continual basis. If a deviation is identified, follow-up action after flight is taken, both with the operator and the State of Registry of the aircraft involved, to establish the cause of the deviation and to confirm the approval of the flight to operate in NAT HLA and/or RVSM airspace. The overall navigation performance of all aircraft in the NAT HLA is compared to the standards established for the region, to ensure that the relevant TLSs are being maintained. (See Chapter 11).

1.9.2 A NAT regional monitoring programme to assess actual communication and surveillance performance against RCP and RSP specifications is being undertaken to monitor individual aircraft performance and to determine whether and what, if any, corrective action is required by contributing entities (Operators, ANSPs, CSPs, SSPs, etc.) to ensure achievement of the system performance required for continued PBCS based separation operations.

1.10 PBCS OPERATIONS

1.10.1 Performance Based separation minima as small as 19 NM lateral and 14 NM longitudinal predicated on PBCS and PBN, in accordance with *Procedures for Air Navigation Services – Air Traffic Management* (PANS-ATM, Doc 4444) has been implemented in the ICAO NAT Region. Operators should consult the AIS of relevant NAT Provider States for the detailed application of these separation minima in each of the NAT OCAs. To benefit from these separations Operators must obtain State Approvals in accordance with Annex 6 to file in the flight plan RCP/RSP capabilities including aircraft equipage where RCP and/or RSP specifications are prescribed for the communications and/or surveillance capabilities supporting

this ATS provision. Guidance material for implementation of communication and surveillance capability supporting these separation minima is contained in the *Performance-based Communication and Surveillance (PBCS) Manual* (Doc 9869) and the *Global Operational Data Link (GOLD) Manual* (Doc 10037).

1.10.2 Within the OTS the 42.6 km (23 NM) lateral separation minimum is implemented by applying 42.6 km (23 NM) lateral spacing through whole and half degrees of latitude between PBCS designated NAT OTS Tracks between flight levels FL 350 to FL 390 inclusive, except when the OTS occurs in the New York OCA East. In addition to requiring RNP 4 Approval, Operators must appreciate that unlike the filing criteria for the half degree spaced Tracks, the simple equipage and operation of CPDLC and ADS-C will not be a sufficient criteria for planning and flying on the designated PBCS-based OTS Tracks. To utilize these tracks the aircraft must have formal State Authorization for filing RCP 240 and RSP 180.

1.10.3 Application of the reduced lateral and longitudinal separation minima in the NAT Region is dependent on a smooth functioning FANS 1/A data link system. Various known data link related deficiencies in aircraft systems and poor data link performance have a detrimental effect on the air traffic control system and impede aircraft operator's efforts to obtain performance-based communication and surveillance (PBCS) authorizations. Many of these known deficiencies have already been fixed by aircraft manufacturers and software upgrades are available. To ensure the best possible functioning of the NAT air traffic control system, it is of utmost importance that aircraft operators always operate the latest available FANS 1/A related software version in aircraft that fly in the NAT high level airspace (HLA) and that the aircraft systems are configured in an optimal manner. Meanwhile, implementation of improvements and corrections is also a priority undertaking for the ground and network segments of the overall FANS 1/A system.

1.10.4 NAT OPS Bulletin 2019_003 provides a list of recommended data link performance improvement options and recommended software versions for NAT data link operations. Aircraft operators are advised to review this OPS Bulletin to identify if some of the issues identified in the Bulletin apply to their operations. The bulletin will be updated on regular basis.

1.10.5 Some NAT ANSPs have implemented the message latency monitor function which is designed to prevent pilots from acting on a CPDLC uplink message that has been delayed in the network. The most serious of such cases would be the pilot executing a clearance that was no longer valid. Because aircraft implementations are varied, it is impossible for ATC to tailor the uplink of the message SET MAX UPLINK DELAY VALUE TO 300 SEC to different aircraft types. It has therefore been decided among the NAT ANSPs to uplink this message to all CPDLC connected aircraft immediately after they enter each control area. An aircraft may therefore receive this message multiple times during a flight. Refer to section 8.4.5 for pilot procedures concerning this function.

Note: When operating in the NAT airspace, aircraft operators can expect a value of 300 seconds for the delayed message parameter which had been agreed by the NAT ANSPs on a trial basis.

1.11 TRIALS AND FUTURE DEVELOPMENTS

1.11.1 The ICAO North Atlantic Systems Planning Group undertakes a continuous programme of monitoring the safety and efficiency of flight operations throughout the NAT region. Plans are thereby developed to ensure the maintenance and further enhancement of the safety and traffic capacity of the airspace. An overview of expected development of North Atlantic flight operations is contained in Volume III of the *NAT Regional Air Navigation Plan* (NAT eANP, Doc 9634). This document is available at www.icao.int/EURNAT/, following "[EUR & NAT Documents](#)", then "[NAT Documents](#)", in folder "[eANP NAT Doc9634](#)".

1.11.2 All planned or anticipated changes will involve consultation and coordination with the airspace users. Advanced notification of any changes will be provided by the appropriate ANSP(s).

CHAPTER 2

THE ORGANISED TRACK SYSTEM (OTS)

2.1 GENERAL

2.1.1 As a result of passenger demand, time zone differences and airport noise restrictions, much of the North Atlantic (NAT) air traffic contributes to two major alternating flows: a westbound flow departing Europe in the morning, and an eastbound flow departing North America in the evening. The effect of these flows is to concentrate most of the traffic uni-directionally, with peak westbound traffic crossing the 30W longitude between 1130 UTC and 1900 UTC and peak eastbound traffic crossing the 30W longitude between 0100 UTC and 0800 UTC.

2.1.2 The flight levels normally associated with the OTS are FL 340 to FL 400 inclusive. These flight levels, and their use have been negotiated and agreed by the NAT ATS providers and are published as the Flight Level Allocation Scheme (FLAS). (See Attachment 5). The FLAS also determines flight levels available for traffic routing partly or wholly outside of the OTS as well as flights operating outside of the valid time periods of the OTS; often referred to as “transition times”.

2.1.3 The hours of validity of the two Organised Track Systems (OTS) are as follows:

(Westbound) Day-time OTS 1130 UTC to 1900 UTC at 30°W

(Eastbound) Night-time OTS 0100 UTC to 0800 UTC at 30°W

Note: *Changes to these times can be negotiated between Gander and Shanwick OACGs and the specific hours of validity for each OTS are indicated in the NAT track message. For flight planning, operators should take account of the times as specified in the relevant NAT track message(s). Tactical extensions to OTS validity times can also be agreed between OACGs when required, but these should normally be transparent to operators.*

2.1.4 Use of the OTS tracks is not mandatory. Aircraft may flight plan on random routes which remain clear of the OTS or may fly on any route that joins, leaves, or crosses the OTS. Operators must be aware that while ATC will make every effort to clear random traffic across the OTS at requested levels, re-routes or significant changes in flight level from those planned are likely to be necessary during most of the OTS traffic periods. A comprehensive understanding of the OTS and the FLAS may assist flight planners in determining the feasibility of flight profiles.

2.2 CONSTRUCTION OF THE ORGANISED TRACK SYSTEM (OTS)

General processes

2.2.1 The appropriate OACG constructs the OTS after determination of basic minimum time tracks; with due consideration of airlines' preferred routes and taking into account airspace restrictions such as danger areas and military airspace reservations. The night-time OTS is produced by Gander OACG and the day-time OTS by Shanwick OACG (Prestwick), each incorporating any requirement for tracks within the New York, Reykjavik, Bodø and Santa Maria Oceanic Control Areas (OCAs). OACG planners co-ordinate with adjacent OACGs and domestic ATC agencies to ensure that the proposed system is viable. They also take into account the requirements of opposite direction traffic and ensure that sufficient track/flight level profiles are provided to satisfy anticipated traffic demand. Random routes and OTS tracks eastbound typically start with a “named” oceanic entry point, followed by LAT/LONG waypoints, and typically end with 2 “named” waypoints, the first being the oceanic exit point, and the second being a “named” waypoint inside domestic airspace. Random

routes and OTS tracks westbound typically start with a “named” oceanic entry point, followed by LAT/LONG waypoints, and typically end with a “named” waypoint that is the oceanic exit point.

2.2.2 When the expected volume of traffic justifies it, tracks may be established to accommodate the EUR/CAR traffic axis. Extra care is required when planning these routes as they differ slightly from the 'core tracks' in that they may cross each other (using vertical separations via different flight level allocations), and in some cases may not extend from coast-out to coast-in (necessitating random routing to join or leave).

Note 1: The “named” waypoint inside domestic airspace ensures application of oceanic North Atlantic separations beyond the common boundary allowing time for domestic agency to establish identification, establish direct controller pilot communications via VHF voice, and to issue instructions as necessary

Note 2: OTS tracks can start at “named” waypoints or LAT/LONG waypoints in NAT oceanic airspace (i.e. not at oceanic entry point or exit point). OTS track design of this nature is most commonly seen within New York East and Reykjavik OCAs.

Collaborative Decision Making Process

2.2.3 Operators proposing to execute NAT crossings during the upcoming OTS period are encouraged to contribute to the OTS planning process. A comprehensive set of Collaborative Decision Making (CDM) procedures for NAT track design is now employed.

2.2.4 To ensure emphasis is placed on operators' preferred routes, the CDM process begins with the Preferred Route Message (PRM) system. All NAT operators (both scheduled and non-scheduled) are urged to provide information by AFTN message to the appropriate OACs regarding optimum routing for any/all of their flights intending to operate during upcoming peak traffic periods. Such information should be provided, in the correct format, as far in advance as possible, but not later than 1900 UTC for the following day-time OTS and 1000 UTC for the following night-time OTS. The details for submitting operators' preferred routes in respect of day-time westbound flights are specified in the UK AIP. The filing of night-time eastbound preferred routings is an element of the NAV CANADA Traffic Density Analyser (TDA) tool (see Chapter 16).

2.2.5 Subsequently, following the initial construction of the NAT tracks by the publishing agencies, the proposed tracks are published on an internet site for interested parties to view and discuss. One hour is allocated for each of the proposals during which any comments will be considered by the publishing agency and any changes which are agreed are then incorporated into the final track design. This internet site is currently operated by NAV CANADA. Access to this site is by password which any bona fide NAT operator may obtain on application to NAV CANADA - see Canada AIP for details. Requests for access should be sent to noc@navcanada.ca.

Split Westbound Structure

2.2.6 On occasions, when a strong westerly Jetstream closely follows the Great Circle of the dominant NAT traffic flow between London and New York, the resulting daytime Westbound minimum time tracks can be located both north and south of this great circle. In such cases, Shanwick may publish a "split" track structure, leaving at least two adjacent exit points and landfalls at the Eastern NAT boundary for use by the daytime eastbound traffic flow.

2.3 THE NAT TRACK MESSAGE

2.3.1 The agreed OTS is promulgated by means of the NAT track message via the AFTN to all interested addressees. A typical time of publication of the day-time OTS is 2200 UTC and of the night-time OTS is 1400 UTC.

2.3.2 This message gives full details of the coordinates of the organised tracks as well as the flight levels that are expected to be in use on each track. In most cases there are also details of domestic entry and exit routings associated with individual tracks (e.g. NAR). In the westbound (day-time) system the track most northerly, at its point of origin, is designated Track 'A' (Alpha) and the next most northerly track is designated Track 'B' (Bravo) etc. In the eastbound (night-time) system the most southerly track, at its point of origin, is designated Track 'Z' (Zulu) and the next most southerly track is designated Track 'Y' (Yankee), etc. Examples of both eastbound and westbound systems and NAT track messages are shown in Example 1/**Figure 2-0-1** and Example 2/ **Figure 2-0-2** in this chapter.

2.3.3 The originating OACG identifies each NAT track message, within the Remarks section appended to the end of the NAT track message, by means of a 3-digit Track Message Identification (TMI) number equivalent to the Julian calendar date on which that OTS is effective. For example, the OTS effective on February 1st will be identified by TMI 032. (The Julian calendar date is a simple progression of numbered days without reference to months, with numbering starting from the first day of the year.) If any subsequent NAT track amendments affecting the entry/exit points, route of flight (coordinates) or flight level allocation are made, the whole NAT track message will be re-issued. The reason for this amendment will be shown in the Notes and a successive alphabetic character, i.e. 'A', then 'B', etc., will be added to the end of the TMI number (e.g. TMI 032A).

2.3.4 The remarks section is an important element of the NAT track message. Included is essential information for operators that may vary greatly from day to day. The Remarks may also include details of special flight planning considerations, reminders of ongoing initiatives (e.g., Data Link Mandate), planned amendments to NAT operations, or active NOTAMS referencing airspace restrictions. The remarks section of both the Westbound and Eastbound OTS Messages will identify any designated PBCS tracks. ~~The Eastbound OTS Message will also include important information on appropriate clearance delivery frequency assignments.~~

2.4 OTS CHANGEOVER PERIODS

2.4.1 To ensure a smooth transition from night-time to day-time OTSs and vice-versa, a period of several hours is interposed between the termination of one system and the commencement of the next. These periods are from 0801 UTC to 1129 UTC: and from 1901 UTC to 0059 UTC.

2.4.2 During the changeover periods some restrictions to flight planned routes and levels are imposed. Eastbound and westbound aircraft operating during these periods should file flight level requests in accordance with the Flight Level Allocation Scheme (FLAS) as published in the *UK and Canada AIPs* and shown at Attachment 5.

2.4.3 It should also be recognised that during these times there is often a need for flight clearances to be individually co-ordinated between OACGs and cleared flight levels may not be in accordance with those flight planned. If, for any reason, a flight is expected to be level critical, operators are recommended to contact the initial OACG prior to filing of the flight plan to ascertain the likely availability of required flight levels.

2.5 EXAMPLES OF DAY-TIME WESTBOUND AND NIGHT-TIME EASTBOUND NAT TRACK MESSAGES AND ASSOCIATED TRACK SYSTEMS

Example 1 — Example of Westbound NAT Track Message

ZCZC OLG068 2020190FF EGZZOWXX EGZZOXXX
 082009 202019 EGGXZOZX
 (NAT-1/3 TRACKS FLS 310/390 INCLUSIVE
 APR 09/1130Z TO APR 09/1900Z
 PART ONE OF THREE PARTS-
 A ERAKA 60/20 62/30 63/40 63/50 MAXAR
 EAST LVLS NIL
 WEST LVLS 350 360
 EUR RTS WEST NIL
 NAR NIL -
 B GOMUP 59/20 61/30 62/40 52/50 PIDSO
 EAST LVLS NIL WEST LVLS 350 360 380
 EUR RTS WEST NIL
 NAR NIL -
 C SUNOT 58/20 60/30 61/40 61/50 SAVRY
 EAST LVLS NIL
 WEST LVLS 340 360 380
 EUR RTS WEST NIL
 NAR NIL -
 END OF PART ONE OF THREE PARTS)

FF EGZZOWXX EGZZOXXX
 082009 202020 EGGXZOZX
 (NAT-2/3 TRACKS FLS 310/390 INCLUSIVE
 APR 09/1130Z TO APR 09/1900Z
 PART TWO OF THREE PARTS-
 D PIKIL 57/20 57/30 56/40 NEEKO
 EAST LVLS NIL
 WEST LVLS 340 350 360 370 380 390
 EUR RTS WEST NIL
 NAR NIL -
 E RESNO 56/20 56/30 55/40 53/50 RIKAL
 EAST LVLS NIL
 EST LVLS 340 350 360 370 380 390
 EUR RTS WEST NIL

NAR NIL -
 F VENER 5530/20 5530/30 5430/40 5230/50 SAXAN

EAST LVLS NIL
 WEST LVLS 350 360 370 380 390
 EUR RTS WEST NIL
 NAR NIL -
 G DOGAL 55/20 55/30 54/40 52/50 TUDEP
 EAST LVLS NIL
 WEST LVLS 340 350 360 370 380 390
 EUR RTS WEST NIL
 NAR NIL -
 END OF PART TWO OF THREE PARTS)

72 202021FF EGZZOWXX EGZZOXXX
 082010 202021 EGGXZOZX
 (NAT-3/3 TRACKS FLS 310/390 INCLUSIVE
 APR 09/1130Z TO APR 09/1900Z
 PART THREE OF THREE PARTS-
 H MALOT 54/20 54/30 53/40 51/50 ALLRY
 EAST LVLS NIL
 WEST LVLS 340 350 360 370 380 390
 EUR RTS WEST NIL
 NAR NIL -
 REMARKS.

1. TMI IS 099 OPERATORS ARE REMINDED TO INCLUDE THE TMI NUMBER AS PART OF THE AMENDED ~~OCEANIC RE-ROUTE~~ CLEARANCE READ BACK PRIOR TO OCEANIC ENTRY.
2. SEND RCL 90-30 MINUTES PRIOR TO OCEANIC ENTRY POINT.
3. PBCS OTS LEVELS 350-390. PBCS TRACKS AS FOLLOWS
 TRACK E
 TRACK F
 TRACK G
 END OF PBCS OTS
4. INCLUDE THE MAX LEVEL IN RCL. IF NO MAX LEVEL IS PROVIDED THE RCL LEVEL WILL BE CONSIDERED HIGHEST ACCEPTABLE FL THAT CAN BE MAINTAINED AT THE OCEANIC ENTRY POINT.
5. ~~CLEARANCEE MAY DIFFER FROM THE FLIGHT PLAN, FLY THE CLEARANCE.~~
56. STRATEGIC LATERAL OFFSET PROCEDURE (SLOP) SHOULD BE USED FOR ALL OCEANIC CROSSINGS. LEFT SLOP IS PROHIBITED.

67. 130 MINUTES AFTER ENTERING NAT AIRSPACE OR AFTER LEAVING SURVEILLANCE AREA, USE CODE 2000 ON TRANSPONDER.

78. NAVIGATION ERRORS CAN BE PREVENTED BY THE USE OF PROPER FMS WAYPOINT PROCEDURES.

89. ADS-C AND CPDLC ARE MANDATED FOR LEVELS 290-410 IN NAT AIRSPACE.

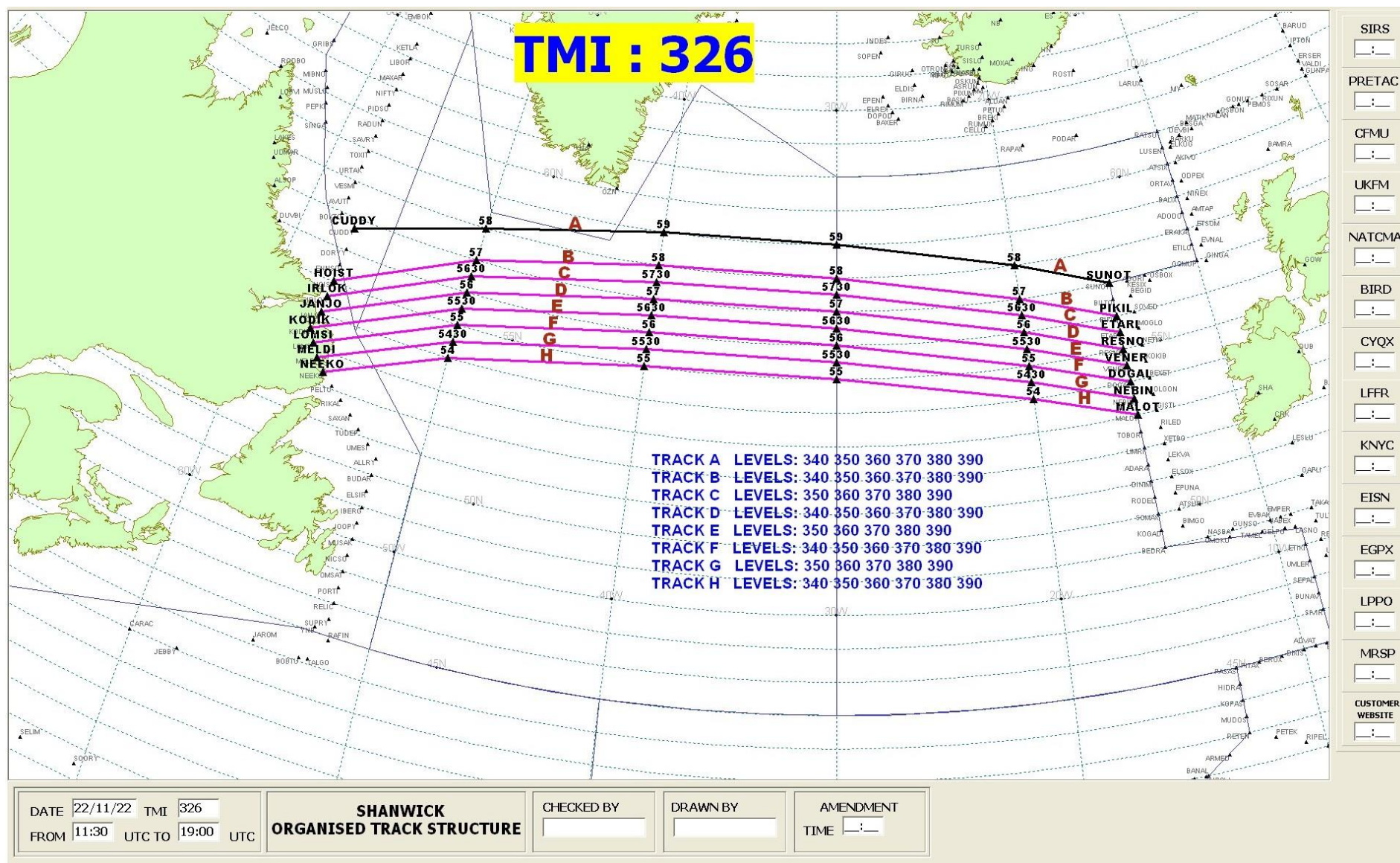
910. UK AIP ENR 2.2.4.2 PARA 5.2 STATES THAT NAT OPERATORS SHALL FILE PRM.

101. OPERATORS SHOULD REFERENCE NAT DOC 007 CHAPTERS 86 AND 113 FOR SPECIFIC NAT OCEANIC PROCEDURES

112. DATA LINK EQUIPPED FLIGHTS NOT LOGGED ON TO DOMESTIC AIRSPACE, PRIOR TO ENTERING THE SHANWICK OCA, MUST INITIATE A LOGON TO EGGX 10 - 25 MINS PRIOR TO OCA ENTRY.-

END OF PART THREE OF THREE PARTS)

Figure 2-0-1 — Example of Day-Time Westbound NAT Organised Track System

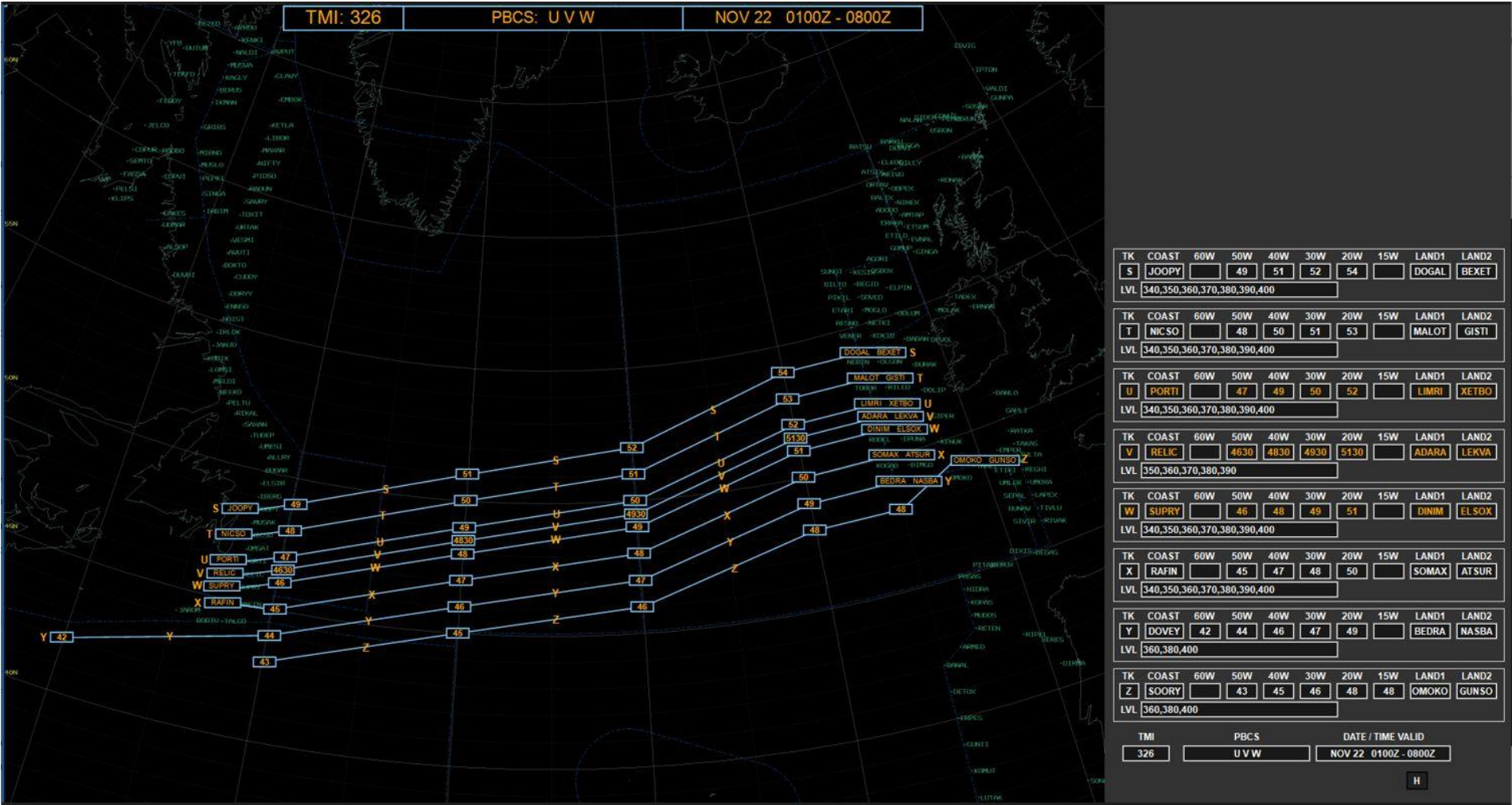


Example 2 — Example of Eastbound NAT Track Message

DD CYZZENAT
 021302 CZQXZQZX
 (NAT - 1 / 3 TRACKS FLS 320 / 400 INCLUSIVE
 NOV 03/0100Z TO NOV 03/0800Z
 PART ONE OF THREE PARTS -
 U JANJO 56/50 58/40 59/30 58/20 SUNOT KESIX
 EAST LVLS 340 350 360 370 380 390 400
 WEST LVLS NIL
 EUR RTS EAST NIL
 NAR N685A N683A-
 V LOMSI 55/50 57/40 58/30 57/20 PIKIL SOVED
 EAST LVLS 340 350 360 370 380 390 400
 WEST LVLS NIL
 EUR RTS EAST NIL
 NAR N625A N621A-
 END OF PART ONE OF THREE PARTS)
 DD BIRDZQZZ
 021302 CZQXZQZX
 (NAT - 2 / 3 TRACKS FLS 320 / 400 INCLUSIVE
 NOV 03/0100Z TO NOV 03/0800Z
 PART TWO OF THREE PARTS -
 W MELDI 5430/50 5630/40 5730/30 5630/20 ETARI MOGLO
 EAST LVLS 350 360 370 380 390
 WEST LVLS NIL
 EUR RTS EAST NIL
 NAR N597A N587A-
 X NEEKO 54/50 56/40 57/30 56/20 RESNO NETKI
 EAST LVLS 340 350 360 370 380 390 400
 WEST LVLS NIL
 EUR RTS EAST NIL
 NAR N561A N555A-
 Y RIKAL 53/50 55/40 56/30 55/20 DOGAL BEXET
 EAST LVLS 340 350 360 370 380 390 400
 WEST LVLS NIL
 EUR RTS EAST NIL
 NAR N511A N495C-
 END OF PART TWO OF THREE PARTS)

DD BIRDZQZZ
 021303 CZQXZQZX
 (NAT - 3 / 3 TRACKS FLS 320 / 400 INCLUSIVE
 NOV 03/0100Z TO NOV 03/0800Z
 PART THREE OF THREE PARTS -
 TUDEP 52/50 54/40 55/30 54/20 MALOT GISTI
 EAST LVLS 340 350 360 370 380 390 400
 WEST LVLS NIL
 EUR RTS EAST NIL
 NAR N453A N435A-
 REMARKS:
 1. TMI IS 099-OPERATORS ARE REMINDED TO INCLUDE THE TMI NUMBER AS PART OF THE OCEANIC CLEARANCE READ BACK.
 2. SEND RCL 90-60 MINUTES PRIOR TO OCEANIC ENTRY POINT.
 3. PBCS OTS LEVELS 350-390. PBCS TRACKS AS FOLLOWS
 TRACK E
 TRACK F
 TRACK G
 END OF PBCS OTS
 4. INCLUDE THE MAX LEVEL IN RCL. IF NO MAX LEVEL IS PROVIDED THE RCL LEVEL WILL BE CONSIDERED HIGHEST ACCEPTABLE FL THAT CAN BE MAINTAINED AT THE OCEANIC ENTRY POINT.
~~5. CLEARANCEE MAY DIFFER FROM THE FLIGHT PLAN, FLY THE CLEARANCE.~~
 56. STRATEGIC LATERAL OFFSET PROCEDURE (SLOP) SHOULD BE USED FOR ALL OCEANIC CROSSINGS. LEFT SLOP IS PROHIBITED.
 67. 130 MINUTES AFTER ENTERING NAT AIRSPACE OR AFTER LEAVING SURVEILLANCE AREA, USE CODE 2000 ON TRANSPONDER.
 78. NAVIGATION ERRORS CAN BE PREVENTED BY THE USE OF PROPER FMS WAYPOINT PROCEDURES.
 89. ADS-C AND CPDLC ARE MANDATED FOR LEVELS 290-410 IN NAT AIRSPACE.
~~910. CANADIAN AIP ENR 7.1.7 STATES THAT NAT OPERATORS SHALL FILE PRM.~~
~~101. OPERATORS SHOULD REFERENCE NAT DOC 007 CHAPTERS 68 AND 113 FOR SPECIFIC NAT OCEANIC PROCEDURES~~
 112. DATA LINK EQUIPPED FLIGHTS NOT LOGGED ON TO DOMESTIC AIRSPACE, PRIOR TO ENTERING THE GANDERSHANWICK OCA, MUST INITIATE A LOGON TO CZQXEGCX 10 - 25 MINS PRIOR TO OCA ENTRY.-
 END OF PART THREE OF THREE PARTS)

Figure 2-0-2 — Example of Night-Time Eastbound NAT Organised Track System



CHAPTER 3

ROUTES, ROUTE STRUCTURES, AND TRANSITION AREAS WITHIN OR ADJACENT TO THE NAT HLA

3.1 GENERAL

3.1.1 Routes, route structures, and transition areas within and adjacent to the NAT HLA are detailed below.

3.2 ROUTES WITHIN THE NAT HLA

3.2.1 Routes within the NAT HLA (illustrated in *Figure 3-1* and *Figure 3-2*) are as follows:

a) *Blue Spruce Routes require State approval for NAT HLA operations, and are listed below:

- MOXAL – RATSU (for flights departing Reykjavik Airport)
(VHF coverage exists. Non HF equipped aircraft can use this route)
- OSKUM – RATSU (for flights departing Keflavik Airport)
(VHF coverage exists. Non HF equipped aircraft can use this route)
- RATSU – ALDAN – KfV (Keflavik)
(VHF coverage exists. Non HF equipped aircraft can use this route)
- ATSIX – 61°N 12°34'W – ALDAN – KfV
(HF is required on this route)
- GOMUP – 60°N 15°W – 61°N 16°30'W – BREKI – KfV
(HF is required on this route)
- KfV – EPENI – 63°N 30°W – 61°N 40°W – OZN
(VHF coverage exists. Non HF equipped aircraft can use this route)
- KfV – SOPEN – DA (Kulusuk) – SF (Kangerlussuaq) – YFB
(VHF coverage exists. Non HF equipped aircraft can use this route)
- SF (Kangerlussuaq) – DARUB – YXP
(VHF coverage exists. Non HF equipped aircraft can use this route)
- OZN – 59°N 50°W – AVUTI (FL 290 to FL 600) - PRAWN – YDP
(VHF coverage exists. Non HF equipped aircraft can use this route)
- OZN – 59°N 50°W – CUDDY (FL 290 to FL 600) - PORGY
(VHF coverage exists. Non HF equipped aircraft can use this route)
- OZN – 58°N 50°W – HOIST – YYR
(VHF coverage exists. Non HF equipped aircraft can use this route)

State approval for NAT HLA operations is required for operations along Blue Spruce routes.

- b) routes between Northern Europe and Spain/Canarias/Lisboa FIR. (T9[#], T290[#], T13, T213 and T16. State approval for NAT HLA operations is required.);
- c) *routings between the Azores and the Portuguese mainland (T25 or random) and between the Azores and the Madeira Archipelago;

- d) routes between Iceland and Constable Pynt on the east coast of Greenland and between Kook Islands on the west coast of Greenland and Canada;
- e) defined routes of short stage lengths where aircraft equipped with normal short-range navigation equipment can meet the NAT HLA track-keeping criteria as follows:
 - G3- VALDI - MY (Myggenes) - ING – KFV
 - G11 - PEMOS - MY (Myggenes)

NAT HLA approval is required for operations on G3 and G11.

*Note 1: *routes/routings identified with an asterisk in sub paragraphs (a), (b) and (c) above may be flight planned and flown by approved aircraft equipped with normal short-range navigation equipment (VOR, DME, ADF) and at least one approved fully operational LRNS.*

Note 2: #routes T9 and T290 may be flight planned and flown by approved aircraft equipped with and operating ADS-B (1090 MHz ADS-B 'out' capability), VHF and capable of RNP 2 (Continental).

Figure 3-1 Northern routes

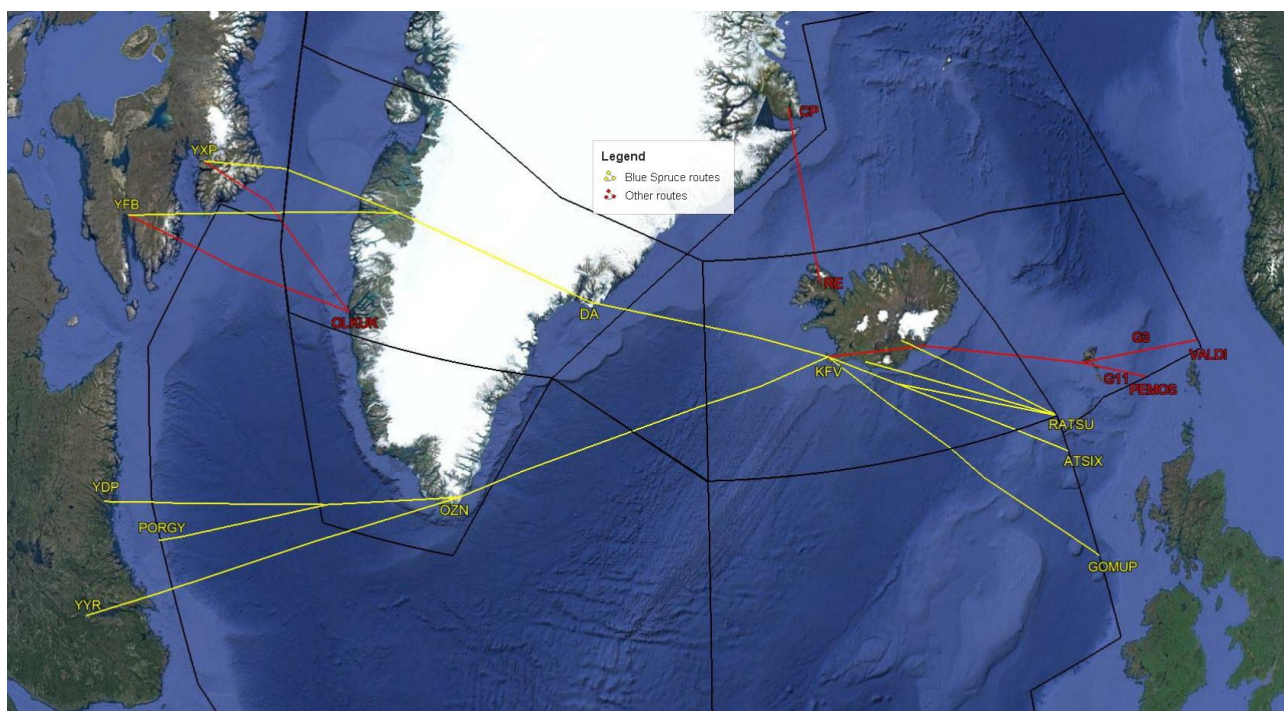
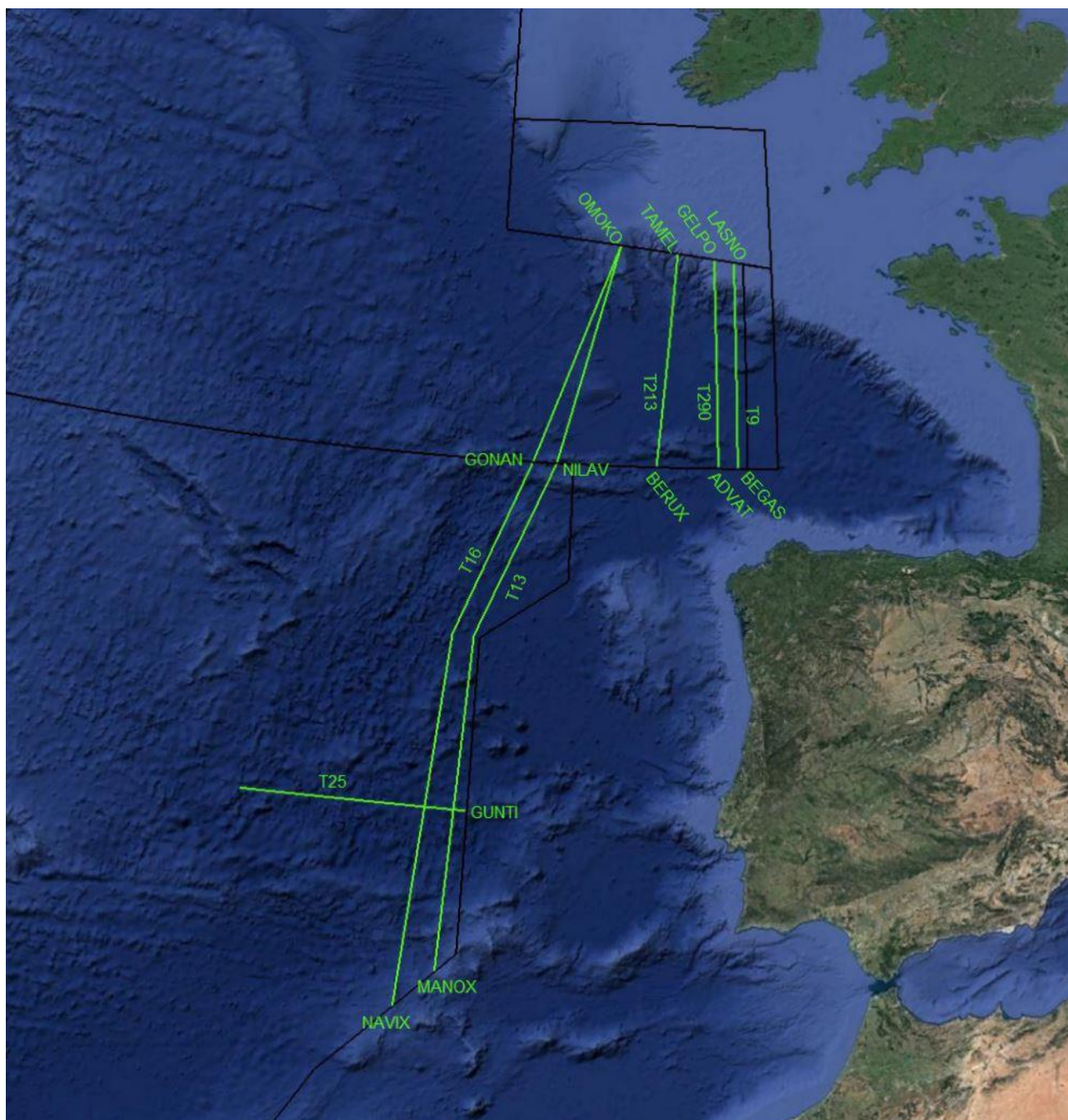


Figure 3-2 Tango routes

3.3 ROUTE STRUCTURES ADJACENT TO THE NAT HLA

North American Routes (NARs)

3.3.1 The North American Routes (NARs) consist of a numbered series of predetermined routes which provide an interface between NAT oceanic and North American domestic airspace. The NAR System is designed to accommodate major airports in North America. (For further information see Chapter 4).

3.3.2 Full details of all NAR routings (eastbound and westbound) together with associated procedures are published in two saleable documents:

- the United States Chart Supplement – Northeast U.S., currently available through the following:
https://www.faa.gov/air_traffic/flight_info/aeronav/productcatalog/supplementalcharts/AirportDirectory/
with an electronic version currently available through the following link:
https://www.faa.gov/air_traffic/flight_info/aeronav/digital_products/dafd/
- and
- the Canada Flight Supplement.

It should be noted that these routes are subject to occasional changes and are re-published/updated on a regular AIRAC 56-day cycle.

US East Coast Transitions

3.3.3 Aircraft operators are encouraged to refer to FAA Air Traffic Control System Command Centre Advisory Database (<https://nasstatus.faa.gov/>) for NAT Advisory Message, published daily, for specified transitions from select US airports to the NAT Entry Points. Additionally, route advisories are published, as necessary, to address special route requirements eastbound and westbound through the New York Oceanic East ~~FIR~~/OCACTA.

Routes between North America and the Caribbean area

3.3.4 The West Atlantic Route System (WATRS) resides within the New York OCA West, the Miami oceanic airspace, and the San Juan oceanic airspace. Details of these routes and associated procedures are contained in the United States AIP.

Northern Oceanic Transition Area (NOTA) and Shannon Oceanic Transition Area (SOTA)

3.3.5 Parts of the Shanwick OCA are designated as the Shannon Oceanic Transition Area (SOTA) and the Northern Oceanic Transition Area (NOTA).

3.3.6 NOTA:

5400N 01500W – 5700N 01500W – 5700N 01000W
– 5434N 01000W – 5400N 01500W

FL 05560 TO UNLIMITED ~~FL 600 INCLUSIVE~~

NAT HLA FL 285 TO FL 420.

3.3.7 Air Traffic Services are provided by Shannon ACC using the call sign SHANNON CONTROL. Full details of the service provided and the procedures used are contained in AIP Ireland.

3.3.8 SOTA:

5100N 01500W – 5100N 00800W – 4830N 00800W –
4900N 01500W – 5100N 01500W

FL 05560 TO UNLIMITED ~~FL 600 INCLUSIVE~~

NOT INCLUDED IN NAT HLA*

* Note: Flights transitioning through SOTA and entering the Shanwick OCA ~~requiring an oceanic clearance~~ FL 285 to FL 420 inclusive must meet NAT HLA requirements.

Brest Oceanic Transition Area (BOTA)

3.3.9 Part of the Shanwick OCA is designated as the Brest Oceanic Transition Area (BOTA):

4834N 00845W – 4830N 00800W – 4500N 00800W –
4500N 00845W – 4834N 00845W

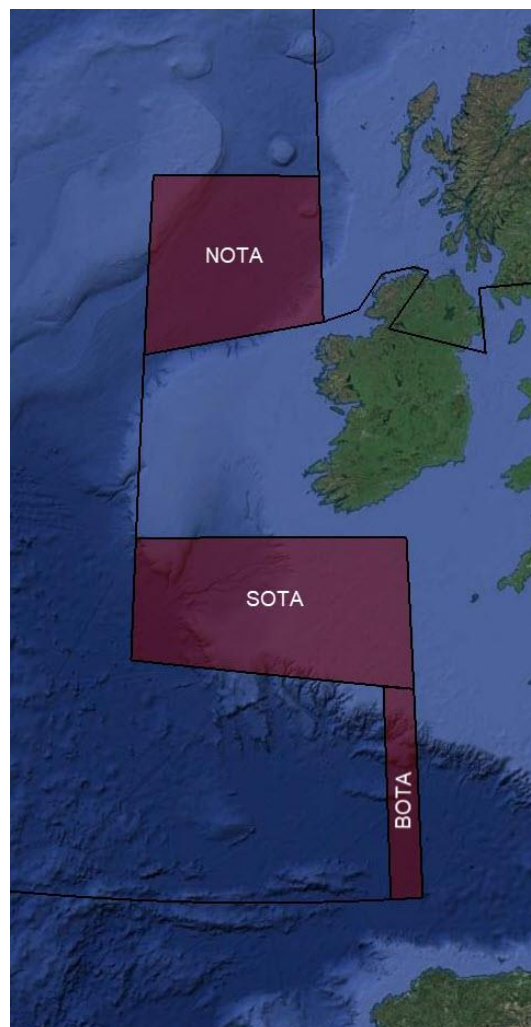
FL 005560 TO UNLIMITED ~~FL 600 INCLUSIVE~~

NOT INCLUDED IN NAT HLA*

* Note: Flights transitioning through BOTA and entering Shanwick OCA ~~requiring an oceanic clearance~~ FL 285 to FL 420 inclusive must meet NAT HLA requirements.

3.3.10 Air Traffic service is provided by the Brest ACC, call sign BREST CONTROL.

Figure 3-3: NOTA, SOTA and BOTA areas



Gander Oceanic Transition Area (GOTA)

3.3.11 Part of the Gander OCA is designated as the Gander Oceanic Transition Area (GOTA):

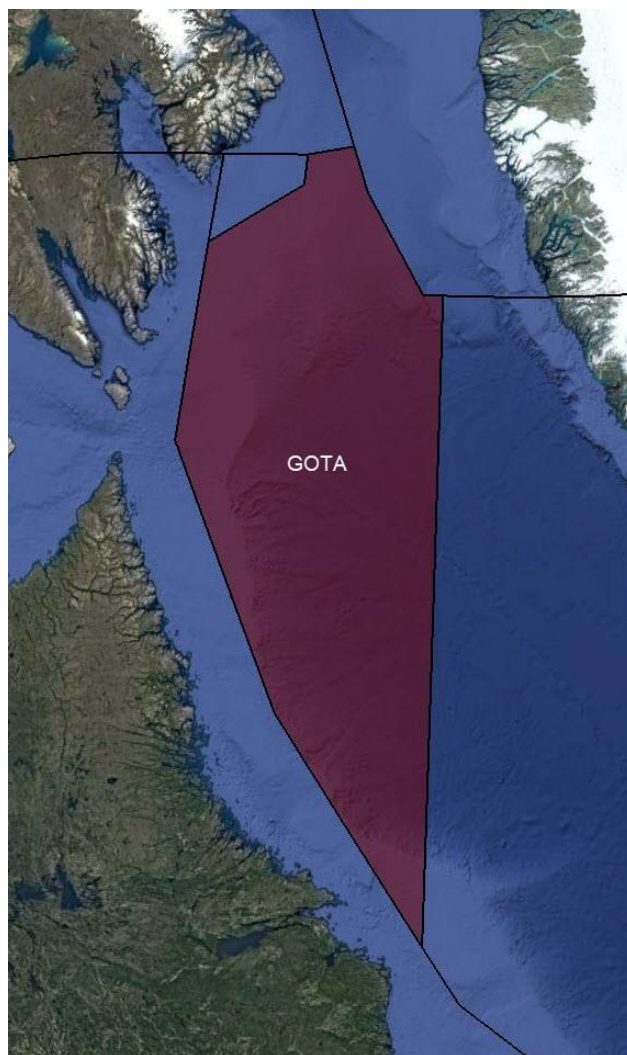
6530N 060W east to the Reykjavik OACAC boundary, southeast along the Reykjavik boundary to 6330N 05540W, east to 6330N 055W, southwest to 5352N 05458W, northwest along the Gander boundary to PRAWN, north to MOATT, northwest to 61N 063W, then north along the Montreal ACC boundary to the Edmonton ACC boundary.

FL 290 to FL 600 inclusive

NAT HLA FL 285 to FL 420

3.3.12 Air Traffic service is provided by the Gander ACC, call sign GANDER CENTRE. Full details of the service provided and the procedures used are contained in Canada Flight Supplement (CFS).

Figure 3-4 GOTA area



CHAPTER 4

FLIGHT PLANNING

4.1 GENERAL

4.1.1 Doc 7030, in conjunction with State AIPs, provides detailed routing constraints reference flight planning in the NAT. Refer to Doc 7030 and relevant State AIP for details. General rules are paraphrased below.

4.1.2 All flights which generally route in an eastbound or westbound direction should normally be flight planned so that specified ten degrees of longitude (20°W, 30°W, 40°W etc.) are crossed at whole or half degrees of latitude; and all generally northbound or southbound flights should normally be flight planned so that specified parallels of latitude spaced at five degree intervals (65°N, 60°N, 55°N etc.) are crossed at whole degrees of longitude. Exceptions apply in the case of flights routing north of 70°N, these are noted below.

4.1.3 In Bodo OCA, Shanwick OCA, and Santa Maria OCA, operators can flight plan their user-preferred routes (UPRs)/free route airspace operations without the need to satisfy the flight planning requirements in sections 4.2.6-4.2.7 in accordance with requirements specified in the relevant State AIPs.

4.1.4 Additionally, relevant State AIPs may detail areas of ATS Surveillance coverage and VHF voice coverage. These areas may allow flight planning between defined entry and exit points without requiring adherence to the above provisions.

Routings

4.1.5 Operators are allowed to flight plan on the OTS, across the OTS or to join or leave the OTS. While ATC will make every effort to clear random traffic affecting the OTS at published flight levels, operators should be aware that re-routes or significant changes in flight level may occur during most of the OTS traffic periods.

4.1.6 Outside of the OTS periods, operators flying against the pending OTS may flight plan any random routing, except:

- a) Eastbound flights that cross 30°W less than one hour prior to the pending Westbound OTS (i.e. after 1029 UTC); or
- b) Westbound flights that cross 30°W less than one hour prior to the pending Eastbound OTS (i.e. after 2359 UTC),

should plan to remain clear of the pending OTS structure.

4.1.7 Flight crews of all NAT flights at or above FL 290, even those that will transit the NAT either above the NAT HLA, or laterally clear of the OTS, must carry a copy of the NAT track message, including any amendments. In the case of amendments, Note One of the NAT track message will generally contain a brief explanation of the amendment and, if warranted, a revised TMI with an alpha suffix.

Note: *A revised TMI with an alpha suffix will be issued for changes to: any track coordinate(s), including “named” waypoints; published track levels; or “named” waypoints within European routes west. A TMI revision will not be issued for changes to other items such as NARs.*

Flight Levels

4.1.8 Flight planning in the NAT between FL 290 and FL 410 inclusive is restricted by the Data Link Mandate. Chapter 1 indicates equipment required within this flight level band.

4.1.9 Flights which are planned to remain entirely clear of the OTS or which join or leave an OTS track (i.e. follow an OTS track for only part of its published length), are all referred to as Random Flights. Flight crews intending to fly on a random route or outside the OTS time periods may plan any flight level(s) in accordance with the NAT FLAS.

Note 1: This FLAS is published in the UK and Canadian AIPs and described in Attachment 5.

Note 2: Arrangements for routes T9 and T290 are published in the UK AIP at ENR 3.3 and 3.5.

4.1.10 Flights which are planned to follow an OTS track for its entire length (during the OTS periods) may plan any of the levels published for that track, keeping in mind PBCS and DLM requirements.

Note: PBCS tracks will be identified in Note 3 of the OTS message. Operators planning to operate in the altitude band FL 350 - FL 390 on the PBCS OTS are subject to equipage and authorization requirements as outlined in NAT OPS Bulletin, "Implementation of Performance Based Separation Minima".

4.1.11 Operators may include climbs in the flight plan, although each change of level during flight must be requested from ATC by the flight crew. Approval of such requests will be entirely dependent upon potential traffic conflicts. ATC may not always be able to accommodate requested flight level changes and prudent pre-flight fuel planning should take this into consideration.

4.1.12 If a flight is expected to be level critical, operators should contact the initial OAC€ prior to filing of the flight plan to determine the likely availability of specific flight levels.

Speed

4.1.13 The planned Mach number must be included in the ICAO flight plan for aircraft capable of maintaining an assigned Mach.

~~4.1.124.1.14~~ 4.1.14 ATC uses speed information, along with position information to calculate estimated times along the cleared route. These times are used as the basis for longitudinal separation and for coordination with adjacent units.

Flight Plans

~~4.1.134.1.15~~ 4.1.15 Correct completion and addressing of the ICAO flight plan is extremely important as errors can lead to delays in data processing and the subsequent issuing of clearances to the flights concerned. Detailed explanations of how to correctly complete a flight plan with respect to the NAT portion of a flight are contained in Chapter 16 of this Manual.

~~4.1.144.1.16~~ 4.1.16 Operators are reminded that they must indicate their aircraft and flight crew capabilities (e.g. RNP, RNAV, RCP 240 and RSP 180 authorization, RVSM, FANS 1/A data link, ADS-B and NAT HLA approval) in the flight plan. Separation criteria and safety improvement initiatives in the NAT region are made available to all appropriately equipped flights based on filed flight plan information. This also supports planning for future initiatives by providing more accurate information regarding the actual capabilities of the fleet operating in the ICAO NAT region.

4.2 FLIGHT PLANNING REQUIREMENTS

4.2.1 If (and only if) the flight is planned to operate along the entire length of one of the organised tracks (as detailed in the NAT track message), from oceanic entry point to oceanic exit point, Item 15 of the flight plan may be defined by using the abbreviation 'NAT' followed by the track letter assigned to the track.

4.2.2 Flights wishing to join or leave an organised track at some intermediate point are considered to be random route aircraft and full route details must be specified in the flight plan. The track letter must not be used to abbreviate any portion of the route in these circumstances.

4.2.3 The planned Mach number and flight level should be specified at either the last domestic reporting point prior to oceanic airspace or the organised track commencement point.

4.2.4 Each point at which a change of Mach number or flight level is planned must be specified by geographical coordinates in latitude and longitude or as a “named” waypoint and followed in each case by the next significant point.

4.2.5 The accumulated estimated elapsed time to each oceanic FIR boundary shall be specified in Item 18 of the FPL following the EET/ indicator.

Flight Planning on Random Route Segments in a Predominantly East - West Direction

4.2.6 Doc 7030 states that flights operating between North America and Europe shall generally be considered as operating in a predominantly east-west direction. However, flights planned between these two continents via the North Pole shall be considered as operating in a predominantly north-south direction. Except in those areas defined in State AIPs where operators meeting specified requirements can flight plan their user-preferred trajectories, the following applies:

- a) For flights operating at or south of 70°N, the planned tracks shall normally be defined by significant points formed by the intersection of half or whole degrees of latitude with meridians spaced at intervals of 10 degrees from the Greenwich meridian to longitude 70°W.
- b) For flights operating north of 70°N and at or south of 80°N, the planned tracks shall normally be defined by significant points formed by the intersection of parallels of latitude expressed in degrees and minutes with meridians normally spaced at intervals of 20 degrees from the Greenwich meridian to longitude 60°W, using the longitudes 000W, 020W, 040W and 060W.
- c) For flights operating at or south of 80°N, the distance between significant points shall, as far as possible, not exceed one hour's flight time. When the flight time between successive significant points is less than 30 minutes, one of these points may be omitted. Additional significant points should be established when deemed necessary due to aircraft speed or the angle at which the meridians are crossed, e.g.:
 - i) at intervals of 10 degrees of longitude (between 5°W and 65°W) for flights operating at or south of 70°N; and
 - ii) at intervals of 20 degrees of longitude (between 10°W and 50°W) for flights operating north of 70°N and at or south of 80°N.
- d) For flights operating north of 80°N, the planned tracks shall normally be defined by points of intersection of parallels of latitude expressed in degrees and minutes with meridians expressed in whole degrees. The distance between significant points shall normally equate to not less than 30 and not more than 60 minutes of flying time.

Flight Planning on Random Routes in a Predominantly North - South Direction

4.2.7 Except in those areas defined in State AIPs where operators meeting specified requirements can flight plan their user-preferred trajectories, the following applies:

- a) For flights whose flight paths at or south of 80°N are predominantly oriented in a north-south direction, the planned tracks shall normally be defined by significant points formed by the intersection of whole degrees of longitude with specified parallels of latitude which are spaced at intervals of 5 degrees.

- b) For flights operating north of 80°N, the planned tracks shall be defined by points of intersection of parallels of latitude expressed in degrees and minutes with meridians expressed in whole degrees. The distance between significant points shall normally equate to not less than 30 and not more than 60 minutes of flying time.

Flight Planning to Enter or Leave the NAT Region via the North American Region

4.2.8 To provide for the safe and efficient management of flights to/from the NAT region, a transition route system is established in the NAM region (North American Routes - NARs). This system details particular domestic routings associated with each oceanic entry or landfall point. These routes are promulgated to expedite flight planning; reduce the complexity of route clearances and minimize the time spent in the route clearance delivery function. The NAR System is designed to accommodate major airports in North America where the volume of North Atlantic (NAT) traffic and route complexity dictate a need to meet these objectives. It consists of a series of pre-planned routes from/to coastal fixes and identified system airports. Most routes are divided into two portions:

Common Portion — that portion of the route between a specified coastal fix and specified Inland Navigation Fix (INF). (*Note: Eastbound NARS only have a common portion*).

Non-common Portion — that portion of the route between a specified INF and a system airport.

4.2.9 The routes are prefixed by the abbreviation “N,” with the numbering for the common portions orientated geographically from south to north. The odd numbers have eastbound application while the even numbers apply to westbound. An alpha character may follow the one to three digit identifying code indicating an amendment. Together it forms the route identifier. The alpha numeric identifier is associated with the common routes only and not with the non-common route portions.

4.2.10 The use of NARs is not compulsory for every oceanic exit point. The Eastbound NAT track message includes recommended NARs for each track which enters oceanic airspace through Canadian domestic airspace. The Westbound NAT track message carries the annotation “NAR Nil” for each track with the exception of tracks terminating at CARAC, JAROM, or RAFIN where NARs must be filed. Operators may file on any one of the destination appropriate NARs published from that relevant coastal fix.

Note: *Westbound NAR details are listed in the Canada Flight Supplement and Moncton FIR issues daily NOTAMS showing “recommended NARs”. Operators may file them if desired.*

4.2.11 Canadian Domestic route schemes and the US East Coast Link Routes are also published. All of these linking structures are referenced in Chapter 3 of this Manual and account must be taken of any such routing restrictions when planning flights in this category.

Flight Planning to Operate Without Using HF Communications

4.2.12 When operating outside of VHF coverage the carriage of fully functioning HF is mandatory throughout the NAT, however some exceptions may apply, refer to State AIPs for further details. Aircraft with only functioning VHF communications equipment should plan their route according to the information contained in the appropriate State AIPs and ensure that they remain within VHF coverage of appropriate ground stations throughout the flight.

Flight Planning to Operate with a Single Functioning LRNS

4.2.13 Information on specific routes that may be flight planned and flown by aircraft equipped with normal short-range navigation equipment (VOR, DME, ADF) and at least one approved fully operational LRNS can be found in Chapter 3.

Flight Planning to Operate with Normal Short-Range Navigation Equipment Only

4.2.14 Two routes providing links between Iceland and the ICAO EUR region (G3 and G11) (see Chapter 3) are designated as special routes of short stage lengths where it is deemed that aircraft equipped with normal short-range navigation equipment can meet the NAT HLA track-keeping criteria. Nevertheless, State approval for NAT HLA operations is still required in order to fly along these routes.

CHAPTER 5

OCEANIC ATC CLEARANCES

Chapter 5 is deleted

5.1 — GENERAL

5.1.1 — There are three elements to an oceanic clearance: Route, Level, and Speed (if required). These elements serve to provide for the three basic elements of separation: lateral, vertical, and longitudinal.

5.1.2 — Oceanic clearances are required for all flights within NAT controlled airspace (at or above FL 060). Flight crews should request oceanic clearances from the ATC responsible for the first OCA within which they wish to operate, following the procedures and the time frame laid down in appropriate AIPs and NAT OPS Bulletins. Such clearances are applicable only from that entry point.

5.1.3 — To assist in optimum airspace utilisation, when requesting an oceanic clearance the flight crew should:

- Advise of any required changes to oceanic flight planned level, track, or speed;
- Advise the maximum acceptable flight level at the oceanic boundary;
- Advise of preferred alternative NAT track if applicable.

5.1.4 — Specific information on how to obtain oceanic clearance from each NAT OACC is published in State AIPs and NAT OPS Bulletins.

5.1.5 — When flight crews are requesting oceanic clearance, they are required to maintain contact on the control frequency, unless having received permission to leave the frequency.

5.1.6 — If an aircraft encounters an in-flight equipment failure relevant to the airspace enroute to the NAT oceanic airspace, then the flight crew must advise ATC when requesting an oceanic clearance.

5.1.7 — The flight crew should monitor the forward estimate for oceanic entry, and if this changes by **3 minutes or more**, unless providing position reports via ADS-C, pass a revised estimate to ATC. As planned longitudinal spacing by these OACCs is based on the estimated times over the oceanic entry fix or boundary, failure to adhere to this ETA amendment procedure may jeopardise planned separation between aircraft, thus resulting in a subsequent re-clearance to a less economical track/flight level for the complete crossing. Any such failure may also penalise following aircraft.

5.1.8 — If any of the route, flight level or speed in the clearance differs from that flight planned, requested or previously cleared, attention may be drawn to such changes when the clearance is delivered (whether by voice or by data link). Flight crews should pay particular attention when the issued clearance differs from the flight plan. *(N.B. a significant proportion of navigation errors investigated in the NAT involve an aircraft which has followed its flight plan rather than its differing clearance).*

5.1.9 — If the entry point of the oceanic clearance differs from that originally requested and/or the oceanic flight level differs from the current flight level, the flight crew is responsible for requesting and obtaining the necessary domestic re-clearance to ensure that the flight is in compliance with its oceanic clearance when entering oceanic airspace.

5.1.10 — If flight crews have not received their oceanic clearance prior to reaching the OCA boundary, they must follow the guidance provided in the appropriate State AIP.

~~5.1.11 — Unless otherwise stated the oceanic clearance issued to each aircraft is at a specified flight level and cruise Mach number. Subsequent en route changes to flight level or Mach number should not be made without prior ATC clearance, except in an urgency situation, (e.g. encountering unanticipated severe turbulence).~~

~~5.1.12 — With the implementation of OWAFS, flight crews can expect ATC to issue the clearance RESUME NORMAL SPEED when traffic permits after oceanic entry. This clearance allows the flight crew to select a cost index (ECON) speed instead of a fixed Mach number with the condition that ATC must be advised if the speed changes by plus or minus Mach .02 or more from the last assigned Mach number.~~

5.2 — CONTENTS OF CLEARANCES

~~5.2.1 — An abbreviated clearance is issued by Air Traffic Services when clearing an aircraft to fly along the whole length of an organised track. The flight crew should confirm the current NAT track message by using the TMI number (including any appropriate alpha suffix) in the readback. There is no requirement for the flight crew to read back the NAT track coordinates. If any doubt exists as to the TMI or the NAT track coordinates, the flight crew should request the complete track coordinates. Similarly, if the flight crew cannot correctly state the TMI, confirmation will include NAT track coordinates in full and a full read back of those coordinates will be required.~~

~~5.2.2 — If the term, “via flight plan route” is used when issuing an oceanic clearance, the flight crew is required to readback the full coordinates of the flight plan route, from the oceanic entry point to the exit point.~~

~~5.2.3 — Attachment 6 provides examples and explanations of clearances and instructions possible in the NAT region. Operators and flight crews, especially those new to NAT operations, are encouraged to review the examples.~~

5.3 — OCEANIC CLEARANCES FOR WESTBOUND FLIGHTS ROUTING VIA 61°N 010°W

~~5.3.1 — The provision of air traffic service at RATSU (61°N 010°W) has been delegated by Shanwick to Reykjavik. Flights intending to enter NAT oceanic airspace via RATSU (61°N 010°W) should not call Shanwick for an oceanic clearance. The required oceanic clearance will be issued by Reykjavik Control. There are three points established at the boundary of delegated airspace from Scottish to Reykjavik, BESGA, DEVBI and BARKU on routes to RATSU. Reykjavik will issue oceanic clearances from those points. Aircraft that have not received their oceanic clearance prior to those points shall enter Reykjavik airspace at the domestic cleared flight level while awaiting such oceanic clearance.~~

5.4 — OCEANIC FLIGHTS ORIGINATING FROM THE NAM, CAR OR SAM REGIONS AND ENTERING THE NAT HLA VIA THE NEW YORK OCA EAST

~~5.4.1 — For flights planning to enter the NAT directly from the New York Oceanic East FIR, the IFR clearance to destination received at the departure aerodrome constitutes the route portion of the oceanic clearance. Once airborne, and prior to entry into the NAT, aircraft will be assigned an altitude and a speed (if required) by New York Centre. The receipt of all three elements of an oceanic clearance: route, flight level, and speed constitutes the complete oceanic clearance. A subsequent change to any element(s) of the oceanic clearance does not alter the others.~~

~~Example: Flight from Santo Domingo to Madrid:-~~

~~*The route portion of the clearance received via PDC or DCL from Santo Domingo should be flown unless amended. San Juan ACC will confirm requested altitude and speed prior to issuing the remainder of the oceanic clearance. All three required elements of an oceanic clearance have been received.*~~

~~Example: Flight from New York (KFJK) to Madrid (LEMD):-~~

~~The route and altitude portions of the clearance received via PDC from Kennedy Clearance should be flown unless amended. Prior to entering oceanic airspace, New York Centre confirms requested speed and issues clearance. All three elements of an oceanic clearance have been received.~~

~~5.4.2 ——— Flights entering Canadian Domestic airspace from the New York Oceanic East FIR and then subsequently entering the NAT require a complete oceanic clearance.~~

~~Note: — There is considerable confusion around which agency is responsible to deliver the oceanic clearance when the flight is operating in New York Oceanic airspace which has been delegated to either Moncton or Gander ACCs. (See Figure 5-1.)~~

~~Example: Flight enters New York Oceanic at SLATN, JOBOC, or DOVEY and does not enter airspace delegated to Moncton ACC or Gander ACC:~~

~~The route portion of the clearance received via PDC or DCL should be flown unless amended. New York ATC will confirm requested altitude and speed prior to issuing the remainder of the oceanic clearance. The TMI is required during the readback if on an organized track.~~

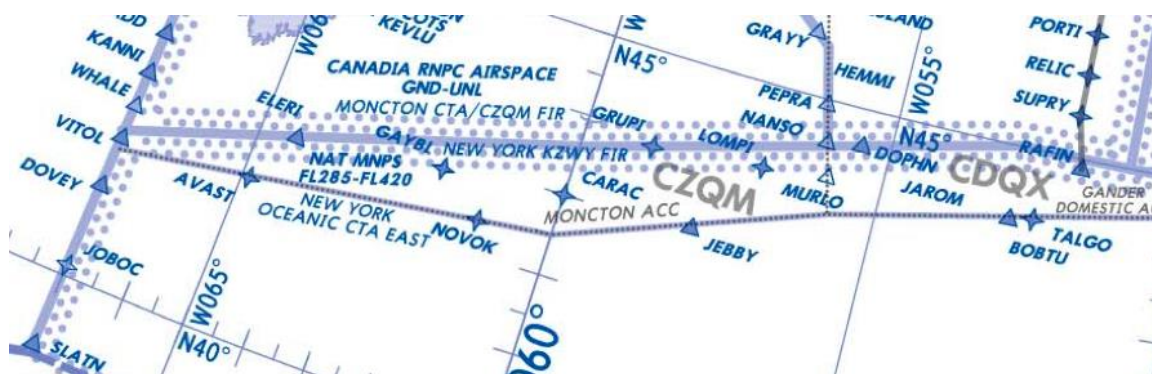
~~Example: Flight enters airspace delegated to Moncton ACC and exits back into New York Oceanic via (AVAST, NOVOK, or JEBBY) never entering Gander Domestic ACC airspace:-~~

~~The route portion of the clearance received via PDC or DCL should be flown unless amended. Moncton ATC will confirm requested altitude and speed prior to issuing the reminder of the clearance.~~

~~Example: Flight enters airspace delegated to Gander ACC (DOPHN, JAROM, BOBTU) via either Moncton ACC or via New York Oceanic and enters NAT airspace through either Gander or New York:~~

~~Full oceanic clearance should be requested with Gander Oceanic via ACARS or voice as appropriate.~~

Figure 5-1



~~5.4.3 ——— Flights entering the southern portion of New York Oceanic East FIR from Piarco CTA will be issued all three components of the oceanic clearances prior to entering New York OCA.~~

~~5.4.4 ——— In cases where aircraft have been cleared via a NAT track, the TMI number will be confirmed prior to reaching the NAT track entry fix.~~

5.5 — CLEARANCES INCLUDING VARIABLE FLIGHT LEVEL

5.5.1 — Clearances which include variable flight level may be requested and granted, traffic permitting. Clearance requests for a variable flight level may be made by voice or CPDLC.

5.5.2 — Within the NAT, on occasion when traffic permits, aircraft are cleared for a cruise climb or to operate within a block of flight levels. The operational difference between cruise climbs and block of flight levels is in accordance with the following:

- **Cruise climb: Only climb or maintain a level, NEVER DESCEND;**
- **Block of flight levels: Climb and/or descend freely within the assigned block of flight levels.**

5.5.3 — A cruise climb should be requested when a flight crew wants to operate with a “flexible” vertical profile and gradually climb as the aircraft weight decreases and the optimum flight level increases. A block of flight levels should be requested when the flight crew wants to operate with a flexible vertical profile and the aircraft’s altitude will vary up or down due to factors such as turbulence or icing.

5.5.4 — ATC will still make the most efficient use of airspace with the block of levels by adjusting the clearance as levels are cleared. For cruise climb, levels below the aircraft are automatically released as the aircraft climbs.

5.6 — ERRORS ASSOCIATED WITH OCEANIC CLEARANCES

5.6.1 — Errors associated with oceanic clearances fall into several categories of which the most significant are ATC System Loop errors and Waypoint Insertion errors.

Communication Errors

5.6.2 — A communication error is any error caused by a misunderstanding between the flight crew and the controller regarding the assigned flight level, speed, or route to be followed. Such errors can arise from: incorrect interpretation of the NAT track message by dispatchers; errors in coordination between OACCs; or misinterpretation by flight crews of oceanic clearances or re-clearances. Errors of this nature, which are detected by ATC from flight crew position reports will normally be corrected. However, timely ATC intervention cannot always be guaranteed, especially as it may depend on the use of third-party relayed HF, GP/VHF or SATVOICE communications.

Waypoint Insertion Errors

5.6.3 — Experience has shown that many of the track-keeping errors in the NAT HLA occur as a result of flight crews programming the navigation system(s) with incorrect waypoint data. These are referred to as Waypoint Insertion Errors. They frequently originate from:

- failure to observe the principles of checking waypoints to be inserted in the navigation systems, against the cleared route;
- failure to load waypoint information correctly; or
- failure to crosscheck on-board navigation systems.

5.6.4 — Many of the navigation error occurrences are the product of one or more of the foregoing causes. It is therefore extremely important that flight crew double check each element of the oceanic clearance on receipt, and at each waypoint, since failure to do so may result in inadvertent deviation from cleared route and/or flight level.

5.6.5 — More detailed guidance on this subject is contained in Chapter 8 and Chapter 14.

CHAPTER 6

COMMUNICATIONS AND POSITION REPORTING PROCEDURES

6.1 ATS COMMUNICATIONS

Equipage Requirements

6.1.1 Operations in the NAT outside VHF coverage require the carriage of two long range communication systems, one of which must be HF, SATVOICE and/or CPDLC (appropriate to route of flight) may satisfy the requirement of the second-long range communication system. Due to coverage limitations, an Inmarsat CPDLC or SATVOICE system does not qualify as a long range communication system when operating north of 80°N. Aircraft that are equipped with both Inmarsat (J5) and Iridium (J7) data link capability should use Iridium when north of 80°N.

6.1.2 Flights planning to operate outside VHF coverage may request waivers from the HF requirement provided the flight falls into one of the following categories:

- Air carriers with HF unserviceable wishing to return to base for repairs, or
- Ferry or delivery flights, or
- Special event flights.

6.1.3 Relief from the HF requirement in accordance with 6.1.2 may be granted by the Air Traffic Control Centres serving the route of flight provided the aircraft has at least two other long-range communication systems appropriate for route of flight.

Note: See State AIPs for details.

HF Voice Communications

6.1.4 It is important that flight crews appreciate that routine* air/ground ATS voice communications in the NAT region are conducted via aeronautical radio stations (hereafter referred to as radio stations) staffed by radio operators **who have no executive ATC authority**. Messages are relayed by the ground station to/from the air traffic controllers in the relevant OACG. This is the case, whether communications are via HF, GP/VHF or SATVOICE.

6.1.5 There are six radio stations in the NAT: Bodø Radio (Norway), Gander Radio (Canada), Iceland Radio (Iceland), New York Radio (USA), Santa Maria Radio (Portugal) and Shanwick Radio (Ireland).

6.1.6 Even with the growing use of data link communications a significant volume of NAT air/ground communications are conducted using voice on SSB HF frequencies and GP VHF frequencies. To support air/ground ATC communications in the North Atlantic region, twenty-four HF frequencies have been allocated, in bands ranging from 2.8 MHz to 18 MHz. Additionally, Shanwick Radio, Santa Maria Radio, and Iceland Radio operate a number of Regional and Domestic Air Route Area (RDARA) frequencies in accordance with operating requirements and agreements between the stations.

6.1.7 There are a number of factors which affect the optimum frequency for communications over a specific path. The most significant is the diurnal variation in intensity of the ionisation of the refractive layers of the ionosphere. Hence frequencies from the lower HF bands tend to be used for communications during night-time and those from the higher bands during day-time. Generally, in the North Atlantic frequencies of less than 6 MHz are utilised at night and frequencies of greater than 5 MHz during the day.

* See 6.1.14 c) and 6.1.27

6.1.8 The 24 NAT frequencies are organized into six groups known as Families. The families are identified as NAT Family A, B, C, D, E and F. Each family contains a range of frequencies from each of the HF frequency bands. A number of stations share families of frequencies and co-operate as a network to provide the required geographical and time of day coverage. A full listing of the frequencies operated by each NAT radio station is contained in the “**HF Management Guidance Material for the North Atlantic Region**” (NAT Doc 003), available at www.icao.int/EURNAT/, following “[EUR & NAT Documents](#)”, then “[NAT Documents](#)”, in folder “[NAT Doc 003](#)”.

6.1.9 Each individual flight may be allocated a primary and a secondary HF frequency before the oceanic boundary.

6.1.10 Radio operators usually maintain a continuous air-ground communication watch on more than one single frequency therefore it is useful for flight crews to state the frequency used when placing the initial call to the radio station.

HF Phraseology applicable when using data link

6.1.11 The integrity of the ATC service remains wholly dependent on establishing and maintaining HF or VHF voice communications with each ATS unit along the route of flight. The procedures in this section are applicable only in NAT airspace and pertain only to ATS data link operations.

6.1.12 Prior to or upon entering each NAT OCA~~oceanic~~CTA, the flight crew should contact the appropriate aeronautical radio station.

6.1.13 If the flight enters an OCA~~oceanic~~CTA followed by another OCA~~oceanic~~CTA, the flight crew should, on initial contact:

- a) not include a position report;
- b) after the radio operator responds, request a SELCAL check and state the next OCA~~oceanic~~CTA;
- c) the radio operator will assign primary and secondary frequencies, perform the SELCAL check and designate the position and frequencies to contact the aeronautical radio station serving the next OCA~~oceanic~~CTA. If the communications instructions are not issued at this stage, the crew should assume that the frequencies to use prior or upon entering the next OCA~~oceanic~~CTA will be delivered at a later time by CPDLC or voice.

Example (Initial contact from an eastbound flight entering GANDER Oceanic):

GANDER RADIO, AIRLINE 123, SELCAL CHECK, SHANWICK NEXT
 AIRLINE 123, GANDER RADIO, HF PRIMARY 5616 SECONDARY 2899, AT 30 WEST
 CONTACT SHANWICK RADIO HF PRIMARY 8891 SECONDARY 4675, (SELCAL
 TRANSMITTED)
 GANDER RADIO, AIRLINE 123, SELCAL OKAY, HF PRIMARY 5616 SECONDARY 2899.
 AT 30 WEST CONTACT SHANWICK RADIO, HF PRIMARY 8891 SECONDARY 4675

6.1.14 If the flight will exit an OCA~~oceanic~~CTA into continental airspace or airspace where the primary means of communication is VHF voice and an ATS surveillance service is available, on initial contact with the OCA~~oceanic~~CTA, the flight crew should:

- a) not include a position report;
- b) after the radio operator responds, request a SELCAL check;

Example (Initial contact from an eastbound flight about to enter SHANWICK Oceanic):

SHANWICK RADIO, AIRLINE 123, SELCAL CHECK
 AIRLINE 123, HF PRIMARY 2899 SECONDARY 5616 (SELCAL TRANSMITTED)
 SHANWICK RADIO, AIRLINE 123, SELCAL OKAY, HF PRIMARY 2899 SECONDARY
 5616.

- c) For flights on T9 and T290, monitor VHF channel 128.360 as advised by Shanwick Radio. Exceptionally, in the event of navigational non-conformance or in an emergency, controllers may communicate directly with the flight. Controllers will use the callsign “Shanwick Control”.

6.1.15 Depending on which data link services are offered in the OCA~~oceanic~~ CTA and the operational status of those services, the aeronautical radio operator will provide appropriate information and instructions to the flight crew.

6.1.16 If a data link connection cannot be established, maintain normal voice communication procedures. In the event of data link connection failure in a NAT OCA~~CTA~~ after a successful logon revert to voice and notify the appropriate radio station. Inform the OAC in accordance with established problem reporting procedures.

Note: *Flights on ~~Tango~~-9 or ~~Tango~~-290 should contact Shanwick Radio on HF voice.*

6.1.17 To reduce frequency congestion, flight crews of flights using ADS-C should not additionally submit position reports via voice unless requested by aeronautical radio operator.

6.1.18 ADS-C flights are exempt from all routine voice meteorological reporting; however, the flight crew should use voice to report unusual meteorological conditions such as severe turbulence to the aeronautical radio station.

6.1.19 For any enquiries regarding the status of ADS-C connections, flight crew should use CPDLC. Should the ATS unit fail to receive an expected position report, the controller will follow guidelines for late or missing ADS-C reports.

6.1.20 When leaving CPDLC/ADS-C or ADS-C-only airspace, the flight crew should comply with all communication requirements applicable to the airspace being entered.

6.1.21 If the flight crew does not receive its domestic frequency assignment by 10 minutes prior to the flight’s entry into the next OCA~~oceanic~~ CTA, the flight crew should contact the aeronautical radio station and request the frequency, stating the current OCA~~CTA~~ exit fix or coordinates.

Note: *Flights on ~~Tango~~-9 or ~~Tango~~-290 should contact Shanwick Radio on HF voice.*

SELCAL

6.1.22 When using HF, SATVOICE, or CPDLC, flight crews shall maintain a continuous air-ground communication watch on the assigned frequency, unless SELCAL equipped, in which case they should ensure the following sequence of actions:

- a) provide the SELCAL code in the flight plan; (any subsequent change of aircraft for a flight will require refile of the flight plan or submitting a modification message (CHG) which includes the new registration and SELCAL);
- b) check the operation of the SELCAL equipment, at or prior to entry into oceanic airspace, with the appropriate radio station. (This SELCAL check shall be completed prior to commencing SELCAL watch); and
- c) maintain thereafter a SELCAL watch.

6.1.23 It is important to note that it is equally essential to comply with the foregoing SELCAL provisions even if SATVOICE or CPDLC are being used for routine air/ground ATS communications. This will ensure that ATC has a timely means of contacting the aircraft.

6.1.24 Flight management staff and flight crews of aircraft equipped with SELCAL equipment should be made aware that SELCAL code assignment is predicated on the usual geographical area of operation of the aircraft. If the aircraft is later flown in geographical areas other than as originally specified by the aircraft operator, the aircraft may encounter a duplicate SELCAL code situation. Whenever an aircraft is to be flown routinely beyond the area of normal operations or is changed to a new geographic operating area, the aircraft operator should contact the SELCAL Registrar and request a SELCAL code appropriate for use in the new area.

6.1.25 When acquiring a previously owned aircraft equipped with SELCAL, many aircraft operators mistakenly assume that the SELCAL code automatically transfers to the purchaser or lessee. This is not true. As soon as practical, it is the responsibility of the purchaser or lessee to obtain a SELCAL code from the Registrar, or, if allocated a block of codes for a fleet of aircraft, to assign a new code from within the block of allocated codes.

6.1.26 Issues associated with duplicate SELCALs should be made to the SELCAL Registrar, Aviation Spectrum Resources, Inc. (ASRI). The SELCAL Registrar can be contacted via the AFTN address KDCAXAAG, and by including “ATTN. OPS DEPT. (forward to SELCAL Registrar)” as the first line of message text or via online at <https://www.asri.aero/selcal/>.

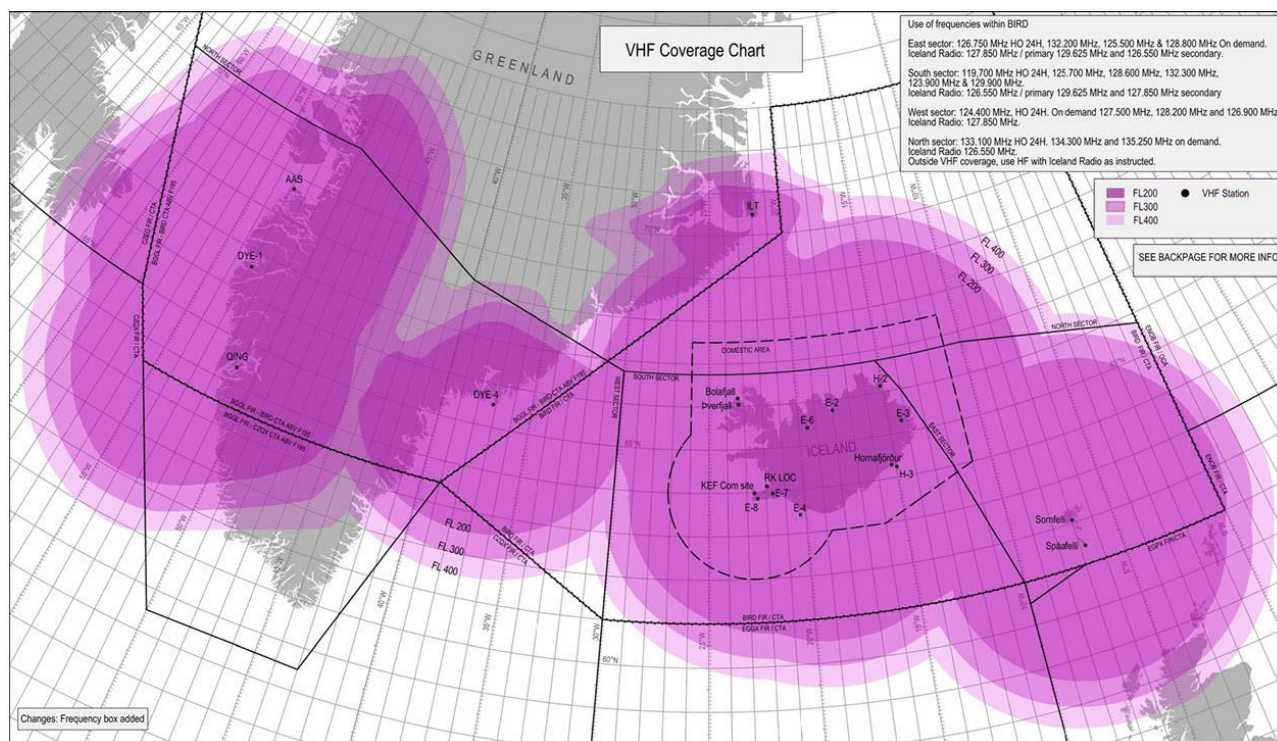
VHF Voice Communications

6.1.27 Radio stations are also responsible for the operation of General Purpose VHF (GP/VHF) outlets. North Atlantic flights may use these facilities for all regular and emergency communications with relevant OACs, except that VHF Channel 128.360 may not be used for routine communication on routes ~~Tango-9~~ and ~~Tango-290~~. Such facilities are especially valuable in the vicinity of Iceland, Faroes and Greenland since VHF is not as susceptible to sunspot activity as HF. Outlets are situated at Prins Christian Sund, which is operated by Gander Radio, and at Kangerlussuaq (Sondrestrom), Kulusuk, several locations in Iceland and the Faroes, via Iceland Radio. It is important for the flight crew to recognise that when using GP/VHF, as with HF and SATVOICE, these communications are with a radio station and the flight crew is not normally in direct contact with ATSU. However, contact between the flight crew and ATC can be arranged, for example via patch-through on HF or GP/VHF frequencies by Iceland Radio and Shanwick Radio.

6.1.28 Reykjavik centre operates a number of Direct Controller Pilot Communications (DCPC) VHF stations in Iceland, Faroe Islands and Greenland. At jet flight levels the coverage is approximately 250 NM as indicated in *Figure 5-1* below. Those stations are used to provide tactical procedural control and ATS Surveillance services within the South, East and West sectors of the Reykjavik area. The callsign of the Reykjavik centre is “*Reykjavik Control*” or just “*Reykjavik*” and indicates that the flight crew is communicating directly with an air traffic controller. The callsign of Iceland radio is “*Iceland radio*” and indicates that the flight crew is communicating with a radio operator who is relaying messages between the flight crew and the appropriate control facility.

Note: *Due to technical data link interoperability requirements, CPDLC uplink messages refer to Iceland Radio as “Iceland Radio Centre”. This is done to enable the flight crew of capable aircraft to automatically load the specified frequency into the aircraft communication system.*

Figure 56-1 Reykjavik Control Direct Controller Pilot VHF Coverage



SATVOICE Communication

6.1.29 The Aeronautical Mobile Satellite (Route) Service (AMS(R)S), more commonly referred to as SATVOICE, can be used as a supplement to HF & CPDLC communications throughout the NAT region for any routine, non-routine or emergency ATS air/ground communications. NAT ATS provider State AIPs contain the necessary telephone numbers and/or short-codes for air-initiated call access to radio stations and/or direct to OACGs. Since oceanic traffic typically communicates with ATC through radio facilities, routine SATVOICE calls should be made to such a facility rather than the ATC Centre. Only when the urgency of the communication dictates otherwise should SATVOICE calls be made to the ATC Centre. SATVOICE communication initiated due to HF propagation difficulties does not constitute urgency and should be addressed to the air-ground radio facility. The use of SATVOICE is described in *The SATVOICE Operations Manual* (Doc 10038).

6.1.30 The provisions governing the use of SATVOICE for ATS communications in the NAT region are contained in Doc 7030. These provisions include that even when using SATVOICE, flight crews must simultaneously operate SELCAL or maintain a continuous air-ground communication watch on the assigned HF/VHF frequency.

6.1.31 Operators must also recognise that they are bound by their own State of Registry's regulations regarding carriage and use of any and all long-range ATS communications equipment. Some States do not authorise the carriage of SATVOICE as redundancy for HF equipment.

Data Link Communications

6.1.32 Data link communications have been gradually introduced into the NAT for position reporting (via ADS-C and CPDLC) and air/ground ATC communications using FANS 1/A CPDLC. Operational procedures are specified in Doc 10037, *Global Operational Data Link (GOLD) Manual*. AIP publications of the NAT ATS provider States should be consulted to determine the extent of current implementation in each of the North Atlantic OCAs.

6.1.33 When operating CPDLC, the aircraft data link system provides indication to flight crews of any degraded performance which results from a failure or loss of connectivity. The flight crew should then notify the ATS unit of the failure as soon as practicable. Timely notification is essential to ensure that the ATS unit has time to assess the situation and apply a revised separation standard, if necessary.

6.1.34 Similar to SATVOICE usage, flight crews electing to use Data link communications for regular ATS communications in the ICAO NAT region remain responsible for operating SELCAL (including completion of a SELCAL Check), or maintaining a continuous air-ground communication watch on the assigned HF frequency outside VHF coverage. As stated in section 2.1.4 of the *ICAO Global Operational Data Link (GOLD) Manual* (Doc 10037) ANSPs are required to notify operators, using the AIP or other appropriate AIS, the detail of all the supported data link services. Such notification will include advice when the aircraft SATCOM system is not serviceable. In such circumstances, when the planned route of flight is to extend beyond VHF data link coverage, the ANSP may restrict the use of CPDLC and ADS-C, even within VHF data link coverage areas, if so Operators should then ensure that the relevant CPDLC/ADS-C descriptors (J5/J7/D1) are not filed.

6.1.35 Flights equipped with CPDLC and /or ADS-C should ensure that the data link system is logged on to the appropriate OAC. This applies even when the aircraft is provided with ATS Surveillance services. With the introduction of PBCS separation, establishing and maintaining a data link connection becomes even more important since an active data link connection is one of the requirements for the application of the separation. CPDLC provides communication redundancy and controllers will in many cases use CPDLC for communication even though the flight crew is maintaining a continuous air-ground communication watch on the assigned DCPC VHF frequency. ADS-C furthermore enables ATC to perform route conformance monitoring for downstream waypoints.

6.2 INTER-PILOT AIR-TO-AIR VHF FACILITY 123.450 MHZ AND EMERGENCY FREQUENCY 121.500 MHZ

6.2.1 The frequency 121.500 MHz should be continuously monitored by all aircraft operating in the NAT region so as to be prepared to offer assistance to any other aircraft advising an emergency situation.

6.2.2 An air-to-air VHF frequency has been established for world-wide use when aircraft are out of range of VHF ground stations which utilise the same or adjacent frequencies. This frequency, 123.450 MHz, is intended for pilot-to-pilot exchanges of operationally significant information (*N.B. It is not to be used as a "chat" frequency*).

6.2.3 123.450 MHz may be used to relay position reports via another aircraft in the event of an air-ground communications failure.

6.2.4 This frequency (123.450 MHz) may also be used by flight crews to contact other aircraft when needing to coordinate offsets required in the application of the Strategic Lateral Offset Procedures (SLOP).

6.2.5 If necessary initial contact for relays or offset coordination can be established on 121.500 MHz, although great care must be exercised should this be necessary, in case this frequency is being used by aircraft experiencing or assisting with an ongoing emergency.

6.2.6 Therefore in order to minimise unnecessary use of 121.500 MHz, it is recommended that when possible aircraft additionally monitor 123.450 MHz when flying through NAT airspace.

6.3 POSITION REPORTING

Time and Place of Position Reports

6.3.1 Unless otherwise requested by ATC, position reports from flights on routes which are not defined by designated reporting points shall be made at the significant points listed in the flight plan.

6.3.2 ATC may require any flight to report its position at any intermediate waypoints when deemed necessary.

6.3.3 In requiring aircraft to report their position at intermediate points, ATC is guided by the requirement to have positional information at approximately hourly intervals and also by the need to accommodate varying types of aircraft and varying traffic and MET conditions.

6.3.4 Unless providing position reports via ADS-C, if the estimated time for the ‘next position’, as last reported to ATC, has changed by **three minutes or more**, a revised estimate must be transmitted to the ATS unit concerned as soon as possible.

6.3.5 Flight crews must always report to ATC as soon as possible on reaching any new cruising level.

Contents of Position Reports

6.3.6 For flights outside domestic ATS route networks, position should be expressed in terms of latitude and longitude except when flying over named reporting points. Except in those areas defined in State AIPs where operators meeting specified requirements can flight plan their user-preferred trajectories, flights whose tracks are predominantly east or west, latitude should be expressed in degrees and minutes, longitude in degrees only. For flights whose tracks are predominantly north or south, latitude should be expressed in degrees only, longitude in degrees and minutes. However, it should be noted that when such minutes are zero then the position report may refer solely to degrees.

6.3.7 All times should be expressed in four digits giving both the hour and the minutes UTC.

6.3.8 Radio operators may simultaneously monitor and operate more than one frequency. Therefore, when initiating an HF voice contact it is helpful if the flight crew include advice on the frequency being used (see examples below).

“Operations Normal” Reports

6.3.9 When “operations normal” reports are transmitted by flight crews, they should consist of the prescribed call followed by the words “OPERATIONS NORMAL”.

Standard Message Types

6.3.10 Standard air/ground message types and formats are used within the NAT region and are published in State AIPs and Atlantic Orientation charts. To enable ground stations to process messages in the shortest possible time, flight crew should observe the following rules:

- a) use the correct type of message applicable to the data transmitted;
- b) state the message type in the contact call to the ground station or at the start of the message;
- c) adhere strictly to the sequence of information for the type of message;
- d) **all times** in any of the messages should be expressed in hours and minutes **UTC**.

6.3.11 The message types are shown below with examples:

POSITION

Pilot: *“Shanwick Radio, Swiss 456, Position on 8831”*

Radio operator: *“Swiss 456, Shanwick Radio”*

Pilot: *“Shanwick Radio, Swiss 456, RESNO at 1235, Flight Level 330, Estimating 56 North 020 West at 1310, Next 56 North 030 West”*

POSITION REPORT AND REQUEST CLEARANCE

Pilot: *“Shanwick Radio, American 123, Request Clearance on 8831”*
Radio operator: *“American 123, Shanwick Radio”*
Pilot: *“Shanwick Radio, American 123, 56 North 020 West at 1308, Flight Level 330, Estimating 56 North 030 West at 1340, Next 56 North 040 West. Request Flight Level 350”*

REQUEST CLEARANCE

Pilot: *“Shanwick Radio, Speedbird 212, Request Clearance on 3476”*
Radio operator: *“Speedbird 212, Shanwick Radio”*
Pilot: *“Shanwick Radio, Speedbird 212, Request Flight Level 370”*

REVISED ESTIMATE

Pilot: *“Shanwick Radio, Speedbird 212, Revised Estimate on 3476”*
Radio operator: *“Speedbird 212, Shanwick Radio”*
Pilot: *“Shanwick Radio, Speedbird 212, 57 North 040 West at 0305”*

MISCELLANEOUS

Plain language – free format

6.4 “WHEN ABLE HIGHER” (WAH) REPORTS

6.4.1 The provision of WAH reports advises ATC of the time or position that a flight will be able to accept the next higher level allowing controllers to more effectively utilise their airspace and provide aircraft more fuel efficient profiles. A WAH report should be provided by all flights when entering the Santa Maria OCA. Provision of WAH reports on entering other NAT OCAs is optional or they may be requested by any OACG.

6.4.2 Information provided of the aircraft’s future altitude “ability” will not automatically be interpreted by ATC as an advance “request” for a climb. It will be used as previously indicated to assist ATC in planning airspace utilisation.

6.4.3 It should be noted that ATC acknowledgement of a WAH report (and any included requests) is NOT a clearance to change altitude.

6.5 METEOROLOGICAL REPORTS

6.5.1 In accordance with ICAO Annex 3 - *Meteorological Service for International Air Navigation*, aircraft are no longer required to provide voice reports of MET observations of wind speed and direction nor outside air temperature.

6.5.2 When an ATS unit establishes an ADS-C contract, it may also request the MET group, which contains wind and temperature data, to satisfy the MET authorities’ requirements for the provision of MET data. However, it must be appreciated that any such automated MET Reports do not include information on any observations of special or non-routine significant meteorological phenomena, such as moderate/severe turbulence or icing, volcanic ash, thunderstorms, etc. Therefore, any flight crew providing position reports via data link, who encounters any such significant meteorological phenomena should report this information via voice or, if appropriate, via a CPDLC free text downlink message. The format to be used for the reporting of such observations should, where appropriate, be by reference to geographical coordinates.

VOLMET Services

6.5.3 This is a H24 continuous voice broadcast of weather information consisting of SIGMETs for the NAT region, terminal forecasts and actual weather observations for the principal airports in North America & Europe provided by Gander, New York and Shanwick. Consult State AIPs and NAT Doc 003-*HF Management Guidance Material for the North Atlantic Region*.

6.6 HF COMMUNICATIONS FAILURE

6.6.1 Rules and procedures for the operation of an aircraft following a radio communications failure (RCF) are established to allow ATC to anticipate that aircraft's subsequent actions and thus for ATC to be able to provide a service to all other flights within the same vicinity, so as to ensure the continued safe separation of all traffic. The general principles of such rules and procedures are set out in Annexes 2 and 10 to the ICAO Convention. States publish in their AIPs specific RCF rules and regulations to be followed within their particular sovereign airspace.

~~6.6.2 ———— Poor HF propagation conditions are the result of ionospheric disturbances. These are usually caused by sun-spot or solar flare activity creating bursts of charged particles in the solar wind which can spiral down around the Earth's magnetic lines of force and distort or disturb the ionised layers in the stratosphere which are utilised to refract HF radio waves. As with the Aurora Borealis, which is of similar origin, these ionospheric disturbances most commonly occur in regions adjacent to the Magnetic Poles. Since the Earth's North Magnetic Pole is currently located at approximately 87N 150W, flights through the North Atlantic and Northern Canada regions can, on occasion, experience HF communications difficulties. It must be recognised that there is in general an underlying premise in "normal" radio communications failure procedures that they are for use when a single aircraft suffers an on-board communications equipment failure. Within the NAT region and some adjacent domestic airspace (e.g. Northern Canada), where HF Voice is used for air-ground ATC communications, ionospheric disturbances resulting in poor radio propagation conditions can also interrupt these communications. While it is impossible to provide guidance for all situations associated with an HF communications failure, it is, however, extremely important to differentiate between two distinct circumstances: firstly, an on-board communications equipment failure, resulting in an individual aircraft losing HF communications with ATC and; secondly, the occurrence of poor HF propagation conditions (commonly referred to as "HF Blackouts"), which can simultaneously interrupt HF air-ground communications for many aircraft over a wide area.~~

6.6.2

6.6.3 Sometimes these disturbances are very wide-spread and HF air-ground communications on all frequencies can be severely disrupted throughout very large areas (e.g. simultaneously affecting the whole of the NAT region and the Arctic.). However, at other times the disturbances may be more localised and/or may only affect a specific range of frequencies.

6.6.4 In this latter circumstance, HF air-ground communications with the intended radio station may be possible on a frequency other than the primary or secondary frequencies previously allocated to an aircraft. In the event of encountering poor HF propagation conditions flight crews should try using alternative HF frequencies to contact the intended radio station.

6.6.5 While these disturbances may be severe, they may only be localized between the aircraft's position and the intended radio station rendering communications with that station impossible on any HF frequency. Radio stations providing air-ground services co-operate as a network and it may be possible to communicate with another radio station on HF and request that they relay communications.

6.6.6 The occurrence of poor HF propagation conditions can simultaneously interrupt HF air-ground communications for many aircraft over a wide area and ATC may be unable to make any interventions to assure safe traffic separations using HF. Flight crews must recognise that an HF blackout may impact the ability of ATC to ensure the safe separation of aircraft. Even if using other than HF for regular communications

with ATC (CPDLC and SATVOICE), flight crews should still exercise appropriate caution when HF blackout conditions are encountered.

General Provisions

~~6.6.3 In the case of an on-board communications equipment failure, even though ATC loses contact with that aircraft, it can anticipate that aircraft's actions and, if necessary, modify the profiles of other aircraft in the same vicinity in order to maintain safe separations.~~

~~6.6.4 However, the occurrence of poor HF propagation conditions can simultaneously interrupt HF air-ground communications for many aircraft over a wide area and ATC may then be unable to make any interventions to assure safe traffic separations using HF. Notwithstanding the growing use of Data link and SATVOICE for regular air-ground ATS communications in the NAT region, all flight crews must recognise that, pending the mandatory carriage and use of such means, an HF blackout will impact the ability of ATC to ensure the safe separation of all traffic. Hence, even if using other than HF for regular communications with ATC, flight crews should still exercise appropriate caution when HF blackout conditions are encountered.~~

~~6.6.5~~ 6.6.7 The following procedures are intended to provide general guidance for aircraft which experience a VHF and HF communications failure with ATC while operating in, or proposing to operate in, the NAT region. These procedures are intended to complement and not supersede State procedures/regulations.

When so equipped, an aircraft should use CPDLC to communicate with the current controlling authority ATC.
~~General Provisions~~

- 1.
- ~~1. The flight crew of an aircraft experiencing a two-way ATS communications failure should operate the SSR Transponder on identity Mode A Code 7600 and Mode C.~~
2. When so equipped, an aircraft may~~should~~ also use SATVOICE to contact the responsible facility~~radio station~~ via special telephone numbers/short codes published in State AIPs (see also NAT Doc 003, “HF Management Guidance Material for the North Atlantic Region” which can be downloaded from the www.icao.int/EURNAT/, following “[EUR & NAT Documents](#)”, then “[NAT Documents](#)”).~~However, it must be appreciated that pending further system developments and facility implementations the capability for Ground (ATC)-initiated calls varies between different NAT OACCs.~~
3. If the aircraft is not equipped with SATVOICE or CPDLC then the flight crew should attempt to use VHF to contact any (other) ATC facility or another aircraft, inform them of the difficulty, and request that they relay information to the ATC facility with which communications are intended.
4. The inter-pilot air-to-air VHF frequency, 123.450 MHz, may be used to relay position reports via another aircraft. ~~(N.B. The emergency frequency 121.500 MHz should not be used to relay regular communications, but since all NAT traffic is required to monitor the emergency frequency, it may be used, in these circumstances, to establish initial contact with another aircraft and then request transfer to the inter-pilot frequency for further contacts).~~
5. In view of the traffic density in the NAT region, flight crews of aircraft experiencing a two-way ATS communications failure should broadcast regular position reports on the inter-pilot frequency (123.450 MHz) until such time as communications are re-established.
- 5.6. The flight crew of an aircraft experiencing a total two-way communications failure (including VHF, HF, CPDLC and SATVOICE) should operate the SSR Transponder on identity Mode A Code 7600 and Mode C.

Communications Procedures for Use in the Event of an On-board HF Equipment Failure

6.6.6 — Use SATVOICE communications, if so equipped. (See 6.6.5, General Provisions 2. above).

6.6.7 — If not SATVOICE equipped try VHF relay via another aircraft (See 6.6.5).

Communications Procedures for Use during Poor HF Propagation Conditions

6.6.8 — Poor HF propagation conditions are the result of ionospheric disturbances. These are usually caused by sun-spot or solar flare activity creating bursts of charged particles in the solar wind which can spiral down around the Earth's magnetic lines of force and distort or disturb the ionised layers in the stratosphere which are utilised to refract HF radio waves. As with the Aurora Borealis, which is of similar origin, these ionospheric disturbances most commonly occur in regions adjacent to the Magnetic Poles. Since the Earth's North Magnetic Pole is currently located at approximately 87N 150W, flights through the North Atlantic and Northern Canada regions can, on occasion, experience resulting HF communications difficulties.

6.6.9 — SATVOICE communications are unaffected by most ionospheric disturbances. Therefore, when so equipped, an aircraft may use SATVOICE for ATC communications (See 6.6.5).

6.6.10 — If not SATVOICE equipped, in some circumstances it may be feasible to seek the assistance, via VHF, of a nearby SATVOICE equipped aircraft to relay communications with ATC (See 6.6.5).

6.6.11 — Whenever aircraft encounter poor HF propagation conditions that would appear to adversely affect air-ground communications generally, it is recommended that all flight crews then broadcast their position reports on the air-to-air VHF frequency 123.450 MHz. Given the density of traffic in the NAT region and the fact that in such poor propagation conditions ATC will be unable to maintain contact with all aircraft, it is important that even those aircraft that have been able to establish SATVOICE contact also broadcast their position reports.

6.6.12 — If for whatever reason SATVOICE communications (direct or relayed) are not possible, then the following procedures may help to re-establish HF communications. Sometimes these ionospheric disturbances are very wide spread and HF air-ground communications at all frequencies can be severely disrupted throughout very large areas (e.g. simultaneously affecting the whole of the NAT region and the Arctic). However, at other times the disturbances may be more localised and/or may only affect a specific range of frequencies.

6.6.13 — In this latter circumstance, HF air-ground communications with the intended radio station may sometimes continue to be possible but on a frequency other than either the primary or secondary frequencies previously allocated to an aircraft. Hence, in the event of encountering poor HF propagation conditions flight crews should first try using alternative HF frequencies to contact the intended radio station.

6.6.14 — However, while the ionospheric disturbances may be severe, they may nevertheless only be localized between the aircraft's position and the intended radio station, thus rendering communications with that station impossible on any HF frequency. But the radio stations providing air-ground services in the NAT region do co-operate as a network and it may, even then, still be possible to communicate with another radio station in the NAT network on HF and request that they relay communications. Efforts should therefore be made to contact other NAT radio stations via appropriate HF frequencies.

6.6.15 — Nevertheless, as previously indicated, there are occasions when the ionospheric disturbance is so severe and so widespread that HF air-ground communications with any radio station within the NAT region network are rendered impossible.

Rationale for Lost Communications Operational Procedures

6.6.16 — Because of the density of oceanic traffic in the NAT region, unique operational procedures have been established to be followed by flight crews whenever communications are lost with ATC. If

~~communications with the relevant OACC are lost at any time after receiving and acknowledging a clearance then the aircraft must adhere strictly to the routing and profile of the last acknowledged clearance until exiting the NAT region. Flight crews must not revert to their filed flight plan.~~

Operational Procedures following Loss of HF Communications Prior to Entry into the NAT

On-Board HF Communications Equipment Failure

~~6.6.176.6.8~~ Due to the potential length of time in oceanic airspace, it is strongly recommended that a flight crew, experiencing an HF communications equipment failure:

- Prior to departure:
 - Coordinate with the initial NAT OAC according to flight planned route to determine if eligible for HF relief waiver as outlined in 6.1.2.
 - Include any coordinated HF waiver relief details in Item 18 of the flight plan.
- After departure and prior to entering the NAT:
 - Coordinate with the initial NAT OAC according to flight planned route to determine if eligible for HF relief waiver as outlined in 6.1.2.

Operational Procedures for Loss of Communications before Entering the NAT

6.6.9 If loss of communications is encountered before entering the NAT then the pilot should:

- a) follow the radio communication failure procedures of the airspace in which the aircraft is operating.
- b) if the pilot elects to continue the flight, then enter oceanic airspace at the oceanic entry point at the level and speed resulting from the execution of the adjacent airspace RCF procedures; then
- c) follow the procedures in 6.6.10 below.

~~6.6.18 — If, however, an oceanic clearance cannot be obtained, the individual aircraft suffering radio communications equipment failure should enter oceanic airspace at the first oceanic entry point, level and speed contained in the filed flight plan and proceed via the filed flight plan route to landfall. **The initial oceanic level and speed included in the filed flight plan must be maintained until landfall.** Any subsequent climbs included in the filed flight plan **must not** be executed.~~

HF Blackout

~~6.6.19 — In the case of aircraft that lose ATC communications as a result of poor propagation conditions (HF Blackouts) when approaching NAT airspace through domestic airspace where ATC communications are also conducted via HF (e.g. entering the NAT through Northern Canadian airspace into the Reykjavik OCA), it is probably less advisable to execute unscheduled landings. These poor propagation conditions are very likely to affect many aircraft simultaneously and multiple diversions of “lost comms” aircraft might create further difficulties and risks.~~

~~6.6.20 — As with the equipment failure situation, aircraft approaching the NAT and losing ATC communications as a result of poor HF radio propagation conditions should, if already in receipt of an oceanic clearance, follow the routing specified in that clearance and maintain the **initial** cleared level and speed throughout the oceanic segment, i.e. through to landfall.~~

~~6.6.21 ————— However, in these HF Blackout circumstances, if no oceanic clearance has been received, the aircraft must remain at the last cleared domestic flight level, not only to the ocean entry point but also throughout the whole subsequent oceanic segment (i.e. until final landfall). This is in stark contrast to the equipment failure case. In such HF Blackouts, flight crews must not effect level changes to comply with filed flight plans. Such aircraft should, maintain the last cleared level and, enter oceanic airspace at the first oceanic entry point and speed contained in the filed flight plan, then proceed via the filed flight plan route to landfall.~~

~~6.6.22 ————— The rationale here must be appreciated. In such circumstances it is likely that ATC will have simultaneously lost HF communications with multiple aircraft in the same vicinity. Should flight crews then wrongly apply the “normal” radio failure procedures and “fly the flight plan”, there is a possibility that two such aircraft may have filed conflicting flight paths/levels through the subsequent oceanic airspace, and without communications with either aircraft, ATC would then be unable to intervene to resolve the conflict. Since safe aircraft level separation assurance has already been incorporated into the current domestic clearances, **it is consequently imperative that under such (domestic and oceanic) HF blackout circumstances, all aircraft electing to continue flight into NAT oceanic airspace without a received and acknowledged oceanic clearance, should adhere to the flight level in the last received domestic clearance. No level changes should be made to comply with a filed oceanic level that is different from that of the domestic clearance in effect at the time that ATC air-ground communications were lost.**~~

Operational Procedures for~~Howing~~ ***Loss of HF-Communications after Entering the NAT***

6.6.10 If loss of the ~~HF~~ communications ~~isequipment failure occurs or HF Blackout conditions are~~ encountered after entering the NAT then:

- a) The pilot shall maintain the currently cleared route, flight level and speed until reaching the Oceanic Exit Point.
- b) No route, flight level or speed change shall be made before the Oceanic Exit Point unless a change is deemed necessary by the pilot in command to ensure the safety of the aircraft.
- c) When being vectored or having been directed by ATC to proceed offset using RNAV without a specified limit, proceed in the most direct manner possible to re-join the current flight plan route no later than the next significant point, taking into consideration the applicable minimum flight altitude.

Note: *a) and b) are NAT specific rules while c) is a globally applicable rule in accordance with PANS-ATM 15.3.3 b) 3).*

~~6.6.23 —————~~

~~The flight crew must proceed in accordance with the last received and acknowledged oceanic clearance, including level and speed, to the last specified oceanic route point (normally landfall). After passing this point, the flight crew should conform with the relevant AIP specified State procedures/regulations and if necessary rejoin the filed flight plan route by proceeding, via the published ATS route structure where possible, to the next significant point contained in the filed flight plan. Note: the relevant State procedures/regulations to be followed by an aircraft in order to rejoin its filed flight plan route are specified in detail in the appropriate State AIP.~~

6.6.11 Aircraft with a destination within the NAT region should follow the procedures in 6.6.10 above until reaching the top of decent point and should thereafter follow globally applicable procedures in accordance with PANS-ATM 15.3.3 b) 4) – 7). Those procedures are repeated below for convenience:~~proceed to their clearance limit and follow the ICAO standard procedure to commence descent from the appropriate designated navigation aid serving the destination aerodrome at, or as close as possible to, the expected approach time. Detailed procedures are promulgated in relevant State AIPs.~~

- a) proceed according to the current flight plan route to the appropriate designated navigation aid or fix serving the destination aerodrome and, when required to ensure compliance with b), hold over this aid or fix until commencement of descent;
- b) commence descent from the navigation aid or fix specified in a) at, or as close as possible to, the expected approach time last received and acknowledged; or, if no expected approach time has been received and acknowledged, at, or as close as possible to, the estimated time of arrival resulting from the current flight plan;
- c) complete a normal instrument approach procedure as specified for the designated navigation aid or fix; and
- d) land, if possible, within 30 minutes after the estimated time of arrival specified in b) or the last acknowledged expected approach time, whichever is later.

In all cases, after the NAT oceanic exit point, follow the radio communication failure procedures of the airspace in which the aircraft is operating.

6.6.24 —————

Summary of Operational Procedures Required following Loss of Air/Ground ATS Communications in the NAT Region

6.6.25 ————— The foregoing detailed operational procedures can be simply summarised as follows:

- ~~Equipment Failure before receiving an oceanic clearance:~~

~~Divert or fly the flight plan route, speed and initial planned oceanic level to landfall.~~

- ~~Blackout encountered (in an HF comms Domestic ATC environment) before receiving an oceanic clearance:~~

~~Continue at Domestic cleared level and follow flight planned route and speed to landfall.~~

- ~~Equipment Failure or Blackout after receiving an oceanic clearance:~~

~~Fly that clearance to landfall.~~

~~In all cases, after landfall rejoin, or continue on, the flight planned route, using appropriate State AIP specified procedures for the domestic airspace entered.~~

CHAPTER 7

APPLICATION OF MACH NUMBER TECHNIQUE

Chapter 7 is deleted

7.1 — DESCRIPTION OF TERMS

7.1.1 — Mach Number Technique (MNT) is a technique whereby aircraft operating successively along suitable routes are cleared by ATC to maintain a Mach number for a portion of the enroute phase of flight.

7.1.2 — The ATC clearance ~~RESUME NORMAL SPEED~~ allows the flight crew to fly a cost index (ECON) speed instead of a fixed Mach number with the condition that ATC must be advised if the speed changes by plus or minus Mach .02 or more from the last assigned Mach number.

7.2 — OBJECTIVE

7.2.1 — MNT is used by ATC to control the longitudinal spacing between pairs of aircraft that are close to minimum longitudinal separation. When two or more aircraft are operating along the same route at the same flight level and maintaining the same Mach number, the time interval between them is more likely to remain constant than by using any other method.

7.3 — PROCEDURES IN NAT OCEANIC AIRSPACE

7.3.1 — Oceanic clearances include assigned Mach numbers (when required) which are to be maintained until ATC issues the clearance ~~RESUME NORMAL SPEED~~. Aircraft capable of maintaining an assigned Mach must flight plan their requested Mach number. ATC uses assigned Mach number or other speed information, along with position information to calculate estimated times along the cleared route. These times are used as the basis for longitudinal separation and for coordination with adjacent units.

7.3.2 — ATC will try to accommodate flight crew/dispatcher requested or flight planned Mach numbers when issuing oceanic clearances. It is rare that ATC will assign a Mach number more than 0.01 faster or 0.02 slower than that requested and will issue the clearance ~~RESUME NORMAL SPEED~~ when traffic permits.

7.3.3 — The monitoring and maintenance of longitudinal separation is dependent upon the provision of accurate times in position reports.

7.3.4 — **An assigned Mach number must be maintained.** If an immediate temporary change in an assigned Mach number is essential (due to turbulence for example), ATC must be so informed.

7.3.5 — If a Mach number has been assigned, flight crews should maintain the assigned Mach number during climbs. If due to aircraft performance this is not feasible ATC should be advised at the time of the request for the climb.

7.4 — PROCEDURE AFTER LEAVING OCEANIC AIRSPACE

7.4.1 — After leaving oceanic airspace flight crews maintain their assigned Mach number in domestic controlled airspace unless and until the appropriate ATC unit authorises a change.

CHAPTER 8

NAT HLA FLIGHT OPERATION & NAVIGATION PROCEDURES

8.1 INTRODUCTION

8.1.1 Today's aircraft navigation systems necessary for flying in the NAT HLA are capable of high-performance standards.

8.1.2 ICAO specifies the navigation system performance required for operations within a given airspace. This concept is referred to as "Performance Based Navigation" (PBN). Within this philosophy some navigation specifications, in addition to stating the accuracies to be achieved, also require on-board automatic integrity monitoring and alerting functions. Such specifications are referred to as Required Navigation Performance (RNP X), where X represents a lateral accuracy of 95% containment in X NMs. However, specifications requiring the same accuracies but not requiring on-board monitoring/alerting are referred to as RNAV X.

8.1.3 The majority of modern turbine powered aircraft worldwide are capable of "RNP 10" approvals. To conform with the PBN standard terminology, as indicated above, this system should actually be designated as "RNAV 10". However, it has been recognised that re-classifying such a widespread existing approval designation would create significant difficulties for both operators and State regulators. Consequently, it has been agreed that this designation of "RNP 10" will remain as such, even though the navigation specifications here are, in PBN terminology, effectively "RNAV 10".

8.1.4 With current technology, on-board automatic performance monitoring can only be carried out using Global Navigation Satellite Systems (GNSS). Hence GNSS is mandatory for true RNP airspace (e.g. RNP 4) but is not required for RNAV airspace, including that historically and still designated as "RNP 10".

Note: *For more detailed information on RNP see Doc 9613 – 'Performance Based Navigation Manual'.*

8.1.5 Regardless of how sophisticated or mature a system is, it is still essential that stringent navigation and crosschecking procedures are maintained if Gross Navigation Errors (GNEs) are to be avoided. A GNE within NAT airspace is defined as a deviation from cleared route of 10 NM or more. The importance of employing strict flight deck navigation system operating procedures, designed to avoid the insertion of inaccurate waypoints or misunderstandings between the flight crew and ATC over cleared routes, cannot be over-stated.

8.1.6 All reported navigation errors in North Atlantic airspace are thoroughly investigated. Records show that navigation equipment or system technical failures are rare. However, when they do occur, they can sometimes be subtle or progressive, resulting in a gradual and not immediately discernible degradation of performance. Chapter 11 of this Manual provides guidance on detection and recovery when such problems are encountered.

8.1.7 About half of NAT flights are routed via an Organized Track System (OTS) track and a large portion of the remaining random-route flights follow routes that at some point approach within one or two degrees of latitude from the outermost OTS tracks. One consequence of this is that a single digit error in the latitude of one significant point of an aircraft's route will likely lead to a conflict with another aircraft operating correctly. When such errors are made, the risk of an actual collision between two aircraft operating via a common point is further exacerbated by the improved technical accuracy of the modern lateral navigation and height keeping equipment.

8.1.8 Many of the procedures listed in this chapter are not equipment specific and others may not be pertinent to every aircraft. For specific equipment, reference should be made to Airplane Flight Manuals, Operators' Flight Operations Manuals, and other operator specific guidance material.

8.1.9 There are various references in this material to “two” pilots; however, when additional pilots (augmented crew) are on duty, they should all be involved in pre-flight planning, flight deck pre-flight briefings and in all crosscheck procedures to the extent practicable. Maintaining the highest standard of navigation performance is essential to safety in the NAT HLA.

8.2 FLIGHT OPERATIONS AND NAVIGATION PROCEDURES

Note: For pilot operational use, a Sample Oceanic Checklist is in Attachment 4.

Flight Planning

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

8.2.1 Perform the following:

- a) Review the ATS flight plan with emphasis on Items 10a and 10b and Item 18.
- b) Ensure that the appropriate CNS and Performance-based Navigation codes are properly filed in Items 10 and 18 of the flight plan.
- c) Review aircraft MELs to ensure CNS equipment capability is correctly reported on the flight plan.

Oceanic documents

8.2.2 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:

- a) Master Document (i.e., master flight plan).
- b) NOTAMs for departure, destination, alternate(s), Extended Diversion Time Operations (EDTO) alternates (as applicable) and oceanic FIRs.
- c) Weather for departure, destination, alternate(s), EDTO alternates (as applicable).
- d) Track Message(s).
- e) SIG WX Chart.
- f) ETP(s).
- g) GPS NOTAMs (as applicable).
- h) Volcanic Ash Information.
- i) PIREPs.
- j) Plotting/Orientation Charts.
- k) AIREP Form (as applicable) for position report.
- l) Filing of the ATC FPL.
- m) ETOPS critical fuel analysis.

- n) Space Wx (as appropriate).

Flight plan

8.2.3 The document designated as the Master Document should be carefully checked for date, aircraft type, fuel load and performance requirements. Crosschecks should also be done for routing and forecast ground speeds. The Master Document should be carefully checked against the filed flight plan to ensure the routing agrees 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.

Plotting/Orientation chart

8.2.4 A plotting/orientation chart of appropriate scale or a programmed Electronic Flight Bag (EFB)/Tablet indicating published oceanic routes and tracks should be used for oceanic operations. 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 plotting/orientation chart/EFB 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 plotting/orientation chart/EFB back to the Master Document when verifying data. To read from the Master Document to the plotting/orientation chart/EFB has led to errors based on “seeing what we expect to see”. Plot your *currently cleared route* from oceanic entry (OEP) to oceanic exit (OXP). Be sure to update this whenever your route clearance changes.

Equal Time Point (ETP)

8.2.5 ETPs should be computed for contingencies such as medical divert, engine loss or rapid depressurization. Performance with an engine loss and rapid depressurization should also be calculated. This is an ETOPS Critical Fuel Analysis. It is advisable to note the ETPs on the plotting/orientation chart/EFB. Pilots should review with each other the appropriate diversion airport(s) when crossing ETPs. Pilot procedures should also include a manual method for computing ETPs. Pilots should not enter ETPs in the active route of the Flight Management System (FMS) as this could create 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 Operations (ETOPS)]

8.2.6 Verify EDTO alternates meet the appropriate limitations (e.g., 120 minutes, 180 minutes). Identify EDTO/ETOPS entry and exit points.

Contingency procedures and plans

8.2.7 Operators and Pilots should understand airspace-specific contingency procedures (for in-flight contingencies and weather deviations) as well as plans for any enroute diversion. (See Chapter 13).

Note: *Pilots should comply with ATC clearances. If a given contingency requires deviation from the current clearance, timely and effective coordination can help re-establish a new ATC clearance for the changed flight profile.*

Track message

8.2.8 Pilots shall have access to a current track message even if filed for a random route or filed above North Atlantic High Level Airspace (HLA). Reviewing the date, effective UTC 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 pilots in a timely manner of any amendments to the daily track message. Amendments will be identified by an alpha character to the TMI number for each revision (e.g., TMI031A). Awareness of adjacent tracks can improve situational awareness while executing a contingency procedure.

Weather analysis

8.2.9 Pilots 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.

Pre-Flight

Master clock

8.2.10 A master clock, as designated on board, should be synchronized to UTC or GPS. This time source, which is typically the Flight Management System (FMS), must be used for all ETAs and ATAs.

Maintenance log

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

RVSM

8.2.12 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. Pilots should note any issues that can affect accurate altimetry.

Altimeter checks

8.2.13 Before taxi, pilots 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.

Wind shear or turbulence forecast

8.2.14 Pre-flight preparations should include the projected wind shear and turbulence forecast. Forecast severe turbulence supported by PIREPS, could lead to RVSM suspension. Operators are cautioned against flight planning through areas of forecast greater than moderate turbulence.

Dual Long Range NAV System (LRNS)

8.2.15 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. Aircraft with an “Alternate NAV” capability may be able to dispatch with one FMS INOP.

Long Range Communication Systems (LRCS)

8.2.16 Long range communication system checks:

a) High Frequency (HF) Radio

An HF check should be conducted on the primary and secondary HF radios. If possible, the HF checks should be done on the ground or before entering oceanic airspace. A SELCAL check shall also be accomplished at each Oceanic Control Area (OCA) boundary even if datalink equipped.

b) SATCOM

Ensure SATCOM pre-flight check is complete to comply with FANS/CPDLC requirements.

Confirm Present Position coordinates

8.2.17 Before taxi, 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 FMS was shut down from the previous flight.

Master Document symbols

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

LRNS programming

8.2.19 Check currency and software version:

- a) It is important to check the effective date of the database. Pilots should note if the database is projected to expire during their trip. MELs may allow relief to fly with an expired database but require the pilots to manually crosscheck all data. The software version of the database should also be confirmed in case there has been a change.
- b) Independently verify the full/expanded LAT/LONG of oceanic waypoint entries.

8.2.20 Regardless of the operator, FMS oceanic waypoint format of either full LAT/LONG or ARINC 424, it is critical that both the PF and the PM independently verify the full/expanded LAT/LONG of all unnamed oceanic waypoints. Full LAT/LONGs are truncated in the FMS and cannot be verified without displaying the full LAT/LONGs. ARINC 424 waypoints are coded waypoints susceptible to incorrect coding. Pilots 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”.

8.2.21 Check course and distance:

- a) To minimize oceanic errors, pilots should conduct a magnetic course and distance check from oceanic entry to oceanic exit. Operators should establish a tolerance such as $\pm 2^\circ$ and ± 2 NM. 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 $\pm 2^\circ$ or ± 2 NM should be rechecked and verified.

8.2.22 Upload winds:

- a) FMS units generally allow the crew to upload forecast winds. This procedure supports more accurate reporting of ETAs.

Groundspeed check

8.2.23 The groundspeed should be noted before taxiing the aircraft. Pilots 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

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

Climb-out

Verify ETAs

8.2.25 After climbing above the “sterile-cockpit” altitude, and time permitting, pilots should verify ETAs from departure to destination. These should be noted on the Master Document. This is a crosscheck against ETAs computed by the FMS.

Prior to oceanic entry

Obtain oceanic clearance

8.2.26 ——— Oceanic clearance procedures:

- a) — Obtain the oceanic clearance from the appropriate clearance delivery. (Clearance delivery via ACARS or voice is described in NAT Ops Bulletin 2020_001 and detailed below). Both pilots must confirm the clearance.
- b) — The assigned routing, flight level and Mach number should be crosschecked in a challenge and response manner.
- c) — Contact the ATS provider for clarification in the event of differences.
- d) — For voice clearances on random routes, read back all waypoints and ensure that the read-back is acknowledged. For voice clearances on an OTS track, read back the track identifier and the TMI.
- e) — Verify the route clearance is properly loaded into the navigation system.
- f) — Both pilots should 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. **Pilots should request a climb (or descent) from domestic ATC to comply with the oceanic clearance.** Pilots should include their requested flight level in their initial oceanic clearance request, and the highest acceptable level which can be attained at the OEP. Pilots should be confident that they are able to maintain requested flight levels based on aircraft performance capabilities.

OCA		Prior to OEP
Shanwick, and Bodo		90-30 minutes
Gander		90-60 minutes
Santa Maria		At least 40 minutes
Reykjavik (entering from)	Stavanger and Scottish	No earlier than 25 minutes
	Murmansk	No earlier than 30 minutes*
	Edmonton	No earlier than 45 minutes*
		Rule of thumb 20-25 minutes

~~* Due to coverage limitations, aircraft equipped with Inmarsat data link won't be able to obtain an oceanic clearance via ACARS data link when north of 82°N. Aircraft equipped with Iridium and/or HF ACARS data link should be able to obtain an oceanic clearance via ACARS data link regardless of location.~~

~~Note: (Gander) Flight crews in receipt of an ACARS data link oceanic clearance from Gander OCA while in the New York OCA but subsequently routing through Gander Domestic airspace before re-entering the NAT HLA, should not modify the FMC prior to exiting the New York OCA. Modifications in accordance with the oceanic clearance should be executed while within Gander Domestic airspace.~~

~~Note: (Reykjavik) If the flight planned route does not contain a waypoint on the Reykjavik OCA boundary then the Entry Point should be the next flight plan waypoint before the Reykjavik OCA boundary. In such cases the entry point in the Oceanic Clearance (CLX) message will be a system-calculated boundary crossing point and this change will be highlighted with the text "ENTRY POINT CHANGE <position>" in the ATC/line. Exceptions to this are the waypoints EPMAN, DARUB, JULET and LT.~~

~~Note: A Flight Level in an oceanic clearance, if different than current FL, requires coordination with and a specific clearance from ATC.~~

Send RCL message

8.2.26 An RCL is a voice or data link message via ACARS used to provide ETA at OEP, requested flight level, and speed. There is a requirement to send an RCL message prior to the OEP as follows:

- Gander OCA 90-60 minutes;
- Shanwick OCA 90-60 minutes;
- Santa Maria OCA at least 40 minutes;
- Bodo OCA at least 20 minutes;
- Reykjavik OCA **no earlier** than 20 minutes;
- New York OCA East no requirement for RCL.

Gander: Flights departing airports less than 45 minutes flying time from the OEP should send RCL 10 minutes prior to start-up.

Reykjavik: Due to coverage limitations, aircraft equipped with Inmarsat data link won't be able to send an RCL message via ACARS data link when north of 82°N. Aircraft equipped with Iridium and/or HF ACARS data link should be able to send an RCL message via ACARS data link regardless of location.

8.2.27 The ACARS or voice RCL must contain all of the following information:

- Oceanic Entry Point (OEP);
- ETA for the OEP;
- Mach number (based on FMS cost index (ECON));
- Requested flight level;
- The highest acceptable Flight Level which can be attained at the OEP (via free text);
 - Provide the highest acceptable Flight Level as MAX FL

- Example: Requesting FL360 – enter free text MAX F380
- If requested Flight Level is the highest acceptable; provide the requested Flight Level as MAX FL
 - Example: Requesting FL360 – enter free text MAX F360

8.2.28 Voice shall be used to submit an RCL message if;

- Not ACARS data link equipped;
- ACARS data link is not operational;
- ETA for OEP is less than 30 minutes (other than Reykjavik);
- RCL REJECTED is received by the aircraft;
- No response to RCL is received within 15 minutes of sending RCL.

8.2.29 The following response message to the RCL will be generated automatically by the ANSP and delivered to the aircraft via ACARS or voice as appropriate:

RCL RECEIVED BY [ANSP]. FLY CURRENT FLIGHT PLAN OR AS AMENDED BY ATC

Revert to voice if **RCL REJECTED** is received.

Note: There will be no clearance sent via the traditional ACARS method. Flight crew must fly current flight plan or as amended by ATC (what is loaded in the FMS).

Note: If ATC cannot accept the requested OEP altitude, the closest oceanic FL to the one requested (RCL) will be determined and a clearance to climb or descend issued prior to the OEP. The “MAX FL” will never be violated.

Note: Flight crews are reminded that a change in FL, Speed or Route can be requested at any time after the OEP.

8.2.30 The information provided in the RCL message is processed as follows:

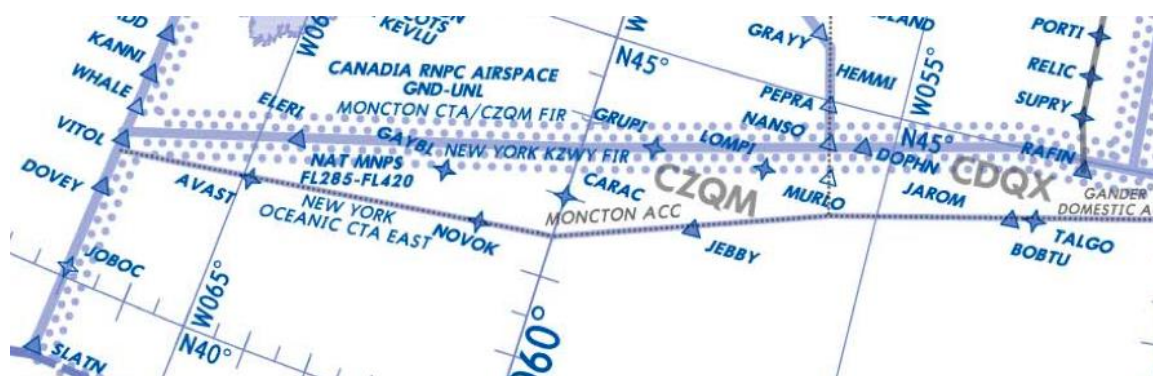
RCL data item	ATC Processing
Oceanic Entry Point (OEP) and ETA time	Information is used to update the currently held ATC data.
Mach Number	ATC will use the requested Mach speed information as the reference speed for cost index (ECON) operations. The aircraft should continue to operate on FMS cost index (ECON) unless it is assigned a fixed Mach speed by ATC. ATC must be advised if the speed changes by Mach 0.02 or more from the Mach in the RCL.
Flight Level	ATC will store the requested flight level information. The aircraft shall not change flight level unless it is cleared for a flight level change by ATC. Flight crews are reminded that a change in Flight Level can be requested at any time after the OEP as the traffic situation constantly changes and previously blocked flight levels may become available.

RCL data item	ATC Processing
Max Flight Level	Max FL shall be provided in the RCL. ATC will store the Max Flight Level Information for traffic planning purposes. If no Max Flight Level is provided, the RCL requested Flight Level will be considered as the highest acceptable flight level at OEP.

8.2.31 Aircraft routing from Gander Domestic to New York Oceanic via TALGO are required to send an RCL for TALGO to Gander Oceanic.

8.2.32 Aircraft routing from New York Oceanic to Gander Domestic via BOBTU are required to send an RCL for their OEP (RAFIN or north) to Gander Oceanic.

Note: *In all cases, any necessary changes to route, level or speed will be issued by the jurisdictional controller.*



Oceanic Route Change prior to the OEP

8.2.33 Any route amendment to the current flight plan (what is loaded in the FMS) will be issued either by voice or CPDLC loadable route clearance uplink.

8.2.34 Route amendments are the number one scenario leading to Gross Navigation Errors. Pilots must be particularly cautious when receiving a route amendment.

- Both pilots should confirm the new routing and conduct independent crosschecks after the FMS, Master Document and plotting/orientation chart are updated.
- Ensure the expanded coordinates for new waypoints are checked and confirmed. It is critical that pilots check the magnetic course and distance between the new waypoints as noted in PREFLIGHT under the paragraph "FMS Programming".
- Brief all relief pilots on the amended route prior to them assuming cockpit duties. It is also good practice for relief pilots to independently check the amended route in the FMS.

8.2.35 Abbreviated route clearance may be issued by Air Traffic Services prior to the oceanic entry point when re-clearing an aircraft to fly along the whole length of an organised track. The flight crew should confirm the current NAT track message by using the TMI number (including any appropriate alpha suffix) in the read back. There is no requirement for the flight crew to read back the NAT track coordinates. If any doubt exists as to the TMI or the NAT track coordinates, the flight crew should request the complete track coordinates. Similarly, if the flight crew cannot correctly state the TMI, confirmation will include NAT track coordinates in full and a full read back of those coordinates will be required.

Shanwick

8.2.36 The Shanwick oceanic controller will only issue the ACARS message **CONTACT SHANWICK BY VOICE** instructing the flight crew to contact Shanwick OAC (123.950/127.650) when:

- An oceanic route different from the current flight plan (what is loaded in the FMS) is necessary due to traffic;
- Shanwick OAC considers it appropriate to do so, to ensure the most efficient oceanic route and altitude.

Entry Conditions

8.2.37 Enroute aircraft shall enter the oceanic airspace in accordance with their current flight plan or as amended by ATC (what is loaded in the FMS). **No oceanic clearance is required.**

8.2.38 Fly cost index (ECON). ATC will assign a fixed Mach number if required due to traffic and will rarely assign a fixed Mach number more than 0.01 faster or 0.02 slower than requested or filed in the flight plan.

8.2.39 **An assigned Mach number must be maintained.** If an immediate temporary change in an assigned Mach number is essential (due to turbulence for example), ATC must be informed.

Navigation Accuracy Check

~~8.2.278.~~2.40 Before oceanic entry, the accuracy of the GNSS navigation equipment (FMS) should be checked.

HF Checks

~~8.2.288.~~2.41 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

~~8.2.298.~~2.42 If the aircraft is equipped, pilots should check that SATCOM data link is operational before oceanic entry.

Log on for CPDLC and ADS-C

~~8.2.308.~~2.43 If the operator is approved to use Controller Pilot Data Link Communications (CPDLC) and/or Automatic Dependent Surveillance Contract (ADS-C), the pilot should log on to the appropriate FIR 10 to 25 minutes prior to the boundary if not already logged on to ATC.

Verify RNP value

~~8.2.318.~~2.44 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

~~8.2.32~~ — 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. Pilots must be particularly cautious when receiving a re-clearance.

- ~~a) Both pilots should confirm the new routing and conduct independent crosschecks after the FMS, Master Document and plotting/orientation chart are updated.~~

- ~~b) — Ensure the expanded coordinates for new waypoints are checked and confirmed. It is critical that pilots check the magnetic course and distance between the new waypoints as noted in PREFLIGHT under the paragraph “FMS Programming”.~~
- ~~c) — 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 FMS, 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.~~

Altimeter checks

~~8.2.338.2.45~~ Pilots 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. This is a requirement to operate in RVSM airspace.

After oceanic entry

Route Conformance Checking

8.2.46 **CONFIRM ASSIGNED ROUTE** will be uplinked to FANS equipped aircraft after crossing the OEP. CPDLC loadable route clearance uplinks will be used to amend the current flight plan, when necessary, after the OEP.

Squawk 2000

~~8.2.348.2.47~~ Except when operating in the Reykjavik CTA, ~~Normally, thirty minutes after oceanic entry,~~ pilots should squawk 2000 10 minutes after passing the OEP, ~~if applicable. There are some regional differences, refer to section 10.2 for details.~~

~~Speed~~Maintain assigned Mach

~~8.2.358.2.48~~ Most oceanic clearances include a specific Mach. The requirement is to maintain the assigned ATC Mach, unless cleared to RESUME NORMAL SPEED that allows the pilot to select ~~The aircraft should maintain a cost index (CI/ECON) speed unless ATC has issued a clearance to maintain instead of a fixed Mach number. with the condition that~~ ATC must be advised if the speed changes by plus or minus Mach .02 or more from the speed indicated in the RCL message or the last assigned Mach number.

~~Note: — Until being cleared to RESUME NORMAL SPEED, pilots must ensure they fly the assigned fixed Mach.~~

VHF radios

~~8.2.368.2.49~~ After contacting oceanic radio (HF), and if not on an assigned VHF frequency, pilots should set their VHF radios to air-to-air (123.450 MHz) and guard frequency (121.500 MHz). Pilots must monitor these frequencies. They are not to be used for non-operational conversation.

Strategic Lateral Offset Procedures (SLOP)

~~8.2.378.2.50~~ SLOP should be Standard Operating Procedure for all oceanic crossings. This procedure distributes traffic between the centreline and 2 NM right of centreline and greatly reduces collision risk in the airspace by virtue of randomness. SLOP should also be used when there is a need to avoid wake turbulence; coordination with other aircraft may be necessary.

~~8.2.388.2.51~~ 8.2.388.2.51 Operators that have an automatic offset capability should fly up to 2 NM right of the centreline. Aircraft that do not have an automatic offset capability (that can be programmed in the FMS) should fly the centreline only. Aircraft that do not have a capability to offset in 0.1 NM increments should fly the centreline, 1 NM, or 2 NM right only. **Left offsets are prohibited.**

Note: *Pilots 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 occurred as a result of this.*

Routine monitoring

~~8.2.398.2.52~~ 8.2.398.2.52 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

~~8.2.408.2.53~~ 8.2.408.2.53 Within a few minutes of crossing an oceanic waypoint pilots 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 lateral (LNAV/NAV) mode.

Waypoint crossing

Confirm aircraft transitions to next waypoint

~~8.2.418.2.54~~ 8.2.418.2.54 When overhead an oceanic waypoint, pilots 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 current flight plan) and that the aircraft remains in the proper lateral (LNAV/NAV) mode.

Confirm time to next waypoint

~~8.2.428.2.55~~ 8.2.428.2.55 When transmitting waypoint position reports via voice, a change of three (3) minutes or more requires that ATC be notified in a timely manner. Inaccurate position reports adversely affect ATC’s ability to safely separate aircraft.

Position report

~~8.2.438.2.56~~ 8.2.438.2.56 After passing over the oceanic waypoint, pilots that give a position report to ATC must use the standard format. Pilots 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

Crosscheck navigational performance and course compliance

~~8.2.448.2.57~~ 8.2.448.2.57 In FMS-equipped aircraft, pilots should confirm that proper lateral (LNAV/-NAV) mode is engaged and the aircraft is tracking to the proper waypoint. Other methods of navigation crosschecking may be used subject to State aviation authority approval.

Midway between waypoints

Confirm ETA

8.2.58 It is recommended that during a wind check the pilots 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.

8.2.45

Oceanic exit

Remove Strategic Lateral Offset

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

Confirm routing beyond oceanic airspace

8.2.478.2.60 Before entering the domestic route structure, pilots must confirm their routing and speed assignment.

Note: Pilots experiencing loss of communications leaving oceanic airspace should follow State guidance as published in AIPs.

Speed

8.2.61 If ATC assigns a fixed Mach number in oceanic airspace, request NORMAL SPEED (via CPDLC or voice) after the OXP in Domestic airspace.

Destination / Block-in

Navigation accuracy check

8.2.488.2.62 When arriving at the destination gate, pilots 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

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

8.3 GENERAL PROCEDURES

Provision of Climbs

8.3.1 Controllers will accommodate requests for climbs whenever possible. When cleared, pilots should initiate the climb without delay unless a conditional clearance was issued. Aircraft not using CPDLC/ADS-C should report leaving the old and reaching the new cruising levels. Aircraft using CPDLC/ADS-C should comply with any reporting requests.

8.3.2 Flight levels requested in the flight plan or through the ~~Request for Clearance (RCL)~~ message process are stored in the NAT Air Traffic Management (ATM) systems. These systems routinely interrogate a

flight's profile to determine if the requested level becomes available. When this occurs, controllers will verify the availability and offer the higher level to the flight. Additionally, Gander and Shanwick have instituted a procedure whereby pilots transiting their OCAs will be advised if any higher flight level becomes available during their flight.

Note: These advisory messages are not to be considered a clearance to change FL. ALL FL changes will ALWAYS require a clearance to climb or descend.

Clearances including variable flight level

8.3.3 Clearances which include variable flight level may be requested and granted, traffic permitting. Clearance requests for a variable flight level may be made by voice or CPDLC.

8.3.4 Within the NAT, on occasion when traffic permits, aircraft are cleared for a cruise climb or to operate within a block of flight levels. The operational difference between cruise climbs and block of flight levels is in accordance with the following:

- **Cruise climb: Only climb or maintain a level, NEVER DESCEND;**
- **Block of flight levels: Climb and/or descend freely within the assigned block of flight levels.**

8.3.5 A cruise climb should be requested when a flight crew wants to operate with a “flexible” vertical profile and gradually climb as the aircraft weight decreases and the optimum flight level increases. A block of flight levels should be requested when the flight crew wants to operate with a flexible vertical profile and the aircraft's altitude will vary up or down due to factors such as turbulence or icing.

8.3.6 ATC will still make the most efficient use of airspace with the block of levels by adjusting the clearance as levels are cleared. For cruise climb, levels below the aircraft are automatically released as the aircraft climbs.

Relief Flight Crew Members

8.3.7 Long range operations may include the use of relief pilots (augmented crew). In such cases operators should have procedures in place to ensure the safe continuity of the operation, particularly with respect to the management of the navigation systems, to ensure positive control of the aircraft.

8.3.8 A comprehensive crew briefing checklist is highly recommended. The briefing by the outgoing pilot(s) to the incoming pilot(s) should take place, in order to ensure that the incoming pilot(s) is (are) aware of any potential changes in flight level, speed, fuel/time score, weather, contingency planning, aircraft status, communication status/frequencies, conditional clearances, cabin issues, and any other operational considerations as required by the operator.

RNP Approval Status

8.3.9 In order for an aircraft to be cleared to fly in airspace where a particular RNP authorization is required, or take advantage of any preferred handling provided by a specific RNP designation, the aircraft's RNP approval status must be accurately reflected in Item 18 of the ATC flight plan. Pilots shall also verify that the corresponding RNP value is entered in the FMS, either by default or through manual input, in order to enable aircraft navigation system monitoring and alerting against the most stringent oceanic RNP capability filed in the ATC flight plan.

ATC Re-clearances

8.3.10 Where practicable, two pilots should listen to and record every ATC clearance and both agree that the recording is correct. Standard Operating Procedures (SOPs) must include independent clearance copy, data entry (coordinates and/or “named” waypoints), and independent crosschecks to verify that the clearance

is correctly programmed. These procedures must also be used when enroute changes are entered. Any doubt should be resolved by requesting clarification from ATC.

8.3.11 In the event that a re-clearance is received when only one pilot is on the flight deck, unless the re-clearance is an ATC instruction that requires immediate compliance, any flight profile, Mach number or routing changes should not be executed, nor should the Navigation or Flight Management Systems be updated, until the second pilot has returned to the Flight Deck and a proper crosschecking and verification process can be completed.

8.4 SPECIAL IN-FLIGHT PROCEDURES

CPDLC Route Clearance Uplinks

8.4.1 **When a loadable CPDLC clearance is sent to the aircraft, pilots are to follow their Operator's SOP with the utmost discipline in order to mitigate any human error.**

- CPDLC route clearance uplinks are used by ATC or flight crews to amend the oceanic routing.
- CPDLC route clearance uplinks allow the flight crew to LOAD the CPDLC route clearance uplink directly into the FMS without having to manually enter waypoints possibly introducing navigational errors.
- Flight crews should ensure that the CPDLC route clearance uplink properly "LOADs" before sending ACCEPT/WILCO.
- Flight crews must be familiar with the proper loading and execution of the following CPDLC message uplinks:

ANSPOCA	CPDLC LOADABLE ROUTE CLEARANCE UPLINKS ICAO Doc10037 (GOLD) CPDLC Message Set			
	PROCEED DIRECT TO (<i>position</i>) *	CLEARED TO [<i>position</i>] VIA (<i>route clearance</i>) *	CLEARED (<i>route clearance</i>)	AT [<i>position</i>] CLEARED (<i>route clearance</i>)
	*Not loadable by some Airbus aircraft	*Note: this message may cause a route discontinuity		
Reykjavik	YES	YES	NO	NO
Shanwick		YES	NO	NO
Santa Maria		YES	YES	YES
New York		YES	YES	YES
Gander		YES	NO	NO
Bodo		NO	NO	NO

PROCEED DIRECT TO (*position*)

- Instruction to proceed directly to the specified position.

CLEARED TO (*position*) VIA (*route clearance*)

- Instruction to proceed to the specified position via the specified route clearance.

- This uplink may not show the “VIA ROUTE CLEARANCE” until it is loaded in the FMS.
- **This is not a “direct”** to the CLEARED TO waypoint. It is a clearance to the waypoint via the route clearance specified.

CLEARED (route clearance)

- Instruction to proceed via the specified route clearance.
- This uplink may not show the “ROUTE CLEARANCE” until it is loaded in the FMS.

AT (position) CLEARED (route clearance)

- Instruction to proceed from the specified position via the specified route clearance.
- This uplink may not show the “ROUTE CLEARANCE” until it is loaded in the FMS.

Note: *Experience shows that pilots often misunderstand the uplink message **CLEARED TO (position) VIA (route clearance)** when they fail to LOAD the uplink in the FMS and incorrectly fly directly to the CLEARED TO position not realizing that the “route clearance” may contain several other waypoints prior to the CLEARED TO position.*

Note: *FMS waypoint weather data (winds and temperature) may be lost depending on the route clearance message received. Flight crews should verify the weather data as they may need to re-enter the weather data for proper FMS predictions.*

Note: *The FMS Legs page should be reviewed to ensure there are no “discontinuities” in the route. If ANY discontinuity, it must be resolved (closed) with ample time before reaching the discontinuity.*

8.4.2 Flight crews should revert to voice if there is any doubt or confusion about any CPDLC uplink.

Strategic Lateral Offset Procedures (SLOP)

8.4.3 This procedure provides for offsets within the following guidelines:

- an aircraft may fly offsets right of centreline up to a maximum of 2 NM; and
- offsets **left** of centreline are **prohibited**.

8.4.4 Distributing aircraft laterally and equally across all available positions adds an additional safety margin and reduces collision risk. The SLOP procedure was developed to reduce the collision risk from highly accurate navigation systems and operational errors. SLOP is now **a standard operating procedure** for the entire NAT region and flight crews **are required** to adopt this procedure as is appropriate. It should be noted that:

- Aircraft without automatic offset programming capability must fly the centreline.
- Aircraft able to perform offsets in tenths of nautical mile should do so as it contributes to risk reduction.
- It is recommended that flight crews of aircraft capable of programming automatic offsets should randomly select flying centreline or an offset. In order to obtain lateral spacing from nearby aircraft (i.e. those immediately above and/or below), flight crews should use whatever means are available (e.g. ACAS/TCAS, communications, visual acquisition, GPWS) to determine the best flight path to fly.
- An aircraft overtaking another aircraft should offset within the confines of this procedure, if capable, so as to minimize the amount of wake turbulence for the aircraft being overtaken.

- e) For wake turbulence purposes, flight crews should fly one of the offset positions. Flight crews may contact other aircraft on the air-to-air channel, 123.450 MHz, as necessary, to co-ordinate the best wake turbulence mutual offset option. *(Note: It is recognized that the flight crew will use their judgement to determine the action most appropriate to any given situation and that the pilot-in-command has the final authority and responsibility for the safe operations of the aircraft. See also Chapter 13).*
- f) Flight crews may apply an offset outbound at the oceanic entry point and must return to centreline prior to the oceanic exit point unless otherwise authorized by the appropriate ATS authority or directed by the appropriate ATC unit.
- g) There is no ATC clearance required for this procedure and it is not necessary that ATC be advised.
- h) Voice Position reports should be based on the waypoints of the current ATC clearance and not the offset positions.
- i) Aircraft shall not apply SLOP below FL 285 in the Reykjavik OCA~~CTA~~ and Bodo OCA.
- j) The offset should be applied from the time the aircraft reaches its cruising level until top of descent.

Uplink Message Latency Monitor Function

8.4.5 The uplink message latency monitor function is designed to prevent pilots from acting on a CPDLC uplink message that has been delayed in the network. Some NAT ANSPs uplink the latency monitor message to all CPDLC connected aircraft immediately after they enter each control area. An aircraft may therefore receive this message multiple times during a flight.

8.4.6 When the pilot receives the uplink CPDLC message SET MAX UPLINK DELAY VALUE TO 300 SEC he/she shall:

- a) Send a positive response to ATC as prompted by the avionics (ACCEPT [ROGER]) regardless of whether the aircraft supports the latency monitor function.

Note 1: It is important that pilots respond to the SET MAX UPLINK DELAY VALUE TO 300 SEC uplink message to avoid having open unanswered CPDLC messages in the system. This also applies to aircraft that have deficient message latency monitor functionality or no such functionality at all.

Note 2: The Global Operational Data Link (GOLD) Manual (Doc 10037) specifies that the pilot should append the response downlink with the free text message TIMER NOT AVAILABLE when the message latency monitor function is not available in the aircraft (refer to GOLD Table 4-1).

- b) If the aircraft is equipped with a correctly functioning message latency monitor, enter the specified uplink delay into the avionics in accordance with the aircraft procedures. Some avionics will automatically set the delay value in accordance with the uplink message and do not allow for a manual input.

Note 3: If an aircraft is instructed to log off and then log on again mid-flight, ATC may send the message SET MAX UPLINK DELAY VALUE TO 300 SEC again once the logon is completed.

8.4.7 When a pilot receives a CPDLC uplink message with an indication that the message has been delayed the pilot shall:

- a) Revert to voice communications to notify the ATS unit of the delayed message received and to request clarification of the intent of the CPDLC message; and

- b) Respond appropriately to close the message as per the instructions of the controller.
- c) **The pilot must not act on the delayed uplink message until clarification has been received from the controller.**
- d) **If a pilot receives a random clearance, for example a change in FL, without the pilots requesting a FL change, it is good practice to check the time-stamp in the message to ensure it is logically relevant.**

8.5 OLDER AIRCRAFT SYSTEMS

8.5.1 This section addresses those aircraft operating in the NAT HLA with reduced LRNS equipage (inertial navigation only) and/or no altimetry monitoring.

Navigation accuracy check prior to OEP

8.5.2 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 pilots 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 (GNE). 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.

8.5.3 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 have a NOTAM rendering them unusable and is helpful when departing airports close to oceanic airspace. Examples include Shannon (EINN), Lisboa (LPPT), Boston (KBOS), etc.

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

Compass heading check (Inertial Navigation Systems)

8.5.4 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.

Hourly altimeter checks

8.5.5 Pilots 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 pilots in determining the most accurate altimeter if an altimetry problem develops.

Routine Monitoring

8.5.6 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.

8.5.7 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.

8.5.8 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 0.0 NM). Verify the “TO” waypoint is consistent with the current flight plan.

Cross-check winds

8.5.9 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 pilots in case there is a need for a contingency procedure such as dead reckoning (DR).

Compare ground-based NAVAID to LRNS after Oceanic Exit (OXP)

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

8.6 LATERAL NAVIGATION PERFORMANCE MONITORING

8.6.1 The navigation performance of operators within the NAT HLA is monitored on a continual basis. The navigation accuracy achieved by NAT HLA aircraft is periodically measured and additionally all identified instances of significant deviation from cleared track are subject to thorough investigation by the NAT Central Monitoring Agency (CMA), currently operated on behalf of ICAO by the UK National Air Traffic Services Limited. <http://natcma.com/>.

8.6.2 Operators are encouraged to cooperate as fully as possible with the CMA in its investigations of any deviations, since the objective here is to support regional safety management function. These investigations are not conducted for regulatory/punitive purposes.

8.6.3 The CMA also maintains a database of all NAT HLA approvals. The CMA runs a continuous monitoring process to compare this approvals list with the records of all aircraft flying in the NAT HLA. The approval status of any aircraft involved in a track deviation is specifically checked against the database and in any cases of doubt the State of the operator or the State of Registry is contacted. Chapter 10 provides full details of the monitoring processes.

CHAPTER 9

RVSM FLIGHT IN THE NAT HLA

9.1 GENERAL

9.1.1 The aircraft altimetry and height keeping systems necessary for flying in RVSM airspace are capable of high-performance standards. However, it is essential that stringent operating procedures are employed, both to ensure that these systems perform to their full capabilities and to minimise the consequences of equipment failures and possible human errors. Should any of the required components fail, ATC must be informed.

9.1.2 In the event of severe turbulence, RVSM procedures may be suspended.

Pre-Flight

9.1.3 For flight through the NAT HLA the aircraft and the operator must have the appropriate State approvals for both NAT HLA and RVSM operations. The flight crew must be qualified for flight in RVSM airspace and all aircraft intending to operate within the NAT HLA must be equipped with altimetry and height-keeping systems which meet RVSM Minimum Aircraft System Performance Specifications (MASPS). RVSM MASPS are contained in Doc 9574 (*Manual on implementation of a 300m (1,000ft) Vertical Separation Minimum between FL 290 and FL 410 inclusive*) and detailed in FAA Advisory Circular (AC) 91-85 which can currently be accessed through:

https://www.faa.gov/regulations_policies/advisory_circulars/index.cfm/go/document/information/documentID/1035328

Also, further guidance from EASA on where to find information related to Airborne RVSM Equipment and Performance Requirements is contained within CS-ACNS (Certification Specification and Acceptable Means of Compliance for Airborne Communications, Navigation and Surveillance), in the EUROCONTROL Library, at:

<https://www.skybrary.aero/articles/reduced-vertical-separation-minima-rvsm>.

9.1.4 A 'W' must be entered into Item 10 of the ICAO flight plan to indicate that the aircraft is approved for flight at RVSM levels.

9.1.5 For operations in NAT HLA, flight crews are required to perform standard pre-flight checks of altimeters.

9.1.6 Special arrangements exist for non-RVSM approved aircraft/operators to climb or descend through NAT RVSM airspace; and in very specific circumstances arrangements may be made for non-approved aircraft to fly at RVSM levels in the NAT region. Both such arrangements are explained in Chapter 1 (See Special Arrangements for Non-RVSM Approved Aircraft – Section 1.6).

In-Flight – Before Operating in the NAT HLA

9.1.7 Most flights will approach the NAT HLA through European or North American RVSM airspaces. It is therefore expected that continuous monitoring of the serviceability of the aircraft's height keeping systems will have been undertaken. Nevertheless, in view of the significant change of operating environment (i.e. to indirect surveillance and communications) it is recommended that a final confirmation of the aircraft systems serviceability is performed immediately prior to entering the NAT HLA. Check to ensure the two primary altimeters are reading within 200 feet of each other (or lesser value if specified in your aircraft's flight manual). Conduct this check while at level flight. You should also note the stand-by altimeter reading. The readings of the primary and standby altimeters should be recorded to be available for use in any possible contingency situations.

In-Flight – Entering and Flying in the NAT HLA

9.1.8 One automatic altitude-control system should be operative and engaged throughout the cruise. This system should only be disengaged when it is necessary to re-trim the aircraft, or when the aircraft encounters turbulence and operating procedures dictate.

9.1.9 When passing waypoints, or at intervals not exceeding 60 minutes (whichever occurs earlier), or on reaching a new cleared flight level, a crosscheck of primary altimeters should be conducted. If at any time the readings of the two primary altimeters differ by more than 200 ft, the aircraft's altimetry system should be considered defective and ATC must be informed.

9.1.10 To prevent unwanted TCAS/ACAS warnings or alerts, when first approaching any cleared flight level in NAT RVSM airspace, flight crews should ensure that the vertical closure speed is not excessive. It is considered that, with about 1500 ft to go to a cleared flight level, vertical speed should be reduced to a maximum of 1500 ft per minute and ideally, to between 1000 ft per minute and 500 ft per minute. Additionally, it is important to ensure, by manually overriding if necessary, that the aircraft neither undershoots nor overshoots the cleared level by more than 150 ft.

9.1.11 It must also be recognised that even under normal operations when using such indirect communication methods, there does exist the potential for misunderstanding between flight crew and controller regarding the detail of any issued clearances or re-clearances. Occasionally, such "ATC Loop Errors" can lead to an aircraft being flown at a level other than that expected by the controller. In such circumstances separation safety margins may be eroded. To avoid possible risks from any of the foregoing situations, it is therefore essential in the NAT HLA that **flight crews not using CPDLC/ADS-C always report to ATC immediately on leaving the current cruising level and on reaching any new cruising level.**

9.2 EQUIPMENT FAILURES

9.2.1 The following equipment failures must be reported to ATC as soon as practicable following their identification:

- a) loss of one or more primary altimetry systems; or
- b) failure of all automatic altitude-control systems

9.2.2 The aircraft should then follow the appropriate procedure described in Chapter 12 – "Procedures in the Event of Navigation System Degradation or Failure", or as instructed by the controlling ATC unit.

9.3 VERTICAL NAVIGATION PERFORMANCE MONITORING

9.3.1 The vertical navigation performance of operators within the NAT HLA is monitored on a continual basis by the NAT CMA. Such monitoring includes both measurement of the technical height-keeping accuracy of RVSM approved aircraft and assessment of collision risk associated with all reported operational deviations from cleared levels. Chapter 11 deals more fully with this matter.

CHAPTER 10

ATS SURVEILLANCE SERVICES IN THE NAT HLA

10.1 GENERAL

10.1.1 ATS Surveillance services are provided within the NAT HLA where radar, ADS-B or multilateration coverage exists in accordance with ATS Surveillance procedures in the *Procedures for Air Navigation Services – Air Traffic Management* (PANS-ATM, Doc 4444).

10.1.2 Although ADS-B coverage exists throughout a large section of the NAT, ADS-B equipage is not mandated except on routes ~~Tango-9~~ and ~~Tango-290~~.

10.1.3 If ADS-B equipment B1 or B2 has been filed in Item 10b of the ICAO FPL, the pilot shall consider that the aircraft is identified when the aircraft is operating above FL 285 in the Gander OCACTA, Shanwick OCACTA, Santa Maria OCACTA and the Reykjavik OCACTA south of 87°N. The controller will not inform the pilot of the identification. The controller will inform the pilot if the aircraft is not identified. This procedure is established to facilitate application of ATS surveillance separation using CPDLC by eliminating the need to inform every aircraft via CPDLC that the aircraft is identified.

10.2 OPERATION OF SSR TRANSPONDERS

10.2.1 All aircraft operating as IFR flights in the NAT region shall be equipped with a pressure-altitude reporting SSR transponder.

10.2.2 Unless otherwise directed by ATC, pilots flying in NAT airspace shall operate transponders continuously in Mode A/C Code 2000, except that the last assigned code shall be retained for a period of 130 minutes after passing the OE ~~entry into NAT airspace or after leaving a surveillance service area~~. Pilots should note that it is important to change from the last assigned domestic code to Code 2000 since the original domestic code may not be recognized by the subsequent Domestic Radar Service on exit from the oceanic airspace. The following exceptions apply:

- Reykjavik OACACG provides a radar control service in the south-eastern part of its area and consequently transponder codes issued by Reykjavik OACACG must be retained throughout the Reykjavik OCA until advised by ATC.
- a) ~~All eastbound flights routing Reykjavik – Shanwick – Scottish shall squawk Mode A Code 2000 ten minutes after entering Shanwick airspace.~~
- b) ~~Tango 9: the change to Code 2000 should be made 10 minutes after passing BEGAS northbound and 10 minutes after passing LASNO southbound.~~
- c) ~~Tango 290: the change to Code 2000 should be made 10 minutes after passing ADVAT northbound and 10 minutes after passing GELPO southbound.~~

10.2.3 This procedure does not affect the use of the special purpose codes (7500, 7600 and 7700) in cases of unlawful interference, radio failure or emergency. However, given the current heightened security environment flight crews must exercise CAUTION when selecting Codes not to inadvertently cycle through any of these special purpose codes and thereby possibly initiate the launching of an interception.

10.3 OPERATION OF ADS-B TRANSMITTERS

10.3.1 ADS-B services are already available in some continental airspaces immediately adjacent to the NAT region as well as within some portions of the NAT HLA. ADS-B equipage is not mandated except on routes ~~Tango-9~~ and ~~Tango-290~~.

10.3.2 Eligibility for ADS-B service in the NAT is based upon the provisions in the Doc 7030 section 5.5.

Note: The following documents provide guidance for the installation and airworthiness approval of the ADS-B OUT system in aircraft:

1. European Aviation Safety Agency (EASA) AMC 20-24 or CS-ACNS; or
2. FAA AC No. 20-165B — Airworthiness Approval of ADS-B; or
3. Configuration standards reflected in Appendix XI of Civil Aviation Order 20.18 of the Civil Aviation Safety Authority of Australia.

10.3.3 The Flight ID is the Aircraft Identification (ACID) and is used in both ADS-B and Mode S SSR technology. Up to seven characters long, it is usually set by the flight crew during pre-flight. The Flight ID is used by the ATC ground system to correlate the ADS-B information with the flight plan data and to identify the aircraft on the ATC situation display system. To allow correlation of a Flight ID to a flight plan, the Flight ID must exactly match the ACID entered in Item 7 of the ICAO flight plan. It is important that the Flight ID is correctly entered or ADS-B service may be denied.

Note: The way in which ADS-B avionics are integrated into the cockpit may prevent changing of Flight ID once airborne. Some avionics may be wired to a weight-on-wheels switch that detects when the aircraft is airborne so that the Flight ID field is not editable after take-off.

10.3.4 Aircraft operators wishing to receive an exemption from the procedures specified in 10.3.2 above for an individual flight shall apply for an exemption to the ATS unit(s) in accordance with AIP directives. Any approvals for such exemptions may be contingent on specific conditions such as routing, flight level and time of day.

10.3.5 Some DO-260 compliant ADS-B transmitters incorporate a single emergency bit for the squawk codes 7500, 7600 and 7700 and therefore do not indicate the nature of the emergency. Thus when activated, the flight crew will need to contact ATC to communicate the type of emergency. Such ADS-B transmitters are also unable to squawk ident while the general emergency mode is being transmitted.

10.4 AIRBORNE COLLISION AVOIDANCE SYSTEMS (ACAS)

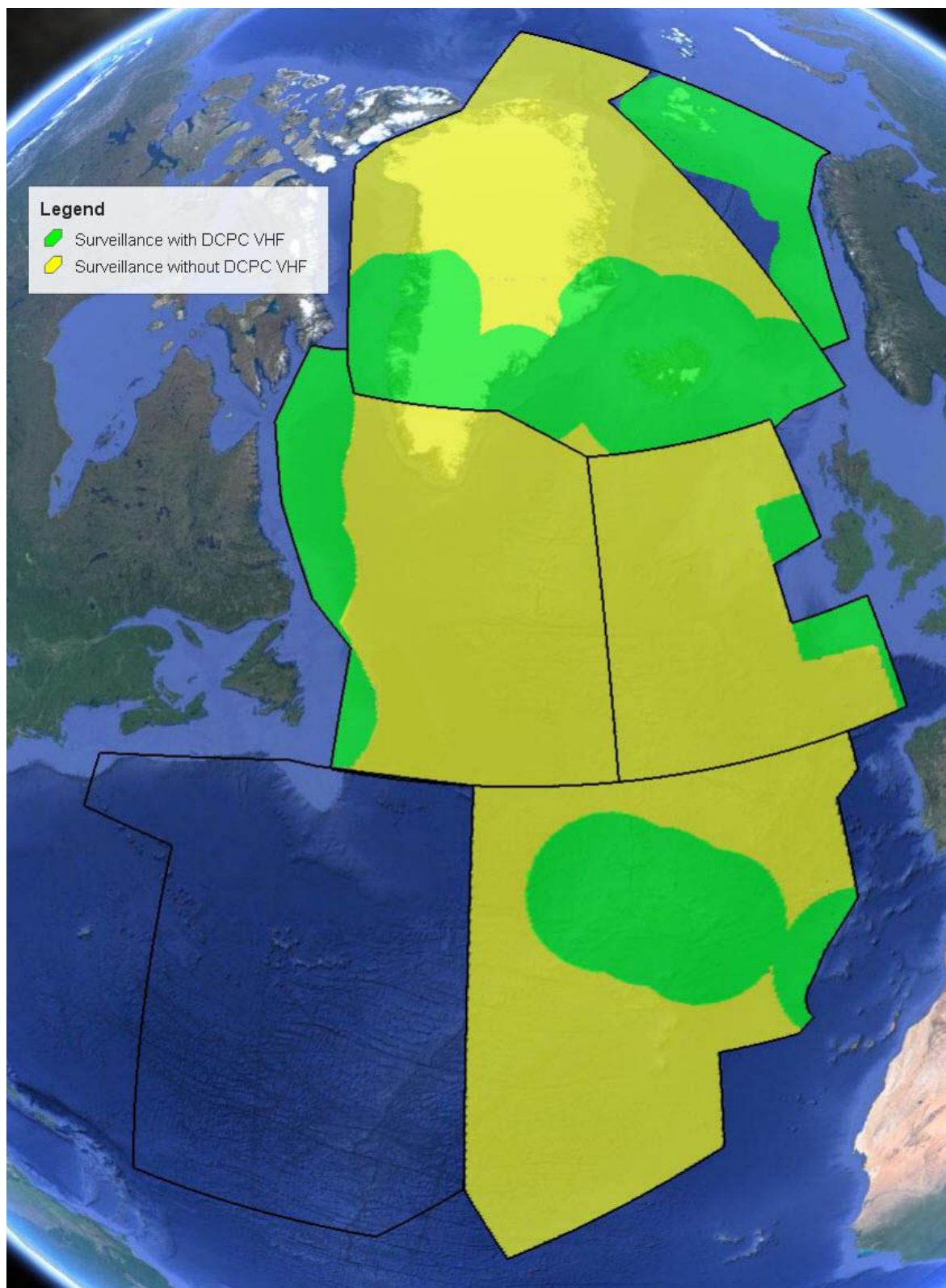
10.4.1 Turbine-engined aircraft having a maximum certificated take-off mass exceeding 5,700 kg or authorized to carry more than 19 passengers are required to carry ACAS II in the NAT region. The technical specifications for ACAS II are contained in ICAO Annex 10 Volume IV. Compliance with this requirement can be achieved through the implementation of traffic alert and collision avoidance system (TCAS) Version 7.1 as specified in RTCA/DO-185B or EUROCAE/ED-143.

10.4.2 Flight crews should report all ACAS/TCAS Resolution Advisories which occur in the NAT region to the controlling authority for the airspace involved. (See Chapter 13.)

10.5 NAT HLA ATS SURVEILLANCE COVERAGE

10.5.1 The figures below indicate the coverage of ATS surveillance systems (radar, ADS-B and multilateration) and Direct Controller Pilot VHF Voice Communications (DCPC VHF) in the NAT HLA.

Figure 108-1 NAT ATS surveillance coverage including radar, ADS-B and multilateration



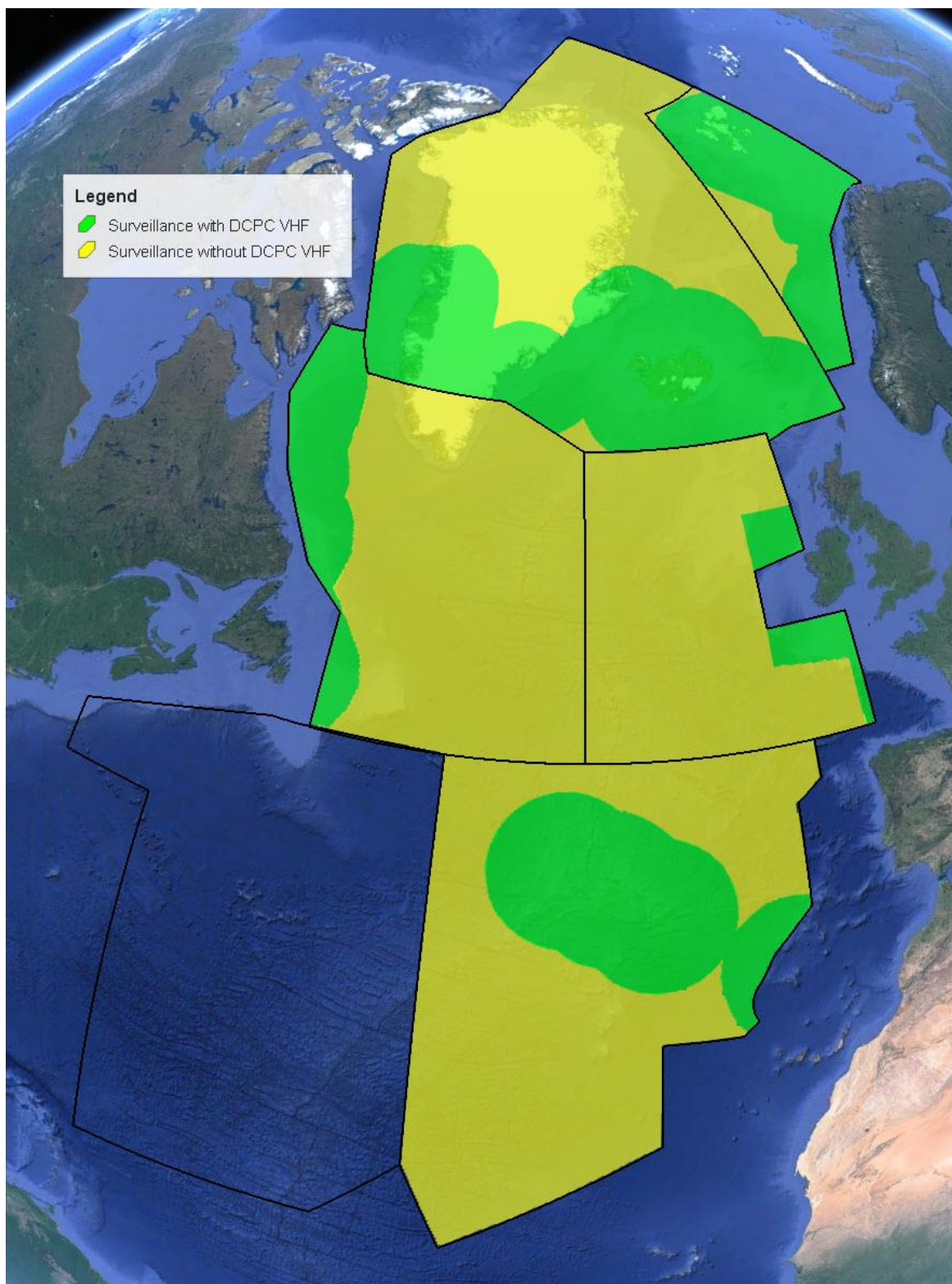
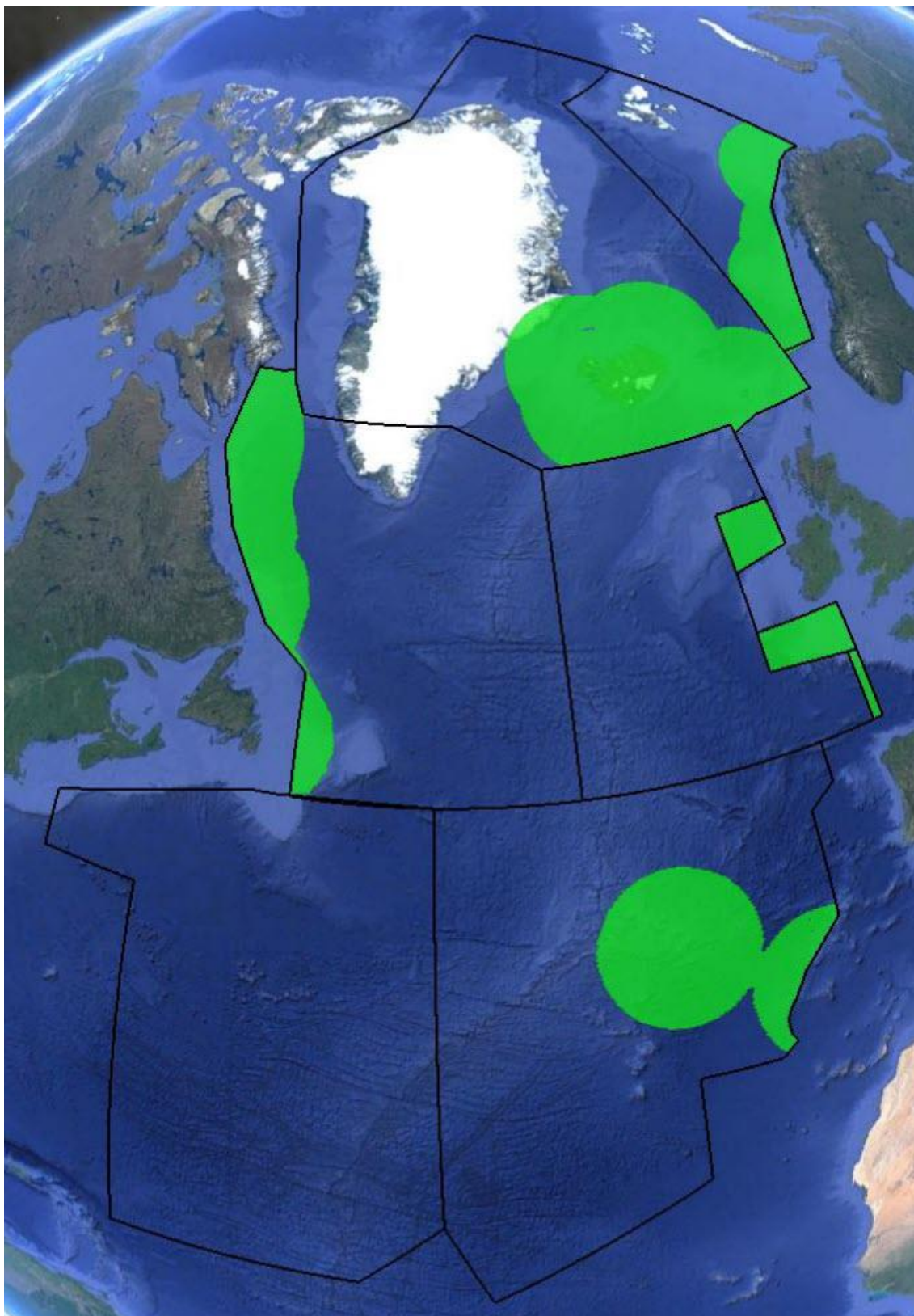


Figure 108-2 NAT ATS surveillance coverage for non-ADS-B equipped aircraft (radar and multilateration)



* Note: see State AIPs for detailed surveillance and communication coverage including coverage in the low level airspace.

CHAPTER 11

MONITORING OF AIRCRAFT SYSTEMS AND FLIGHT CREW PERFORMANCE

11.1 THE MONITORING PROCESS

11.1.1 To ensure compliance with minimum navigation and height-keeping performance specifications, ICAO has established procedures for systematic and periodic monitoring of the actually achieved aircraft systems performance. Formal reporting by flight crews, operators and ATS providers, of specified deviations from assigned track or flight level supports this.

11.1.2 The monitoring process comprises four distinct actions:

- a) monitoring of aircraft navigation performance by the operator in co-operation with flight crews;
- b) monitoring of operators by the State having jurisdiction over those operators in order to ensure that acceptable operating procedures are being applied by the operator while conducting authorised flight operations;
- c) monitoring of actual aircraft systems performance in normal flight operations, as observed by means of ATS Surveillance by the ATC units of States providing service in the NAT region, and by other specialist systems designed to measure the technical height-keeping performance of aircraft; and
- d) monitoring done on the basis of position and occurrence reporting.

11.1.3 Because of the large variety of circumstances existing in the relationship between States of Registry and their operators engaged in NAT operations, it is not expected that all States will be able to make similar or identical arrangements. It is however expected that all States concerned will make maximum effort to comply effectively with their responsibilities and in particular to co-operate with requests for information about a particular incident from an ATS provider or from the NAT CMA.

11.2 MONITORING OF HORIZONTAL NAVIGATION CAPABILITY

Monitoring by the Operators

11.2.1 Decisions regarding the monitoring of aircraft navigation performance are largely the prerogative of individual operators. In deciding what records should be kept, operators should take into account the stringent requirements associated with the NAT HLA. Operators are required to investigate all lateral deviations of 10 NM or greater, and it is imperative, whether these are observed on ground radar, via ADS reports or by the flight crew, that the cause(s) of track deviations be established and eliminated. **Therefore, it will be necessary to keep complete in-flight records so that an analysis can be carried-out.**

11.2.2 Operators should review their documentation to ensure that it provides all the information required to reconstruct any flight, if necessary, some weeks later. Specific requirements could include:

- a) details of the initial position inserted into the Flight Management System, IRS or INS equipment plus the original flight planned track and flight levels;
- b) all ATC clearances and revisions of clearance;
- c) all reports (times, positions, etc.) made to ATC;
- d) all information used in the actual navigation of the flight: including a record of waypoint numbers allocated to specific waypoints, plus their associated ETAs and ATAs;

- e) comments on any problems (including that to do with matters concerning navigation) relating to the conduct of the flight, plus information about any significant discrepancies between INS/IRS displays, other equipment abnormalities and any discrepancies relating to ATC clearances or information passed to the aircraft following ground radar observations;
- f) detailed records of any contingency manoeuvres/procedures undertaken by the flight crew;
- g) sufficient information on accuracy checks to permit an overall assessment of performance. Records of terminal (i.e. residual) errors and of checks made against navigation facilities immediately prior to entering oceanic airspace; details of any manual updates made to IRS/INS units;
- h) where available, navigational and performance data contained in the aircraft's flight data recorders; and
- i) retention of aircraft flight data records whenever a flight crew or operator are aware of a possible report of a vertical or lateral deviation. Such records will assist in quantifying the magnitude and/or duration of any deviation.

11.2.3 It is also important that any forms which are used make it easy to examine key factors. For instance, documentation might include, for each flight, a question calling for flight crew assistance in this regard:

e.g. "Did a track error of 10 NM or more occur on this flight? Yes/No."

Monitoring of the Operator by the State

11.2.4 Decisions regarding the monitoring of operators by the State may be taken unilaterally, but hopefully there will be a co-operative process regarding those specifications to be achieved by the operator during planning, and when reviewing achieved performance. Much of this process will be concerned with procedures approved by the flight operations inspectorate and confirmed by means of monitoring, to ensure compliance.

Direct Action by ATS Provider States and the NAT CMA in the Monitoring Process

11.2.5 The navigation performance of operators within NAT HLA is monitored on a continual basis. The navigation accuracy achieved by NAT HLA aircraft is periodically measured and additionally all identified instances of significant deviation from cleared track are subject to thorough investigation by the NAT Central Monitoring Agency (CMA), currently operated on behalf of ICAO by the UK National Air Traffic Services Limited. The CMA also maintains a database of all NAT HLA approvals. The CMA runs a continuous monitoring process to compare this approvals list with the records of all aircraft flying in the NAT HLA. The approval status of any aircraft involved in a track deviation is specifically checked against the database and in any cases of doubt the State of Registry is contacted.

11.2.6 When a navigation error is identified, follow-up action after flight is taken, both with the operator and, where the deviation is 25 NM or more, the State of operator or State of Registry of the aircraft involved, to establish the circumstances and contributory factors. The format of the (navigation) Error Investigation Form used for follow-up action is as shown at Attachment 1. Operational errors can have a significant effect on the assessment of risk in the system. For their safety and the safety of other users, flight crews are reminded of the importance of co-operating with the reporting OACG in the provision of incident information.

11.2.7 The overall lateral navigation performance of all aircraft in the NAT HLA is continually assessed and compared to the standards established for the region, to ensure that the TLS is being maintained.

Monitoring of Lateral Deviations

11.2.8 The data collection process involves the continuous collection of data relating to all reported lateral deviations.

11.2.9 ANSPs capable of monitoring the boundaries of the NAT region collect data on flights within the NAT HLA, together with that on non-NAT HLA flights. The former data provides a direct input into the risk modelling of operations in the NAT HLA, while the latter provides a wider appreciation of navigation in the NAT region and allows follow-up action to be taken on a larger sample of flights believed to have experienced navigation errors.

11.2.10 When any lateral deviation of less than 25 NM has been detected by the ATS provider State or has been reported to ATC by the flight crew, that ATS provider unit will, in co-operation with the operator, investigate its cause. It is important that all agencies react promptly to such reports of any lateral deviations. Investigations should be made at once so that consideration can be given to the need for swift remedial action. In order that deviation reports can receive prompt attention, each airline/operator should nominate a person to be responsible for receiving reports and to initiate investigations; the name and full address of this individual should be notified to each relevant ATS authority who distributes the name to the ANSPs.

11.3 MONITORING OF HEIGHT-KEEPING PERFORMANCE

11.3.1 The vertical navigation performance of operators within the NAT HLA is monitored on a continual basis by the NAT CMA. Such monitoring includes both measurement of the technical height-keeping accuracy of RVSM approved aircraft and assessment of collision risk associated with all reported operational deviations from cleared levels.

11.3.2 All identified operational situations or errors which lead to aircraft deviating from ATC cleared levels are subject to thorough investigation. Follow-up action after flight is taken with the operator of the aircraft involved, to establish the reason for the deviation or cause of the error and to confirm the approval of the flight to operate in NAT HLA and RVSM airspace. Operational errors, particularly those in the vertical plane, have a significant effect on risk in the system. For their safety and the safety of other users, flight crews are reminded of the importance of co-operating with the reporting OACG in the compilation of appropriate documentation including the completion of an 'Altitude Deviation Report Form', as illustrated at Attachment 2.

11.3.3 The detailed circumstances of all operational errors, both in the vertical and horizontal planes, are thoroughly reviewed by the CMA, together with the Scrutiny Group of the NAT SPG, which includes current NAT flight crews, controllers and State Regulators. Any lessons learned from this review, which may help to limit the possibility of recurrences of such errors, are communicated back to NAT operators and ATS authorities. The intent is to improve standard operating procedures, thereby reducing the future frequency of operational errors and thus contribute to the safety of the overall system.

11.3.4 At RVSM levels, moderate and severe turbulence may also increase the level of system risk and flight crews should report **ALL** occasions, while flying in the NAT HLA, whenever a vertical deviation of 300 ft or more occurs. The form at Attachment 2 may also be used for this purpose.

11.3.5 The overall vertical navigation performance of all aircraft in NAT RVSM airspace is continually assessed and compared to the standards established for the region, to assess whether the relevant TLS is being maintained.

Monitoring of Operational Height-keeping Performance

11.3.6 The introduction of RVSM airspace into the NAT region has increased the necessity for consistent and accurate reporting by flight crews and ATC units, of all deviations of 90 m (300 ft) or more from the cleared flight level, whatever the cause.

Monitoring of Technical Height-keeping Performance

11.3.7 The technical height-keeping accuracy of aircraft flying at RVSM levels is passively monitored during flight over a Height Monitoring Unit (HMU) located near to Strumble in Wales.

Alternatively, individual aircraft can be monitored through temporary carriage of portable GPS (Height) Monitoring Units (GMUs). Furthermore, height monitoring data is available to the NAT CMA from the 3 European HMUs. This monitoring allows the height-keeping accuracies of aircraft types and individual operator's fleets to be assessed. Individual airframes which do not meet required performance standards can also be identified. On such occasions the operator and the State of Registry are advised of the problem and corrective action must be undertaken before further flights in RVSM airspace are conducted. Revised Minimum Monitoring Requirements for RVSM approval, as specified in ICAO Annex 6, ~~became effective in November 2010~~. Operators are required to ensure that a minimum of two aircraft from each of its type groupings are monitored at least once every two years (See Annex 6 Part I para 7.2.7 and Part II para 2.5.2.7).

11.4 MONITORING OF ACAS II PERFORMANCE

11.4.1 ACAS II can have a significant effect on ATC. Therefore, there is a continuing need to monitor the performance of ACAS II in the developing ATM environment.

11.4.2 Following an RA event, or other significant ACAS II event, flight crews and controllers should complete an ACAS II RA report. Aircraft operators and ATS authorities should forward completed reports through established channels.

11.5 OVERALL NAVIGATION (AND SYSTEMS) PERFORMANCE

11.5.1 All information relating to horizontal and vertical navigation (and systems) performance within the NAT region is provided to the NAT SPG via the CMA. Regular statistical assessments of system safety determine whether or not the overall target level of safety (TLS) is being met. On those occasions that summary statistics show that the TLS, in either the horizontal or vertical planes, has been exceeded, the NAT SPG is informed; in which case the NAT SPG will take appropriate action.

11.6 TACTICAL MONITORING OF NAT HLA AND RVSM APPROVALS

11.6.1 Experience with the monitoring process indicates that a proportion of lateral deviations and other operational errors are attributable to aircraft operating in NAT HLA/RVSM airspace without the required approvals. It was for this reason that in 1990, to make random checks more effective, the NAT SPG introduced a programme of tactical monitoring to help identify aircraft operating within the NAT HLA without the required approval. In 1997, this procedure was extended to RVSM approvals, and currently Canada, Iceland and the United Kingdom participate in this programme. Flight crews who are uncertain of, or are unable to confirm their approval status, are issued a clearance to operate outside NAT HLA/RVSM airspace and a report is forwarded to the CMA for follow-up action.

11.7 OPERATIONAL ERROR REPORTING AND CENTRAL MONITORING AGENCY (CMA) ACTIVITIES

Background

11.7.1 In March 1980, the NAT SPG realised that after implementation of a 60 NM lateral separation minima, special importance would have to be placed on monitoring and assessment of navigation performance. It was therefore agreed that there was a need to collect, collate and circulate to States participating in the monitoring programme, data regarding navigation performance in the NAT region. To meet this requirement, the NAT CMA was established.

11.7.2 In the early 1990s, as a consequence of the planned implementation of RVSM in the NAT MNPSA, the NAT CMA acquired the responsibility for monitoring height-keeping performance. Initially, this was limited to collating data on operational errors but when the technical height-keeping programme came into being, the CMA became the data collection and collation centre. It has also become responsible, in

conjunction with other Regional Monitoring Agencies, for setting the target monitoring requirements for the RVSM approval process.

11.7.3 In 2009, it was agreed to make adjustments to the NAT SPG working structure to accommodate the changes in emphasis to performance based requirements, as driven by the *Global Air Navigation Plan* (ANP), and to take account of the *Global Aviation Safety Plan* (GASP). At the same time, the NAT SPG approved a high level safety policy which would be applicable to its work. The NAT Safety Oversight Group (SOG) was formed. It is responsible for the continuous monitoring and improvement of the safety level of the air navigation system in the NAT region. It is composed of ATS provider and airspace user representatives and Regulators. It directs safety oversight and management in the NAT region.

11.7.4 The NAT Central Monitoring Agency (CMA) is responsible to the NAT SOG for certain aspects of operations monitoring and reporting in the NAT region.

11.7.5 The NAT Scrutiny Group is a separate body comprising the NAT CMA, Regulators plus ATS provider and airspace user representation, reporting to the NAT SOG. Its function is to ensure a correct categorisation of all reported occurrences in the NAT region for the purpose of mathematical analysis and other safety management activities.

Responsibilities

11.7.6 The NAT CMA is operated on behalf of the NAT SPG by United Kingdom National Air Traffic Services Limited (NATS) and is responsible for the collection, analysis and dissemination of all data relevant to vertical and horizontal navigation (and systems) performance in the NAT region. It provides participating States, ICAO and other selected operators and organisations with regular summaries of operational performance to promote awareness of NAT system safety, and with any other pertinent information.

11.7.7 Height monitoring by the CMA comprises collection of operational error data in the vertical dimension, and monitoring of aircraft technical height-keeping performance.

11.7.8 The NAT CMA will take follow-up action in the following circumstances:

- a) when reports are received from ATS provider units, or other sources, that detail for any reason operational errors that have resulted in an aircraft being at a level 90 m (300 ft) or more from its cleared flight level. Follow-up action with the appropriate State of Registry will normally only be taken when the information contained in the reports is not sufficiently comprehensive to determine the cause of the deviation;
- b) when reports are received from height monitoring systems indicating that aircraft altimetry system performance may not be compliant with the RVSM airworthiness requirements. i.e. measurements which are in magnitude equal to, or greater than, the following criteria:
 - Total Vertical Error (TVE): 90 m (300 ft);
 - Altimetry System Error (ASE): 75 m (245 ft); or
 - Assigned Altitude Deviation (AAD): 90 m (300 ft) and;
- c) when receiving reports from ATS provider units of height deviations of 90 m (300 ft) or more resulting from turbulence, ACAS/TCAS manoeuvres or contingency action.

11.7.9 System risk monitoring in the NAT region is a continuous process. The vertical dimension occurrence reports as described in 11.7.8 above are used by the CMA in compiling monthly and quarterly summaries. Trends are presented graphically. The Quarterly summaries present a more detailed comparative presentation and various risk factors are quantified. An annual summary is also produced and is utilised in the development of an assessment of system vertical risk. In parallel with these processes and simultaneously, the

CMA analyses reported lateral navigation errors, leading to similar quantifications of risk factors and an assessment of lateral dimension risk.

Follow-up Action on Observed, Reported, and Prevented Lateral Deviations

11.7.10 Different administrative arrangements exist within those States participating in monitoring programmes although follow-up action on lateral deviations should, in general terms, be as indicated in the following paragraphs.

11.7.11 For aircraft operating within the NAT HLA:

- a) the observing ATC unit will inform the flight crew of the aircraft concerned of the observed error and also that an error report will be processed; any comment made by the flight crew at the time of notification should be recorded;
- b) the operators (including military) and any other relevant ATC units and the CMA will be notified of the observed/prevented deviation, either directly by the observing ATC unit or by an agency designated by the State concerned, using the speediest means available and with the least possible delay; and
- c) where an observed deviation is equal to or greater than 10 NM the appropriate State of Registry or the State of the operator will be sent a copy of the written confirmation along with a covering letter by the CMA seeking the State's assistance in ensuring the full cooperation of the operator in the investigation.

11.7.12 For aircraft operating outside the NAT HLA:

- a) the observing ATC unit should, if at all possible, inform the flight crew of the aircraft concerned of the observed error and also that an error report may be processed; any comment made by the flight crew at the time of notification should be recorded;
- b) where the observed deviation from track is 20 NM or more, the procedure detailed in the previous paragraph (covering aircraft operating within the NAT HLA) will be followed; and
- c) where the observed deviation from track is 10 NM or more but less than 20 NM, the observing ATC unit, or other agency designated by the State, will notify the CMA of the deviation with the least possible delay.

11.7.13 Further Follow-up Action by the Operator and/or State of Registry. Subsequent follow-up action on observed deviations of 25 NM or more, notified in accordance with the above provisions, should initially be conducted between the operator and a designated agency of the State having responsibility for the ATC unit which observed the deviation, on the understanding that:

- a) the errors outlined in paragraph 11.7.12 c) above (i.e. deviations 10 NM or more but less than 20 NM occurring outside the NAT HLA) will not normally require further action;
- b) the State of Registry or the State of the operator concerned may be requested to conduct a further investigation if deemed necessary;
- c) all correspondence should be copied to the CMA; and
- d) the EUR/NAT Office of ICAO will assist in those cases where no response is obtained from either the operator concerned or the State of Registry.

Other Reports to the CMA

11.7.14 Details of the following occurrences should also be reported to the CMA by the ATS provider units:

- a) erosions of longitudinal separation between aircraft, within the NAT HLA, of 3 minutes or

more;

- b) occasions when action is taken to prevent a GNE;
 - c) lateral deviations from cleared route of less than 25 NM;
 - d) discrepancies of 3 minutes or more between an ETA/ATA at a waypoint;
 - e) occasions when an operator is suspected of not being in possession of an NAT HLA/RVSM approval;
 - f) diversions or turnbacks, noting in particular whether the appropriate published contingency procedure was correctly adopted;
 - g) ACAS RAs;
 - h) wake turbulence reports; and
 - i) incorrect application of the SLOP (e.g. a left offset).
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CHAPTER 12

PROCEDURES IN THE EVENT OF NAVIGATION SYSTEM DEGRADATION OR FAILURE

12.1 GENERAL

12.1.1 Aircraft navigation systems are generally very accurate and very reliable; as a result, GNEs due to system failures are rare in the NAT HLA. However, when failures do occur, their potential effects on the aircraft's navigation capability can be subtle or progressive, resulting in a gradual and perhaps not immediately discernible degradation of performance. The risks that such errors pose can be significant and flight crews must employ rigorous procedures to ensure early detection of any possible errors and hence mitigation of the ensuing risk. The NAT CMA thoroughly investigates the circumstances of all reported GNEs in the NAT HLA. The majority are the result of human error, and diligent application by flight crews of operating procedures such as those described in Chapter 8 should help to minimise the frequency of such errors. 'Vigilance' must be the watchword when navigating in the NAT HLA. 'Complacency' has no place here.

12.1.2 For unrestricted operation in the NAT HLA an approved aircraft must be equipped with a minimum of **two fully serviceable** LRNSs. Aircraft may be approved for NAT HLA operations when equipped with only a single LRNS. However, such aircraft are only permitted to plan and fly routes specified for this purpose (see paragraph 12.2) and on other particular routings serving individual traffic axes e.g. the Tango routes, routings between the Iberian Peninsula and the Azores/Madeira and routes between Iceland and Greenland (See Chapter 3).

12.1.3 If abnormal navigation indications relating to INS or IRS systems occur after take-off, they should be analysed to discover their cause. Under no circumstances should a flight continue into oceanic airspace with unresolved navigation system errors, or with errors caused by inertial platform misalignment or initial position insertion.

12.1.4 Flight crew training and consequent approval for NAT HLA operations should include instruction on what actions are to be considered in the event of navigation system failures. This chapter provides guidance on the detection of failures and what flight crew action should be considered, together with details of the routes that may be used when the aircraft's navigation capability is degraded below that required for unrestricted operations in the NAT HLA.

Detection of Failures

12.1.5 Normally, navigation installations include comparator and/or warning devices, but it is still necessary for the flight crew to make frequent comparison checks. When an aircraft is fitted with three independent systems, the identification of a defective system should be straightforward. Any degradation of navigation capability should be reported to ATC immediately.

Methods of Determining which System is Faulty

12.1.6 With only two systems on board, identifying the defective unit can be difficult. If such a situation does arise in oceanic airspace any or all of the following actions should be considered:

- a) checking malfunction codes for indication of unserviceability;
- b) obtaining a fix. It may be possible to use the following:
 - the weather radar (range marks and relative bearing lines) to determine the position relative to an identifiable landmark such as an island; or
 - the ADF to obtain bearings from a suitable long-range NDB, in which case magnetic

- variation at the position of the aircraft should be used to convert the RMI bearings to true; or
- if within range, a VOR, in which case the magnetic variation at the VOR location should be used to convert the radial to a true bearing (except when flying in the Canadian Northern Domestic airspace where VOR bearings may be oriented with reference to true as opposed to magnetic north).
- c) contacting a nearby aircraft on VHF, and comparing information on spot wind, or ground speed and drift; or
 - d) if such assistance is not available, and as a last resort, the flight plan wind speed and direction for the current DR position of the aircraft, can be compared with that from navigation system outputs.

Action if the Faulty System Cannot be Identified

12.1.7 Occasions may still arise when distance or cross track differences develop between systems, but the flight crew cannot determine which system is at fault. The majority of operators feel that the procedure most likely to limit gross tracking errors under such circumstances is to fly the aircraft half way between the cross track differences as long as the uncertainty exists.

Guidance on What Constitutes a Failed System

12.1.8 Operations or navigation manuals should include guidelines on how to decide when a navigation system should be considered to have failed, e.g. failures may be indicated by a red warning light, or by self -diagnosis indications, or by an error over a known position exceeding the value agreed between an operator and its certifying authority.

Inertial System Failures

12.1.9 INSs have proved to be highly accurate and very reliable in service. Manufacturers claim a drift rate of less than 2 NM per hour; however in practice IRSs with laser gyros are proving to be capable of maintaining accuracy to better than 1 NM per hour. This in itself can lead to complacency, although failures do still occur. Close monitoring of divergence of output between individual systems is essential if errors are to be avoided and faulty units identified.

GNSS Failures

12.1.10 GNSS are also very accurate and typically very reliable. Unlike inertial systems, GNSS failures can come about as a result of malfunctions of the aircraft, e.g., failures affecting the performance of one of more GNSS satellites. Some failures (e.g., loss of RAIM) may not affect navigation performance but rather affect the ability of the aircraft's GNSS equipment to monitor the reliability of the navigation solution. Similarly, a loss of fault detection and exclusion (FDE) capability may still allow accurate navigation but could also allow a defective satellite to provide faulty navigation data to the aircraft, without the flight crew's knowledge. In the event of loss of RAIM or FDE, flight crews should crosscheck the aircraft GNSS position by any means available, both on and off the aircraft. Procedures for responding to an aircraft GNSS malfunction should be provided in aircraft flight manuals. Flight crews should inform ATC of any GNSS malfunction. ATC aircraft separation minimums may be affected by the GNSS malfunction.

Satellite Fault Detection Outage

12.1.11 If the GNSS receiver displays an indication of a fault detection function outage (i.e. RAIM/FDE is not available), navigation integrity must be provided by comparing the GNSS position with the position indicated by another LRNS sensor (i.e. other than GNSS), if the aircraft is so equipped. However, if the only sensor for the approved LRNS is GPS, then comparison should be made with a position computed by extrapolating the last verified position with airspeed, heading and estimated winds. If the positions do not agree

within 10 NM, the flight crew should adopt navigation system failure procedures as subsequently described, until the exclusion function or navigation integrity is regained. The flight crew should follow flight manual procedures specified for this type of malfunction.

Fault Detection Alert

12.1.12 If the GNSS receiver displays a fault detection alert (i.e. a failed satellite), the flight crew may choose to continue to operate using the GNSS-generated position if the current estimate of position uncertainty displayed on the GNSS from the FDE algorithm is actively monitored. If this exceeds 10 NM, the flight crew should immediately begin using the following navigation system failure procedures, until the exclusion function or navigation integrity is regained. The flight crew should follow flight manual procedures specified for this type of alert.

12.2 LOSS OF NAVIGATION/FMS CAPABILITY

12.2.1 Some aircraft carry triplex equipment (3 LRNSs) and hence if one system fails, even before take-off, the two basic requirements for NAT HLA operations may still be met and the flight can proceed normally. The following guidance is offered for aircraft having State approval for unrestricted operations in the NAT HLA and which are equipped with only two operational LRNSs:

One System Fails Before Take-Off

12.2.2 The flight crew must consider:

- a) delaying departure until repair is possible;
- b) obtaining a clearance above or below the NAT HLA;
- c) planning on the special routes known as the 'Blue Spruce' Routes, which have been established for use by aircraft suffering partial loss of navigation capability (*Note: As indicated in Chapter 1, these routes may also be flown by aircraft approved for NAT HLA operations but equipped with only a single LRNS*). These Blue Spruce Routes are described in Chapter 3.

12.2.3 Such use of the foregoing routes is subject to the following conditions:

- a) sufficient navigation capability remains to ensure that NAT HLA accuracy and the ICAO Annex 6 (*Part I para 7.2.9 and Part II para 2.5.2.9*) requirements for redundancy can be met by relying on short-range nav aids;
- b) a revised flight plan is filed with the appropriate ATS unit;
- c) an appropriate ATC clearance is obtained.

(Further information on the requisite procedures to follow can be obtained from *Section ENR 1.8.2 in AIP Iceland and in Section NAT 1.19 in AIP Canada*.)

Note: Detailed information (including route definitions and operating procedures), which enables flight along other special routes within the NAT HLA, may be found in relevant AIPs. This is specifically so, for aircraft operating without two LRNSs between Iceland and Greenland and between Greenland and Canada.

One System Fails Before the OCA Boundary is Reached

12.2.4 The flight crew must consider:

- a) landing at a suitable aerodrome before the boundary or returning to the aerodrome of departure;
- b) diverting via one of the special routes described previously;

- c) obtaining a re-clearance above or below the NAT HLA.

One System Fails After the OCA Boundary is Crossed

12.2.5 Once the aircraft has entered oceanic airspace, the flight crew should normally continue to operate the aircraft in accordance with the current flight plan or as amended by ATC ~~oceanic clearance already received~~, appreciating that the reliability of the total navigation system has been significantly reduced.

12.2.6 The flight crew should however,

- a) assess the prevailing circumstances (e.g. performance of the remaining system, remaining portion of the flight in the NAT HLA, etc.);
- b) prepare a proposal to ATC with respect to the prevailing circumstances (e.g. request clearance above or below the NAT HLA, turn-back, obtain clearance to fly along one of the special routes, etc.);
- c) advise and consult with ATC as to the most suitable action;
- d) obtain appropriate re-clearance prior to any deviation from the last acknowledged ~~oceanic~~ clearance.

12.2.7 When the flight continues in accordance with its current flight plan or as amended by ATC ~~original clearance~~ (especially if the distance ahead within the NAT HLA is significant), the flight crew should begin a careful monitoring programme:

- a) to take special care in the operation of the remaining system bearing in mind that routine methods of error checking are no longer available;
- b) to check the main and standby compass systems frequently against the information which is still available;
- c) to check the performance record of the remaining equipment and if doubt arises regarding its performance and/or reliability, the following procedures should be considered:
 - attempting visual sighting of other aircraft or their contrails, which may provide a track indication;
 - calling the appropriate OACG for information on other aircraft adjacent to the aircraft's estimated position and/or calling on VHF to establish contact with such aircraft (preferably same track/level) to obtain from them information which could be useful. (e.g. drift, groundspeed, wind details).

The Remaining System Fails After Entering the NAT HLA

12.2.8 The flight crew should:

- a) immediately notify ATC;
- b) make best use of procedures specified above relating to attempting visual sightings and establishing contact on VHF with adjacent aircraft for useful information;
- c) keep a special look-out for possible conflicting aircraft, and make maximum use of exterior lights;
- d) if no instructions are received from ATC within a reasonable period consider climbing or descending 500 feet, broadcasting action on 121.500 MHz and advising ATC as soon as possible.

Note: *This procedure also applies when a single remaining system gives an indication of degradation of performance, or neither system fails completely but the system indications diverge widely and the defective system cannot be determined.*

Complete Failure of Navigation Systems Computers

12.2.9 A characteristic of the navigation computer system is that the computer element might fail, and thus deprive the aircraft of steering guidance and the indication of position relative to cleared track, but the basic outputs of the IRS (LAT/LONG, Drift and Groundspeed) are left unimpaired. A typical drill to minimise the effects of a total navigation computer system failure is suggested below. It requires comprehensive use of the plotting chart.

- a) use the basic IRS/GPS outputs to adjust heading to maintain mean track and to calculate ETAs.
- b) draw the cleared route on a chart and extract mean true tracks between waypoints.
- c) at intervals of not more than 15 minutes plot position (LAT/LONG) on the chart and adjust heading to regain track.

Note: *EAG Chart AT (H) 1; No 1 AIDU (MOD) Charts AT(H)1, 2, 3 & 4; the Jeppesen North/Mid Atlantic Plotting Charts and the FAA North Atlantic Route Planning Chart are considered suitable for this purpose.*

CHAPTER 13

SPECIAL PROCEDURES FOR IN-FLIGHT CONTINGENCIES

13.1 INTRODUCTION

13.1.1 Although all possible contingencies cannot be covered, the procedures in 13.2, 13.3 and 13.4 provide for the more frequent cases such as:

- a) inability to comply with assigned clearance due to meteorological conditions, (13.4 refers);
- b) en-route diversion across the prevailing traffic flow (for example, due to medical emergencies (13.2 and 13.3 refer)); and
- c) loss of, or significant reduction in, the required navigation capability when operating in an airspace where the navigation performance accuracy is a prerequisite to the safe conduct of flight operations, or pressurization failure (13.2 and 13.3 refer).

Note: *Guidance on procedures to follow when an aircraft experiences a degradation in navigation capabilities can be found in Doc 4444, Chapter 5, section 5.2.2.*

13.1.2 The pilot shall take action as necessary to ensure the safety of the aircraft, and the pilot's judgement shall determine the sequence of actions to be taken, having regard to the prevailing circumstances. Air Traffic Control shall render all possible assistance.

13.2 GENERAL PROCEDURES

Note: *Figure -1 provides an aid for understanding and applying the contingency procedures contained in paragraph 13.3.*

13.2.1 If an aircraft is unable to continue the flight in accordance with its ATC clearance, a revised clearance shall be obtained, whenever possible, prior to initiating any action. If prior clearance cannot be obtained, the following contingency procedures should be employed until a revised clearance is received:

- a) leave the cleared route or track by initially turning at least 30 degrees to the right or to the left, in order to intercept and maintain a parallel, same direction track or route offset 9.3 km (5 NM). The direction of the turn should be based on one or more of the following:
 - 1) aircraft position relative to any organized track or route system,
 - 2) the direction of flights and flight levels allocated on adjacent tracks,
 - 3) the direction to an alternate airport;
 - 4) any strategic lateral offset being flown, and
 - 5) terrain clearance;
- b) the aircraft should be flown at a flight level and an offset track where other aircraft are less likely to be encountered.
- c) maintain a watch for conflicting traffic both visually and by reference to ACAS (if equipped) leaving ACAS in RA mode at all times, unless aircraft operating limitations dictate otherwise;

- d) turn on all aircraft exterior lights (commensurate with appropriate operating limitations);
- e) keep the SSR transponder on at all times and, when able, squawk 7700, as appropriate;
- f) as soon as practicable, the pilot shall advise air traffic control of any deviation from assigned clearance;
- g) use whatever means is appropriate (i.e., voice and/or CPDLC) to communicate during a contingency or emergency;
- h) if voice communication is used, the radiotelephony distress signal (MAYDAY) or urgency signal (PAN PAN) preferably spoken three times, shall be used, as appropriate;
- i) when emergency situations are communicated via CPDLC, the controller may respond via CPDLC. However, the controller may also attempt to make voice communication contact with the aircraft;

Note: Additional guidance on emergency procedures for controllers and radio operators, and flight crew in data link operations can be found in the Global Operational Data Link (GOLD) Manual (Doc 10037).

- j) establish communications with and alert nearby aircraft by broadcasting, at suitable intervals on 121.500 MHz (or, as a backup, on the inter-pilot air-to-air frequency 123.450 MHz) and where appropriate on the frequency in use: aircraft identification, the nature of the distress condition, intention of the person in command, position (including the ATS route designator or the track code, as appropriate) and flight level; and
- k) the controller should attempt to determine the nature of the emergency and ascertain any assistance that may be required. Subsequent ATC action with respect to that aircraft shall be based on the intentions of the pilot and overall traffic situation.

13.3 ACTIONS TO BE TAKEN ONCE OFFSET FROM TRACK

Note: The pilot's judgement of the situation and the need to ensure the safety of the aircraft will determine the actions outlined in 13.3.2 a) or b), will be taken. Factors for the pilot to consider when diverting from the cleared route or track without an ATC clearance include, but are not limited to:

- a) operation within a parallel track system,*
- b) the potential for User Preferred Routes (UPRs) parallel to the aircraft's track or route,*
- c) the nature of the contingency (e.g. aircraft system malfunction) and*
- d) weather factors (e.g. convective weather at lower flight levels).*

13.3.1 If possible maintain the assigned flight level until established on the 9.3 km (5 NM) parallel, same direction track or route offset. If unable, initially minimize the rate of descent to the extent that is operationally feasible.

13.3.2 Once established on a parallel, same direction track or route offset by 9.3 km (5 NM), either:

- a) descend below FL 290, and establish a 150 m (500 ft) vertical offset from those flight levels normally used, ~~then~~ and proceed as required by the operational situation or if an ATC clearance has been obtained, proceed in accordance with the clearance; or

Note: Descent below FL 290 is considered particularly applicable to operations where there is a predominant traffic flow (e.g. east-west) or parallel track system where the aircraft's diversion path will likely cross adjacent tracks or routes. A descent below FL 290 can decrease the likelihood of: conflict with other aircraft, ACAS RA events and delays in obtaining a revised ATC clearance.

- b) establish a 150 m (500 ft) vertical offset (or 300 m (1000 ft) vertical offset if above FL 410) from those flight levels normally used, and proceed as required by the operational situation, or if an ATC clearance has been obtained, proceed in accordance with the clearance.

Note: Altimetry System Error may lead to less than actual 500 ft vertical separation when the procedures above are applied. In addition, with the 500 ft vertical offset applied, ACAS RAs may occur.

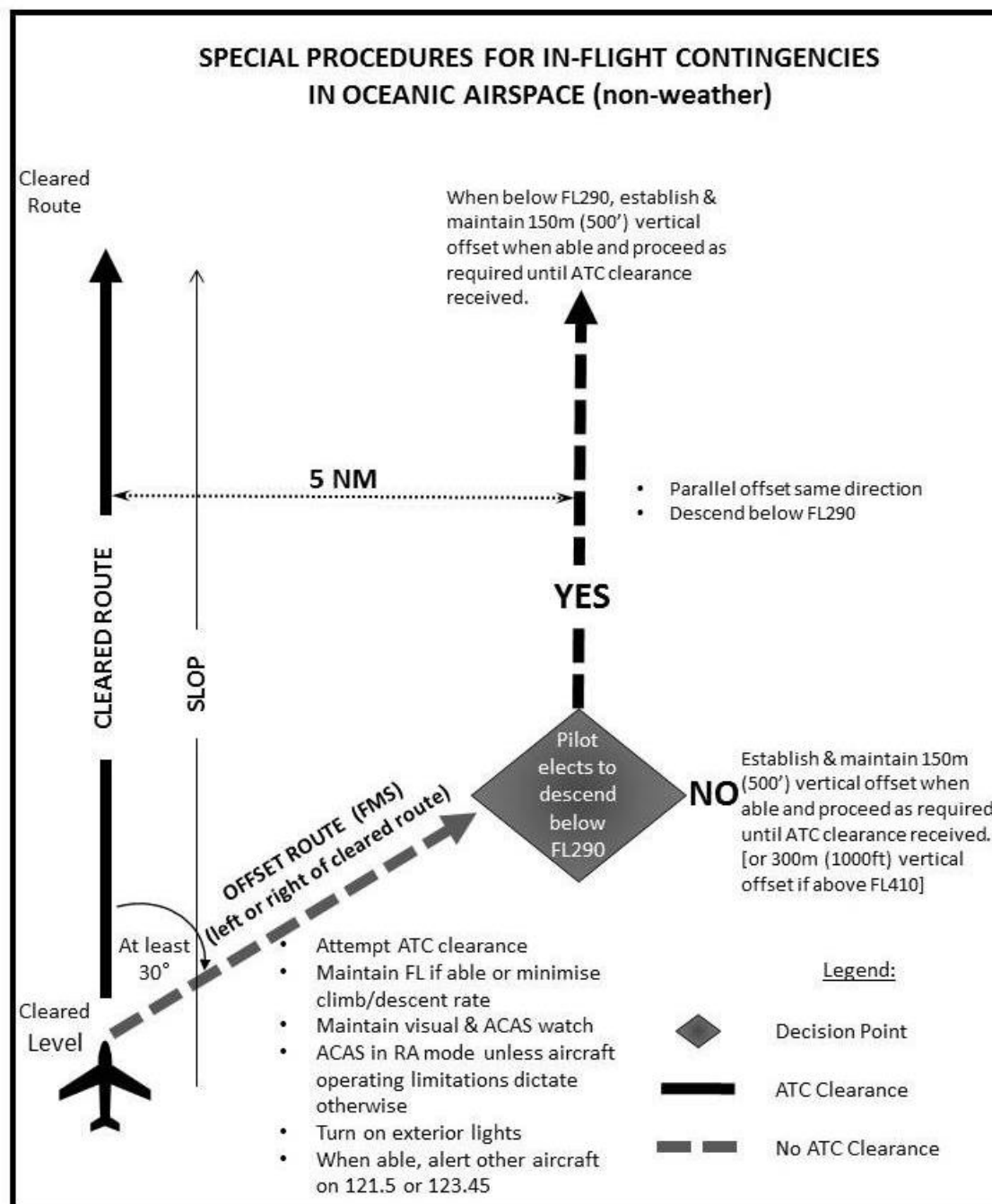


Figure 1311-1 — Visual aid for understanding and applying the contingency procedures guidance.

13.4 WEATHER DEVIATION PROCEDURES

General

Note: *The following procedures are intended for deviations around adverse meteorological conditions.*

13.4.1 When weather deviation is required, the pilot should contact ATC via CPDLC or voice. A rapid response may be obtained by requesting a weather deviation using a CPDLC downlink message (Doc 4444, Appendix 5, Lateral Downlinks (LATD) refers) or stating “WEATHER DEVIATION REQUIRED” to indicate that priority is desired on the frequency and for ATC response. When necessary, the pilot should initiate the communications using CPDLC downlink message (Doc 4444, Appendix 5, Emergency/urgency downlink (EMGD) refers) or by using the urgency call “PAN PAN” (preferably spoken three times).

13.4.2 The pilot shall inform ATC when weather deviation is no longer required, or when a weather deviation has been completed and the aircraft has returned to its cleared route.

Actions To Be Taken When Controller-Pilot Communications Are Established

13.4.3 The pilot should contact ATC and request clearance to deviate from track or route, advising the extent of the deviation requested. The flight crew will use whatever means is appropriate (i.e., CPDLC and/or voice) to communicate during a weather deviation.

Note: *Pilots are advised to contact ATC as soon as possible with requests for clearance in order to provide time for the request to be assessed and acted upon.*

13.4.4 ATC should take one of the following actions:

- a) when appropriate separation can be applied, issue clearance to deviate from track or route; or
- b) if there is conflicting traffic and ATC is unable to establish appropriate separation, ATC shall:
 - 1) advise the pilot of inability to issue clearance for the requested deviation;
 - 2) advise the pilot of conflicting traffic; and
 - 3) request the pilot’s intentions.

13.4.5 The pilot should take the following actions:

- a) comply with the ATC clearance issued; or
- b) advise ATC of intentions and execute the procedures detailed in 13.4.6.

Actions To Be Taken If A Revised ATC Clearance Cannot Be Obtained

Note: *The provisions of this section apply to situations where a pilot needs to exercise the authority of a pilot-in-command under the provisions of Annex 2, 2.3.1.*

13.4.6 If the aircraft is required to deviate from track or route to avoid adverse meteorological conditions and prior clearance cannot be obtained, an ATC clearance shall be obtained at the earliest possible time. Until an ATC clearance is received, the pilot shall take the following actions:

- a) if possible, deviate away from an organized track or route system;

- b) establish communications with and alert nearby aircraft by broadcasting, at suitable intervals: aircraft identification, flight level, position (including ATS route designator or the track code) and intentions, on the frequency in use and on 121.500 MHz (or, as a backup, on the inter-pilot air-to-air frequency 123.450 MHz);
- c) watch for conflicting traffic both visually and by reference to ACAS (if equipped);

Note: If, as a result of actions taken under the provisions of 13.4.6 b) and c), the pilot determines that there is another aircraft at or near the same flight level with which a conflict may occur, then the pilot is expected to adjust the path of the aircraft, as necessary, to avoid conflict.

- d) turn on all aircraft exterior lights (commensurate with appropriate operating limitations);
- e) for deviations of less than 9.3 km (5 NM) from the originally cleared track or route remain at a level assigned by ATC;
- f) for deviations greater than or equal to 9.3 km (5 NM) from the originally cleared track or route, when the aircraft is approximately 9.3 km (5 NM) from track or route, initiate a level change in accordance with Table 13-1;
- g) if the pilot receives clearance to deviate from cleared track or route for a specified distance and, subsequently, requests, but cannot obtain a clearance to deviate beyond that distance, the pilot should apply a 300 ft vertical offset from normal cruising levels in accordance with Table 13-1 before deviating beyond the cleared distance.
- h) when returning to track or route, be at its assigned flight level when the aircraft is within approximately 9.3 km (5 NM) of the centreline; and
- i) if contact was not established prior to deviating, continue to attempt to contact ATC to obtain a clearance. If contact was established, continue to keep ATC advised of intentions and obtain essential traffic information.

Table 13-1

Originally cleared track or route centre line	Deviations ≥ 9.3 km (5.0 NM)	Level change
EAST 000° – 179° magnetic	LEFT RIGHT	DESCEND 300 ft (90 m) CLIMB 300 ft (90 m)
WEST 180° – 359° magnetic	LEFT RIGHT	CLIMB 300 ft (90 m) DESCEND 300 ft (90 m)

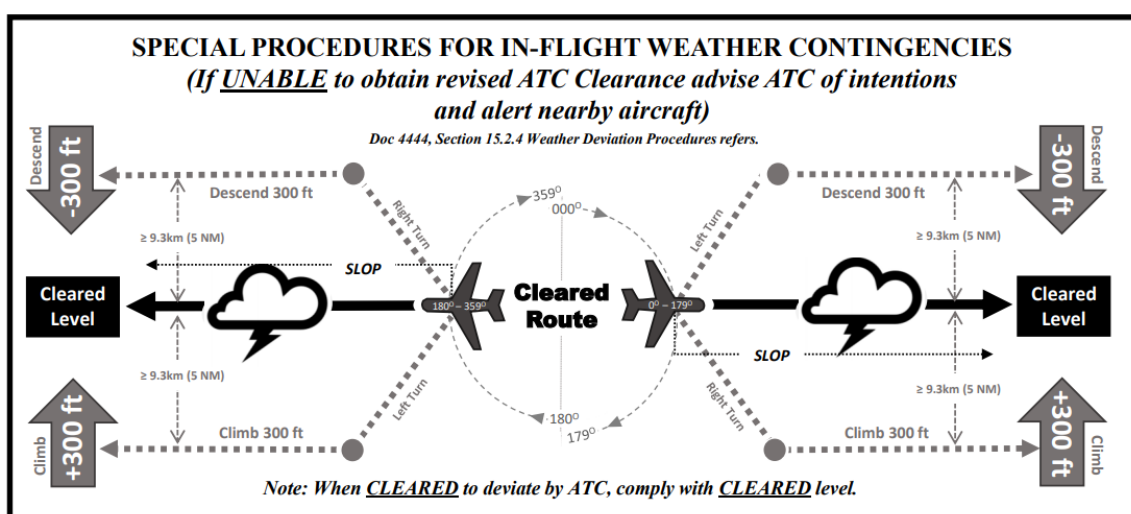


Figure 11-1. Visual aid for understanding and applying the weather contingency procedures guidance.

13.5 WAKE TURBULENCE

13.5.1 ICAO collects data on wake vortex encounters. Most encounters occur in terminal operations and indeed this is where the aircraft type wake categorization scheme is used to regulate separations. Wake vortex encounters are, however, also experienced enroute, although less frequently. To accommodate the predominantly uni-directional diurnal traffic flows through the NAT, on many routes all adjacent flights levels are simultaneously used for a given traffic flow. While this arrangement may not be unique, it is not one that is commonly employed in many other areas of the world. As a result many, if not most, enroute wake vortex encounters outside the NAT arise from opposite direction passings or route crossing situations. In the NAT enroute wake vortices are encountered more commonly from a preceding aircraft following the same track, usually at the next higher level. Such encounters can thus be of a prolonged duration and mitigating flight crew action is desirable/necessary. Any application of lateral offsets to avoid wake turbulence should be made within the confines of SLOP, refer to paragraphs 8.4.3-8.4.4. See Attachment 3 for the preferred wake vortex reporting form.

13.6 ACAS/TCAS ALERTS AND WARNINGS

13.6.1 All turbine-engined aircraft with a certificated take-off mass exceeding 5,700 kg or authorised to carry more than 19 passengers are required to be equipped with ACAS II in the NAT region. Only TCAS Version 7.1 meets the ICAO technical specifications for ACAS II as described in the current ICAO Annex 10 Volume IV.

13.6.2 The provisions relating to the carriage and use of ACAS II are contained in ICAO Annexes 2, 6, 10 and 11 and in the *Procedures for Air Navigation Services (PANS) Aircraft Operations* (PANS-OPS, Doc 8168) and *Air Traffic Management* (PANS-ATM, Doc 4444). Operational procedures are fully detailed in PANS-OPS Doc 8168, Volume 1, Part VIII, Chapter 3.

13.6.3 All Resolution Advisories (RAs) should be reported to ATC:

- a) verbally, as soon as practicable; and
- b) in writing, to the Controlling Authority, after the flight has landed, using the necessary procedure and forms, including, when appropriate, the ‘Altitude Deviation Report Form’ shown at Attachment 2 to this Manual.

13.7 LOSS OR SUDDEN WITHDRAWAL OF AIR TRAFFIC CONTROL SERVICES IN THE NAT REGION

13.7.1 In the anticipation of situations arising which might result in the partial or total disruption of Air Traffic Services within the NAT region, NAT ATS providers have developed procedures which would ensure, as far as possible, the continued safety of air navigation. These procedures are detailed in the “**Air Traffic Management Operational Contingency Plan –North Atlantic Region**” (NAT Doc 006) which can be downloaded from www.icao.int/EURNAT/, following “[EUR & NAT Documents](#)”, then “[NAT Documents](#)”, in folder “[NAT Doc 006 - NAT Contingency Plan](#)”.

Common ANSP procedures

13.7.2 The following are common ANSP procedures regarding loss or sudden withdrawal of air traffic services in the NAT:

- a) In the event of a loss or sudden withdrawal of Air Traffic Services in the NAT, ANSPs will notify all affected agencies and operators appropriately.
- b) In Limited Service situations the individual ANSP will decide upon the level of notification necessary and act appropriately.

- c) In “No Service” situations, it is likely that the ATC facility involved will be subject to evacuation. In this instance the ANSP will issue NOTAMs and broadcast on appropriate frequencies that contingency procedures have been initiated.
- d) The notification process employed by individual ANSPs is detailed in NAT Doc 006, however the general format will be as follows:

- i. Issue a NOTAM advising operators of the evacuation. The following is an example of the type of information which may be promulgated:

“Due to emergency evacuation of (OACG) all ATC services are terminated. Flights within (OCA) FIR should continue as cleared and contact the next ATC agency as soon as possible. Flights that have not entered (OAC) FIR ~~not in receipt of an oceanic clearance~~ should land at an appropriate airfield or request clearance to avoid (OAC) FIR. Flights should monitor (defined frequencies).”

- ii. Broadcast an evacuation message on appropriate frequencies:

“Emergency evacuation of (OACG) is in progress. No air traffic control service will be provided by (OACG). Use extreme caution and monitor (control frequencies), emergency frequencies and air to air frequencies. Contact the next air traffic control unit as soon as possible”

Pilot procedures for flights outside the NAT

13.7.3 Pilots are strongly advised not to enter the airspace. Request clearance to avoid the affected OCA or land at an appropriate aerodrome.

13.7.4 Flights can choose to continue using pilot’s discretion. Continue in accordance with the current flight plan (what is loaded in the FMS) or as amended by ATC.

Pilot procedures for flights inside the NAT

13.7.5 The procedures outlined below are to be used as guidance for pilots following a loss or sudden withdrawal of the Air Traffic service as described above.

13.7.6 Although advised not to enter the NAT OCA without Air Traffic Services, which could entail significant reroutes, flights can continue with their current flight plan (what is loaded in the FMS) or as amended by ATC.

- a) Pilots should continue with their current flight plan (what is loaded in the FMS) or as amended by ATC. Pilots shall use extreme caution and use all available means to detect any conflicting traffic.
- b) On receipt of the contingency message, pilots are requested to broadcast to other flights on 121.500 MHz and 123.450 MHz and a listening watch on these frequencies must be maintained. Pilots should continuously monitor VHF frequencies 121.500 MHz and 123.450 MHz in order to exchange position information with other flights, in the event they are unable to communicate on HF.
- c) Pilots should establish communication with the next OCA at the earliest opportunity stating current position, cleared flight level, next position and estimate and subsequent position. This also applies to flights using automatic position reports (ADS-C) as these reports may not have been received by the next OCA.
- d) Where no contact with the next OCA can be established, HF radio or SATVOICE should be used. HF frequency congestion is likely. Communications should be kept to a minimum.
- e) When ADS equipped flights are notified of a loss or sudden withdrawal of air traffic services,

they must revert to voice position reporting until clear of current OCA, or notified otherwise. Pilots should note that they may be asked to log-on to other OCAs. Pilots should not initiate this action until instructed to do so.

- f) Requests for changes to route, flight level, or speed should be limited to those required for flight safety.
- g) Any flight conducting a flight level change should complete the FL change as soon as possible in accordance with the clearance.
- h) If unable to establish radio contact, pilots may use SATVOICE to provide position reports.
- i) Pilots may request their flight dispatch offices to forward position reports if they are otherwise unable to make position reports.
- j) Pilots may also use other flights to relay their position reports, on 123.500 MHz, if necessary.

Contact details

Oceanic Centre	Telephone Number	SATVOICE Short Code
New York	+1 631 468 1413	436623
Gander	+1 709 651 5207	431613
Reykjavik, via Iceland Radio	+354 568 4600	425105
Bodø	+47 755 42900	425702
Ballygirreen (Shanwick Radio)	+353 61 368241 Ground/Air Ops	425002
Santa Maria	+351 296 820 438 +351 296 886 042 (satellite link)	426305

Common broadcast procedures

13.7.7 In the event of a loss or sudden withdrawal of Air Traffic Service in the NAT, the following communication procedures have been developed in accordance with the Traffic Information Broadcast by Aircraft (TIBA) procedures recommended by ICAO (Annex 11 – Air Traffic Services, Attachment B). ~~These procedures should be applied when completing flight level change to comply with the oceanic clearance.~~

At least 3 minutes prior to the commencement of a climb or descent, the flight should broadcast on the last assigned frequency, 121.500 MHz, 243.000 MHz and 123.450 MHz the following:

Note: 243.000 MHz is a UHF military frequency that can only be used and heard by other military aircraft/pilots.

“ALL STATIONS (callsign) (direction) DIRECT FROM (position) TO (position)

LEAVING FLIGHT LEVEL (number) FOR FLIGHT LEVEL (number) AT (distance)(direction) FROM (position) AT (time)”.

When the flight level change begins, pilots should make the following broadcast:

“ALL STATIONS (callsign) (direction) DIRECTION FROM (position) TO (position)

LEAVING FLIGHT LEVEL (number) NOW FOR FLIGHT LEVEL (number).”

When level, pilots should make the following broadcast:

“ALL STATIONS (callsign) MAINTAINING FLIGHT LEVEL (number).”

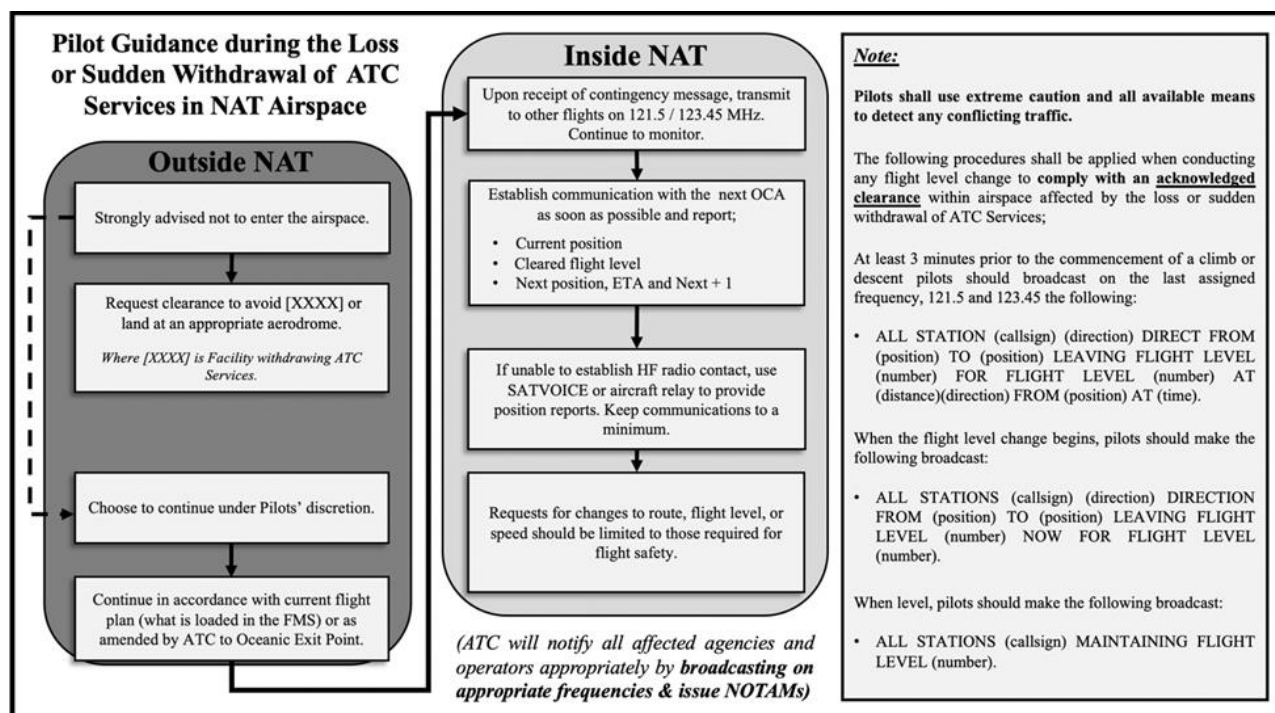


Figure 1311-3 — Visual aid for pilot guidance during loss or sudden withdrawal of ATC services in NAT airspace.

13.8 SPACE WEATHER

13.8.1 Refer to NAT Doc 006 Part III, *Space Weather Contingency Procedures North Atlantic Region*.

CHAPTER 14

GUARDING AGAINST COMMON ERRORS

14.1 INTRODUCTION

14.1.1 Careful monitoring procedures provide a good indication both of the frequency with which navigation errors occur and their causes. As a result of the accuracy and reliability of modern navigation systems, the errors which do occur are often the result of flight crew error.

14.1.2 Operational errors in the vertical plane also occur. Aircraft are sometimes flown at levels other than those for which ATC clearance has been issued. The potential collision risk of even a single incidence of flying at an un-cleared level can be significant. The NAT HLA risk estimates in the vertical plane, as a result of operational errors or un-cleared departures from flight level, exceed those arising from lateral gross navigation errors.

14.1.3 It is essential that flight crews do not take modern technology for granted. They should at all times, especially during periods of low workload, guard against complacency and over-confidence, by adhering rigidly to approved cockpit/flight deck procedures which have been formulated over many years, in order to help stop operational errors.

14.1.4 This chapter lists some of the errors that have been recorded in the NAT during recent years.

14.2 OPERATIONAL HEIGHT ERRORS

14.2.1 The most common height errors are caused by:

- a) executing an un-cleared climb, which means proper separation can no longer be assured; aircraft following an ATC clearance are assured of separation from other potentially conflicting traffic;
- b) misinterpreting an ATC acknowledgement of a request as a clearance; not being aware that when DCPC is unavailable and air/ground ATS communications are via a third party (whether radio operator or data link service provider) acknowledgements of requests do not constitute approval;
- c) not climbing or descending as cleared; being cleared to change level after the next route waypoint but doing it immediately or being cleared to change level immediately and only doing it at a later time. Such instances are often, but by no means exclusively, associated with misinterpretation of CPDLC message sets (a flight crew training/familiarity issue) whereby the words AT or BY are interpreted differently from their intended meaning;
- d) not following the correct contingency procedures; not being aware that there is a significant likelihood of conflict with other aircraft unless the appropriate contingency offset procedure is adopted;
- e) ~~entering the NAT HLA at a level different from that contained in the received oceanic clearance; not being aware that flight crews are responsible for requesting and obtaining any domestic ATC clearance necessary to climb (or descend) to the initial flight level specified in their received oceanic clearance, prior to reaching the oceanic boundary; not recognizing that entry into NAT HLA at the cleared oceanic level is entirely their responsibility.~~

14.3 LATERAL NAVIGATION ERRORS

Common Causes of Lateral Navigation Errors

14.3.1 The most common causes of lateral navigation errors, in approximate order of frequency, have been as follows:

- a) having already inserted the filed flight plan route coordinates into the navigation computers, the flight crew have been re-cleared by ATC, or have asked for and obtained a re-clearance, but have then omitted to re-program the navigation system(s), amend the Master Document or update the plotting chart accordingly.
- b) a mistake of one degree of latitude has been made in inserting a forward waypoint. There seems to be a greater tendency for this error to be made when a track, after passing through the same latitude at several waypoints (e.g. 57°N 50°W, 57°N 40°W, 57°N 30°W) then changes by one degree of latitude (e.g. 56°N 20°W). Other circumstances which can lead to this mistake being made include receiving a re-clearance in flight.
- c) the autopilot has been inadvertently left in the heading or de-coupled mode after avoiding weather, or left in the VOR position after leaving the last domestic airspace VOR. In some cases, the mistake has arisen during distraction caused by SELCAL or by some flight deck warning indication.
- d) an error has arisen in the ATC Controller/Pilot communications loop, so that the controller and the flight crew have had different understandings of the clearance. In some cases, the flight crew has heard not what was said, but what they were expecting to hear.

14.4 LESSONS LEARNED

- **Perform navigation crosscheck procedures throughout the ocean crossing.** Do not relax or otherwise skip steps when it comes to following those procedures.
- **Avoid casual R/T procedures.** A number of GNEs have been the result of a misunderstanding between flight crew and controller as to the cleared route and/or flight level. Adhere strictly to proper R/T phraseology and do not be tempted to clip or abbreviate details of waypoint coordinates.
- **Make an independent check on the gate position.** Do not assume that the gate coordinates are correct without crosschecking with an authoritative source. Normally one expects coordinates to be to the nearest tenth of a minute. Therefore, ensure that the display is not to the hundredth, or in minutes and seconds. If the aircraft is near to the Zero Degree E/W (Greenwich) Meridian, remember the risk of confusing east and west.
- **Check LRNS positions before entering oceanic airspace.** Make a careful check of LRNS positions at or near to the last navigation facility – or perhaps the last but one.
- **Do not initiate an on-track un-cleared level change.** If a change of level is essential and prior ATC clearance cannot be obtained, treat this situation as a contingency and execute the appropriate contingency offset procedure, when possible before leaving the last cleared flight level. Inform ATC as soon as practicable.
- **Crosscheck waypoints by reading present position.** Do not assume that the aircraft is at a waypoint merely because the alert annunciator so indicates. Crosscheck by reading present position.
- **Complete navigation crosschecks with more than one flight crew member.** There are some tasks on the flight deck which can safely be delegated to one member of the flight crew, but navigation using automated systems is emphatically not one of them. All such crosschecks should be performed independently by at least two flight crew members.

- **Follow inertial system alignment procedures.** The inertial system alignment procedures for your aircraft must be followed precisely to avoid initialization errors. Once airborne if you have any doubt about the accuracy of your inertial systems and do not have procedures to correct system problems, you should not enter the NAT HLA, unless your aircraft has other operable LRNS that meet HLA navigation performance requirements.
- **Confirm waypoint loading.** Before departure, at least two flight crew members should independently check that the following agree: computer flight plan, ICAO flight plan, track plotted on chart, and if appropriate, the NAT track message. In flight, involve two different sources in the crosschecking, if possible. Do not be so hurried in loading waypoints that mistakes become likely, and always check waypoints against the current ATC clearance. Always be aware that the cleared route may differ from that contained in the filed flight plan. Prior to entering the NAT HLA—ensure that the waypoints programmed into the navigation computer reflect the current flight plan or as amended by ATC ~~oceanic clearance received and not any different previously entered planned or requested route.~~
- **Complete flight progress charts periodically.** Making periodic plots of position on a suitable chart and comparing with current cleared track, greatly helps in the identification of errors before getting too far from track.
- **Use basic DR navigation as a back-up.** Outside Polar Regions, provided that the magnetic course (track) is available on the flight log, a check against the magnetic heading being flown, plus or minus drift, is likely to indicate any gross tracking error.
- **Maintain situational awareness.** Take advantage of every available means, both inside and outside of the aircraft, to ensure you are proceeding according to your ATC clearance. There are often ways in which an overall awareness of directional progress can be maintained; the position of the sun or stars; disposition of contrails; islands or coast-lines which can be seen directly or by using radar; radio nav aids, and so forth. This is obvious and basic piloting, but some of the errors which have occurred could have been prevented if the flight crew had shown more of this type of awareness. **Do not assume.**
- **Advise ATC of any possible system degradation.** If the flight crew suspects that equipment failure may be leading to divergence from cleared track, it is better to advise ATC sooner rather than later.

In conclusion, navigation equipment installations vary greatly between operators; but lessons learned from past mistakes may help to prevent mistakes of a similar nature occurring to others in the future.

CHAPTER 15

THE PREVENTION OF LATERAL DEVIATIONS FROM TRACK

15.1 THE PROBLEM

15.1.1 ~~Lateral deviations continue to occur in the NAT. The vast majority are attributable to flight crew error, following the filed flight plan route rather than the cleared route. Additionally, errors can be attributed to the insertion of incorrect waypoints or misunderstanding of ATC clearances.~~ Experience has shown that many of the lateral deviations in the NAT HLA occur as a result of flight crews programming the navigation system(s) with incorrect waypoint data. These are referred to as Waypoint Insertion Errors. They frequently originate from:

- failure to observe the principles of checking waypoints to be inserted in the navigation systems, against the cleared route;
- failure to load waypoint information correctly; or
- failure to crosscheck on-board navigation systems.

15.1.2 It is important that flight crew double check route amendments received prior to the oceanic entry point and at each waypoint, since failure to do so may result in inadvertent deviation from cleared route.

~~15.1.1~~—————

15.2 THE SOLUTION

15.2.1 Procedures must be used to display and verify the DEGREES and MINUTES loaded into the Flight Management Computer (FMC) for the “un-named” (LAT/LONG) waypoints defining the route contained in the current flight plan or as amended by ATC ~~oceanic clearance~~.

15.2.2 Regardless of FMC waypoint format and entry method, flight crew procedures should be designed to promote strong crew resource management techniques, to prevent opportunities for error occurring as a result of confirmation bias and to generally maintain an attitude of healthy suspicion. Accordingly, the waypoint verification procedures should be conducted as detailed below.

- a) During pre-flight LRNS programming, both flight crew members independently verify the full latitude and longitude coordinates of “un-named” (LAT/LONG) waypoints defining the expected route of flight within oceanic airspace as entered in the FMC.
- b) Upon receipt of an amended route ~~revised oceanic clearance~~ (i.e., one not conforming to the flight planned route), both flight crew members independently verify the full latitude and longitude coordinates of “un-named” (LAT/LONG) waypoints defining the route contained in the amended route ~~revised oceanic clearance~~.
- c) Approaching an oceanic waypoint, one flight crew member should verify the full latitude and longitude coordinates of that waypoint in the FMC, the NEXT and NEXT +1 waypoints, while the other flight crew member crosschecks the latitude and longitude coordinates against the master flight plan ~~oceanic clearance~~.

15.2.3 Lateral deviations from track could be virtually eliminated if all operators/flight crews adhere to approved operating procedures and crosschecking drills. This Manual provides a considerable amount of guidance and advice based on experience gained the hard way, but it is quite impossible to provide specific advice for each of the many variations of aircraft navigation systems.

~~15.2.3~~

15.2.4 Additionally, the following procedures are recommended as being a good basis for NAT HLA operating drills/checks:

- a) Record the initialization position programmed into the navigation computer. This serves two purposes:
 - it establishes the starting point for the navigation computations; and
 - in the event of navigation difficulties it facilitates a diagnosis of the problem.
- b) Ensure that your flight log has adequate space for the ATC cleared track coordinates, and always record them. This part of the flight log then becomes the flight deck Master Document for:
 - read back of clearance;
 - entering the route into the navigation system;
 - plotting the route on your chart.
- c) Plot the cleared route on a chart with a scale suitable for the purpose (e.g. Aerad, Jeppesen, NOAA enroute charts). This allows for a visual check on the reasonableness of the route profile and on its relationship to the OTS, other aircraft tracks/positions, diversion airfields, etc.
- d) Plot your Present Position regularly on your chart.
 - this may seem old-fashioned but, since the present position output cannot normally be interfered with and its calculation is independent of the waypoint data, it is the one output which can be relied upon to detect gross tracking errors. **A position should be checked and preferably plotted approximately 10 minutes after passing each waypoint, and, if circumstances dictate, midway between waypoints. e.g. if one system has failed.**
- e) Check the present, next and next+1 waypoint coordinates as shown on the Master Document against those in the steering CDU before transmitting position reports (in performing these checks review the LRNS stored coordinates in expanded LAT/LONG format (not abbreviated ARINC 424 format).
- f) Check the LRNS indicated magnetic heading and distance to the next waypoint against those listed on the Master Document.

15.2.5 The procedures outlined in this section will detect any incipient gross errors, providing that the recorded/plotted cleared route is the same as that provided by the controlling ATS authority. If there has been a misunderstanding between the flight crew and controller over the actual route to be flown, then the last drill above, together with the subsequent passing of the position report, will allow the ATS authority the opportunity to correct such misunderstanding before a hazardous track deviation can develop. The vast majority of instances of errors occur when the ATC cleared oceanic route segment differs (partly or wholly) from that included in the filed flight plan or that requested by the flight crew. Thorough and diligent checking and crosschecking, by more than one flight crew member, of the waypoints entered into the navigation computer, against the received ATC oceanic clearance would eliminate most of these unnecessary and avoidable errors.

CHAPTER 16

GUIDANCE FOR DISPATCHERS

16.1 GENERAL

16.1.1 The NAT is essentially divided into two distinct areas for flight operation, i.e. the NAT HLA and non-NAT HLA airspace. Operations within the NAT HLA require the user to adhere to very specific operating protocols. Refer to Chapter 1 for a description of NAT airspace.

16.2 REGULATORY REQUIREMENTS AND CONSEQUENTIAL ROUTING LIMITATIONS

State Approvals (NAT HLA /RVSM)

16.2.1 Before planning any operations within the NAT HLA, operators must ensure that the specific State NAT HLA and RVSM approvals are in place. These requirements are addressed in Chapter 1.

16.2.2 Before planning any operations of ADS-B equipped aircraft into airspace where ADS-B operation is required, operators must ensure that the aircraft is approved for such flights. These requirements are addressed in Chapter 1.

Minimum Equipage (Navigation/Altimetry/Communications)

16.2.3 Chapter 1 discusses the minimum navigation equipage requirements for unrestricted flight in the NAT HLA.

16.2.4 The Minimum Aircraft Systems Performance Specifications for RVSM operations are common world-wide standards and are contained in Doc 9574 (*Manual on a 300m (1 000ft) Vertical Separation Minimum between FL 290 and FL 410 inclusive*). They are also detailed in FAA Advisory Circular AC91-85B, and in EASA documentation (refer to paragraph 9.1.3). However, notwithstanding the worldwide nature of RVSM MASPS, it must be recognised, as indicated in Chapter 1, that special provisions apply in the North Atlantic HLA and in consequence all NAT flight crews/operators must **be State approved specifically for NAT RVSM operations**.

16.2.5 Many NAT air/ground ATC communications are still conducted on single side-band HF frequencies. For operations in the NAT region fully functioning HF communications equipment is required when operating outside VHF coverage.

Special non-compliance routings

16.2.6 Aircraft not equipped with two functioning long range navigation systems may only fly through the NAT HLA via special designated routes. This is discussed in Chapter 1. Details of these special routes are contained in Chapter 3.

16.2.7 Aircraft not approved for NAT HLA /RVSM operations may climb and descend through NAT HLA/RVSM airspace and in very limited, specified circumstances a NAT HLA approved aircraft that is not approved for RVSM operations may be granted permission to flight plan and operate through the NAT HLA at RVSM levels. (See Chapter 1).

16.2.8 Routings that may be flight planned and operated through the NAT HLA by aircraft without functioning HF communications equipment may be limited by the State of Registry of the operator or by the ATC provider. This is discussed in more detail in Chapter 4.

16.3 ROUTE PLANNING

Route definition conventions

16.3.1 The letter ‘X’ must be included in Item 10 of the ICAO FPL to show that the aircraft satisfies NAT HLA lateral navigation performance requirements.

16.3.2 Outside ATS Surveillance coverage ATC depends upon aircraft supplied position reports for flight progress information. In order to provide separation assurance, ATC requires updates on the progress of flights at no more than hourly intervals. It has been determined that this criteria is met over a wide range of ground speeds if eastbound or westbound NAT flights report on passing each ten degrees of longitude. The criteria is also met by northbound or southbound flights reporting on passing each five degrees of latitude. In consequence, all flights which will generally route in an eastbound or westbound direction should normally be flight planned by specifying significant points at whole or half degrees of latitude at each crossed ten degrees of longitude (20°W, 30°W, 40°W etc.); and all generally northbound or southbound flights should normally be flight planned so that specified parallels of latitude spaced at five degree intervals (65°N, 60°N, 55°N etc.) are crossed at whole degrees of longitude. See Chapter 4.

OTS – Rationale, Structure, CDM & NAT Track Message

16.3.3 As a result of passenger demand, time zone differences and airport noise restrictions, much of the North Atlantic (NAT) air traffic contributes to two major alternating flows: a westbound flow departing Europe in the morning, and an eastbound flow departing North America in the evening. The effect of these flows is to concentrate most of the traffic uni-directionally, with peak westbound traffic crossing the 30W longitude between 1130 UTC and 1900 UTC and peak eastbound traffic crossing the 30W longitude between 0100 UTC and 0800 UTC.

16.3.4 The NAT HLA is consequently congested at peak hours and in order to provide the best service to the bulk of the traffic, a system of organised tracks is constructed to accommodate as many flights as possible within the major flows, on or close to their minimum time tracks and altitude profiles. Due to the dynamic nature of the NAT weather patterns, including the presence of jet streams, consecutive eastbound and westbound minimum time tracks are rarely identical. The creation of a different organised track system is therefore necessary for each of the major flows. Separate OTS structures are therefore published each day for eastbound and westbound flows.

16.3.5 The construction of these OTS structures is accomplished through a formal process of cooperation between ATC and the operators, known as the Preferred Route Message system. Details of this process are explained in Chapter 2.

16.3.6 The resulting OTS structures are published (twice each day) in the form of a “NAT Track Message” via the AFTN. This Message and its correct interpretation are detailed in Chapter 2.

16.3.7 If orientation/location of the published OTS structure appear to be appropriate for the origin and destination of a particular flight, then the operator is encouraged to flight plan the NAT route segment via one of the published tracks.

Random Routings

16.3.8 Use of OTS tracks is not mandatory. The orientation/location of the published OTS may not be appropriate for the origin and/or destination of a particular flight. A NAT route segment that does not follow a published OTS track, in its entirety, is known as a “Random Route”. Aircraft may fly on random routes which remain clear of the OTS or may fly on any route that joins or leaves an outer track of the OTS. There is also nothing to prevent an operator from planning a route which crosses the OTS. However, in this case, operators must be aware that while ATC will make every effort to clear random traffic across the OTS at published levels, re-routes or changes in flight level from those planned may be necessary during most of the OTS peak traffic periods.

16.3.9 Outside of the OTS periods operators may flight plan any random routing. During the hour prior to each OTS period some additional restrictions apply. These are detailed in Chapter 4.

Adjacent Airspace, Route Structures, Links & Constraints

16.3.10 A large majority of flights through the NAT HLA enter and/or leave it via the North American region. To facilitate these flows of traffic, various transitional airspaces and linking route structures have been established in and through the adjacent NAM region. These are described in Chapter 3 above. Of particular significance is the NAR structure. Details of these routes and associated procedures are contained in the AIP of the relevant State authorities and/or via their websites. The necessary Internet Links to obtain this information are listed in Chapter 3. Account must be taken of these route structures in planning any flight through the NAT region that starts or ends in the North American region.

16.4 ALTITUDE & SPEED

Flight Levels

16.4.1 During the OTS Periods (eastbound 0100-0800 UTC, westbound 1130-1900 UTC) aircraft intending to follow an OTS track for its entire length may plan at any of the levels as published for that track on the relevant current daily OTS Message. Aircraft following a “random route” (see above definition) or flying outside the OTS time periods, may plan any flight level(s) irrespective of direction (i.e. there is no need in the NAT HLA to plan in accordance with the ICAO Annex 2 Table of Cruising Levels). Planners should note however that the NAT provider State AIPs, both during the OTS time periods and outside them, reserve some appropriate direction levels for use by the opposite direction traffic flows that then predominate. The current usage allocation of flight levels in the NAT HLA is published in the UK and Canadian AIPs and shown at Attachment 5 below as the “North Atlantic Flight Level Allocation Scheme” (NAT FLAS). Hence, flight crews and planners should always consult the current AIPs and any supporting NOTAMs when flight planning random routes through the NAT HLA. If a flight is expected to be level critical, operators should contact the initial OACG prior to filing the flight plan to determine the likely availability of specific flight levels.

Mach Number

16.4.2 In the NAT HLA the Mach number technique is used to manage longitudinal separations between aircraft following the same track. With the implementation of OWAFS, operators will have more efficiencies in the NAT. ~~Chapter 7 provides more detailed information about the application of Mach number techniques.~~ Chapter 4 provides details about ATC flight planning (ICAO FPL) requirements. Operators can flight plan cost index (ECON) provided that the planned true Mach number for any portion of the flight within the NAT is specified in Item 15 of the ICAO FPL.

16.5 FPL COMPLETION

16.5.1 It is important that all of the foregoing conventions and protocols are adhered to when planning a flight through the NAT HLA. Guidance on the flight planning requirements for specific routes is given in Chapter 4. Correct completion and addressing of the filed flight plan is extremely important. Non-observance of any of the NAT HLA planning principles, or even simple syntax errors in the filed FPL, can lead to delays in data processing and/or to the subsequent issuing of clearances to the flights concerned. Despite the growing use of automated flight planning systems a significant proportion of flight plans submitted in respect of flights through the North Atlantic region continue to contain errors. In some instances these errors are such that the flight plan is rejected and the operator is required to re-submit a corrected version. New and/or infrequent North Atlantic operators are earnestly recommended to make diligent reference to this document. Furthermore it should be noted that a free text editor is available on the EUROCONTROL website that can validate any proposed ICAO flight plan before filing. It will advise if a flight plan is acceptable for routes, altitudes and transitions. If the flight plan would be rejected, this editor will describe what is wrong, thereby allowing the operator to repair it before filing.

16.5.2 The guidance in the paragraphs that follow here refer to the ICAO model flight plan form as described in Chapter 4.4 of the *Procedures for Air Navigation Services – Air Traffic Management* (PANS-ATM, Doc 4444).

16.5.3 If filing via an OTS track, particularly during peak traffic periods, it must be appreciated that ATC may not be able to clear the aircraft as planned. ATC will, if possible, first offer a clearance on the planned track but at a different flight level. If, however, no reasonable alternative level is available, or if the offered flight level is unacceptable to the flight crew, then ATC will clear the aircraft via another route/OTS track.

16.5.4 In order to signify that a flight is approved to operate in the NAT HLA, the letter ‘X’ shall be inserted, in addition to the letter ‘S’, within Item 10 of the flight plan. A ‘W’ must also be included in Item 10 to indicate that the flight is approved for RVSM operations.

16.5.5 The NAT Data Link Mandate (DLM) requires aircraft to be equipped with, and operating, CPDLC and ADS-C in the NAT region from FL 290 to FL 410 inclusive. The ICAO flight plan should indicate data link equipage as follows:

- Item 10 (Equipment)
 - “J5” (CPDLC SATCOM FANS 1/A Inmarsat)
 - “J7” (CPDLC SATCOM FANS 1/A Iridium)
 - “D1” (ADS-C)

16.5.6 Approval for RNAV 10 (RNP 10), RNP 4, RCP 240 and RSP 180 is required in order to benefit from the reduced lateral separations employed in the NAT Region. Any NAT HLA aircraft should ensure that its PBN and PBCS approval status is included in the ICAO flight plan as follows:

- Item 10 (Equipment)
 - “R” (PBN approved)
 - “P2” (CPDLC RCP 240)
- Item 18 (Other Information)
 - “PBN/A1” (RNAV 10 (RNP 10) approval)
 - “PBN/L1” (RNP 4 approval)
 - “SUR/RSP180” (ADS-C RSP 180)

16.5.7 For flights planning to operate through specified ADS-B service areas and wishing to benefit from that service the appropriate equipage and authorisation for ADS-B use should be indicated by filing the B1 or B2 descriptor as appropriate in Item 10b of the flight plan.

16.6 DISPATCH FUNCTIONS

General

16.6.1 All US FAR Part 121 carriers (domestic and flag operators) and many non-US carriers employ aircraft dispatchers or flight operations officers (hereafter referred to as dispatchers) to provide flight planning, flight watch and/or flight monitoring services. Most of the information presented here is included in other

chapters of this manual but since this chapter deals with issues primarily important to dispatchers, the information is sometimes repeated here for emphasis and additional guidance.

16.6.2 Nothing in this chapter should be construed as to take precedence over appropriate government regulations or individual company policy.

16.6.3 The dispatcher is responsible for providing the pilot-in-command with information necessary to conduct a flight safely and legally under appropriate State civil aviation authority regulatory requirements. ICAO Annex 6 defines the requirement for an en route aircraft, but when operating under US FAR Part 121, and certain other State civil aviation rules, the dispatcher shares responsibility for exercising operational control with the pilot-in-command of the flight.

Flight Planning

Route Planning

16.6.4 The daily published OTS tracks provide optimal NAT segment routings for about half of all the flights between Europe and North America. For many other flights the location of the OTS structure on the day may constrain available random routings. Consequently, the development of a successful NAT flight plan almost always requires consideration of the detail of the relevant OTS structure. Operators can influence the OTS construction process by providing Preferred Route Messages and participating in this collaborative decision making (see Chapter 2).

16.6.5 The eastbound and westbound OTS structures are the subject of separate “NAT Track Messages” published via the AFTN. A detailed description of the NAT track message is provided in Chapter 2 above.

Planning on an OTS Track

16.6.6 Dispatchers must pay particular attention to defined coordinates, domestic entry and exit routings, allowable altitudes, track message identification number (TMI) and any other information included in the remarks section. They must also take care to be apprised of any amendments or corrections that may be subsequently issued. When such amendments are issued the TMI is appended with an alpha suffix (e.g. “123A”). Since NAT track messages are often manually entered into company flight planning systems, dispatchers should verify that all waypoints on flight plans comply with the current OTS message.

- The NAT Data Link Mandate (DLM) requires aircraft to be equipped with, and operating, CPDLC and ADS-C in the NAT region. Currently, the mandate incorporates FL 290 to FL 410 inclusive. For other details, see 1.8 **DATA LINK REQUIREMENTS** in Chapter 1.
- It is important for dispatchers to understand that transition routes specified in the NAT track message are as important as the tracks themselves. The transition route systems in North America – the North American Routes (NARs) and the US East Coast routes are described in Chapter 3. Dispatchers should comply with any specified transition route requirements in all regions. Failure to comply may result in rejected flight plans, lengthy delays and operating penalties such as in-flight re-routes and/or the flight not receiving requested altitudes.
- If (and only if) the flight is planned to operate along the entire length of one of the organized tracks, from oceanic entry point to oceanic exit point, as detailed in the NAT track message, should the intended track be defined in Item 15 of the ICAO flight plan using the abbreviation “NAT” followed by the code letter assigned to the track.
- The planned Mach number and flight level at the commencement point of the track should be specified at the organised track commencement point.
- Each point at which a change of Mach number or flight level is requested must be specified as geographical coordinates in latitude and longitude or as a “named” waypoint.

Planning a Random Route

16.6.7 A random route is any route that is not planned to operate along the entire length of the organised track from oceanic entry point to oceanic exit point. (See Chapter 4 for more information on filing a random route)

16.6.8 Random routes can be planned anywhere within the NAT HLA but the dispatcher should sensibly avoid those routes that conflict directly with the OTS. Examples of sensibly planned random routes include routes that:

- Remain clear of the OTS by at least 1 degree;
- Leave or join outer tracks of the OTS;
- Are above or below the OTS flight level stratum;
- Are planned on track coordinates before/after valid OTS times.

16.6.9 Care should be taken when planning random routes and it would be prudent to plan sufficient fuel to allow for potential re-routes or non-optimum altitudes. The following examples illustrate particular issues to consider.

Examples:

- Flights planned to initially operate below the NAT HLA/RVSM flight levels at FL 280 on routes that pass under the OTS should not plan to climb until 1 degree clear of the OTS.
- Planning to join an outer track is allowable. However, the dispatcher should be aware that the clearance may not be given due to the adverse impact on track capacity. Leaving an outer track is seldom a problem as long as at least 1 degree of separation is subsequently maintained from other tracks.
- Random routes paralleling the OTS 1 or 2 degrees north or south can be as busy as the OTS itself.

16.6.10 Dispatchers planning NAT flights originating in south Florida or the Caribbean should consider the effect of traffic from South America operating north eastwards to the USA, when deciding on flight levels. Although the dispatcher should plan optimum flight levels, adequate fuel should be carried so that a NAT flight can accept a lower altitude (FL 260 or FL 280) until east of 70°W.

16.6.11 Any flight planning to leave an OTS track after the oceanic entry point must be treated as a random route. The track letter must not be used to abbreviate any route segment description.

16.6.12 Flights operated against the peak traffic flows should plan to avoid the opposite direction OTS. Even if operating outside of the validity periods of the OTS some restrictions on routings may apply. These can affect Eastbound traffic crossing 30°W at 1030 UTC or later; and Westbound traffic crossing 30°W at 2400 UTC and later (See Chapter 4). If in any doubt it would be prudent to co-ordinate any such routes directly with appropriate OACs.

Flight Levels

16.6.13 Flight dispatchers should be aware of the North Atlantic FLAS. This is subject to change and the current FLAS is published in the UK and Canadian AIPs and shown in Attachment 5.

16.6.14 Chapter 2 and Chapter 4 contain details on RVSM flight level guidance. Dispatchers should be aware that some “opposite direction” levels, which may be flight planned for the NAT segment of a flight, may not be similarly allowed in adjacent domestic areas. Guidance for RVSM flight procedures in the NAT HLA can be found in Chapter 9.

16.6.15 RVSM allows more flight levels for planning and therefore provides better opportunity to fly closer to an optimum route/profile. It is acceptable to plan and/or request climbs within the OTS but because of traffic volumes and the difference in aircraft performance it is wise to plan conservatively. Climbs on random routes that are totally north or south of the track system are more readily approved. Flight crews should be encouraged to request a climb as aircraft decreasing weight permits.

Communications

16.6.16 Operations in the NAT outside VHF coverage require the carriage of two long range communication systems, one of which must be HF. SATVOICE and CPDLC (appropriate to route of flight) may satisfy the requirement of the second-long range communication system.

16.6.17 Many operators now use ADS-C (Automatic Dependent Surveillance Contract) and CPDLC (Controller Pilot Data Link Communications) for oceanic position reporting and clearance updating. These features improve position reporting speed and accuracy. They also reduce the chance of errors. If the aircraft is equipped with FANS-1 or FANS-A it should be utilised during the NAT segment of the flight and the appropriate descriptor should be inserted into the filed flight plan.

16.6.18 SATVOICE can be used as a supplement to HF communications throughout the NAT region (see Chapter 6). If the aircraft is SATVOICE equipped, the SATVOICE numbers (both radio stations and ATC) for the areas that the aircraft is planning to fly through, should be made available for the flight crew.

MEL Compliance

16.6.19 Dispatchers planning flights within the NAT HLA must ensure that the allocated aircraft has the minimum required navigation, communications and altitude alerting/reporting equipment on board. Flight procedures for minimum equipment and standards can be found in Chapter 8 and Chapter 11 of this Manual. Particular attention must be paid to MEL Items that may affect the aircraft. Be aware that the company MEL or Operations Specifications may be more restrictive than general NAT HLA requirements.

16.6.20 Even though a flight that suffers a failure of a system (or component) once enroute, is not directly mandated to abide by MEL restrictions, it is important that any failures that will affect either NAT HLA or RVSM operations be promptly advised to, and closely coordinated with, the appropriate ATS facility.

16.6.21 An aircraft MEL (navigation, communications or altitude alerting/reporting system) may prohibit operating in the NAT HLA. Dispatchers may need to modify the flight plan and intended route of flight. Enroute failures can also affect what ATC will accept regardless of what was flight planned or filed. This situation could occur before departure or once enroute but before entering the NAT HLA. Options that should be considered by the dispatcher are:

- operate above or below the NAT HLA;
- fly on special routes developed for aircraft equipped with limited LRNS equipment – see Chapter 1, Chapter 3, and Chapter 12.

ETOPS/EDTO

16.6.22 A large portion of NAT crossings are ETOPS operations. ETOPS rules require that one or more suitable enroute alternate airports are named prior to dispatch and then monitored while aircraft are enroute. Enroute alternate airports in the NAT region are limited to those in the Azores, Bermuda, Greenland and Iceland. In determining ETOPS alternate minima, the dispatcher must consider weather conditions, airport conditions (in addition to simple runway lengths), navigation approach aids, and the availability of ATS and ARFF facilities.

Note: *The term EDTO (Extended Diversion Time Operations) is now used throughout Annex 6 Part I. Here it states that EDTO provisions for aeroplanes with two turbine engines do not differ from the previous*

provisions for extended range operations by aeroplanes with two turbine engines (ETOPS). Therefore, EDTO may be referred to as ETOPS in some documents.

16.6.23 Recent changes have begun to attach additional conditions to 3-4 engine aircraft long range operations. In situations requiring the aircraft to operate long distances from adequate enroute airports, more stringent planning conditions may apply. Guidance can be obtained from appropriate government and industry websites.

Collaborative Decision Making (CDM) Tools

16.6.24 It would not be practical to list all available CDM tools and available websites here. Refer to the bibliography at the end of this manual for a more complete list. The following are some of the most important sites for managing the daily operation of flights.

- Nav Canada TDA (Traffic Density Analyser) Website

This tool was designed to introduce Collaborative Decision Making during the NAT OTS design phase. The OTS are posted in advance of formal publication so the user community can comment on whether or not they agree with the proposed OTS. A USER ID and password can be obtained from NAV CANADA. Track loading information is available and it is possible to view all filed flight plans on the OTS and random routes.

- EUROCONTROL Website – Network Manager function

This website contains a wealth of tactical information regarding restrictions, delays, weather problems, military activity, CDRs, preferred routing schemes and transition routes.

<https://www.eurocontrol.int/network-operations>

There is a free text editor that will validate ICAO flight plan before filing and advise if the flight plan is acceptable for routes, altitudes and transitions. If the flight plan would be rejected, this editor will describe what is wrong, allowing the dispatcher to repair it before filing the ICAO flight plan.

- FAA Websites

These websites contain complete FAR section, Airport information, airport capacity (real time) advisories with airport delays and status, NOTAMS, weather Information, RVSM and statistical data. They include www.faa.gov and <https://nasstatus.faa.gov>.

Flight Monitoring

Oceanic-ATC Clearances

~~16.6.25 Oceanic clearances will be discontinued in the NAT Region. This is expected to take place in March 2024. Refer to Chapter 5 for details. The flight crew can obtain oceanic clearances by GP, VHF, HF, DCPC, or data link. Chapter 5 in this manual can be referenced for complete oceanic clearance requirements. Be aware that for some airports located close to oceanic boundaries oceanic clearances may be obtained before departure. Indeed on the east side of the NAT this will apply to departures from all Irish airfields, all UK airfields west of 2 degrees 30 minutes West and all French Airfields west of 0 degrees longitude. Flights leaving airports in Iceland, Faeroes, or Greenland will receive oceanic clearances prior to departure.~~

16.6.26 It is important for dispatchers to verify the contents of any the oceanic re-clearances and check it against the filed route. If the flight has received a re-route or a different altitude the Dispatcher may provide the flight with re-analysis data for fuel consumption along the revised route.

Transponder

16.6.27 16.6.26 All aircraft operating as IFR flights in the NAT region shall be equipped with a pressure-altitude reporting SSR transponder (see Chapter 10).

Re-Routes

~~16.6.28 When traffic exceeds track capacity, ATS providers may not be able to accommodate a flight's filed altitude or routing. A different flight level on the planned route will be offered as the first option. If this is not possible, ATC will offer an alternative route. On an eastbound flight the flight crew should anticipate a preferred route within the domestic route structure appropriate to the oceanic exit point of the re-route. For westbound flights into Canada, ATC will normally attempt to route the flight back to its original route unless the flight crew requests a new domestic routing.~~

En route Contingencies

~~16.6.29~~ 16.6.27 Dispatchers must also be aware of special procedures for In-Flight Contingencies as published in Chapter 13 of this manual. They include procedures for use in the event that the aircraft is unable to maintain assigned altitude for weather, turbulence, aircraft performance or maintenance problems or loss of pressurization. The general concept of the in-flight contingency procedures is to parallel offset from the assigned track by 5 NM and descend below FL 290; or once on the 5 NM parallel offset, establish a 150 m (500 ft) vertical offset (or 300 m (1000 ft) vertical offset if above FL 410) from those flight levels normally used, and proceed as required by the operational situation.

~~16.6.30~~ 16.6.28 Procedures for loss of communications and HF failure are contained in Chapter 6.

Dispatcher/pilot considerations for en-route diversions

~~16.6.31~~ 16.6.29 Pilots and dispatchers should collaborate, when able, regarding where the flight diverts based on the nature of the en-route contingency and the viability of the otherwise adequate airports available to assure the airport is actually suitable for the diversion.

Dispatcher guidance for NAT RVSM operations.**References**

~~16.6.32~~ 16.6.30 The FAA Advisory Circular AC91-85() was developed by ICAO sponsored international working groups, to provide guidance on airworthiness and operations programmes for RVSM. ICAO has recommended that State CAA's use of AC91-85() or an equivalent State document for approval of aircraft and operators to conduct RVSM operations. Appendices 4 and 5 of AC91-85() contain practices and procedures for flight crews and dispatchers involved in RVSM operations. This particular dispatcher guidance, available at https://www.faa.gov/regulations_policies/advisory_circulars/index.cfm/go/document.information/documentID/1035328 was developed using those appendices as the reference.

Flight Planning**NAT RVSM Airspace**

This is defined as any airspace between FL 290 - FL 410 inclusive where 1,000 ft vertical separation is applied.

Limits of Operational Authorisation

At the flight planning stage, the dispatcher is responsible for selecting and filing a route that is consistent with the carrier's operational authorisation (e.g. Operations Specifications), taking account of all route, aircraft and weather considerations, flight crew constraints and other limitations.

MEL

When planning and filing to fly within NAT RVSM airspace, the dispatcher must ensure that the route meets the requirements of the paragraph above and that the aircraft also meets certain MEL provisions.

Maintenance Flights

NAT ATS providers have established a policy to enable an aircraft that is temporarily non-RVSM compliant to fly in NAT RVSM airspace for the purpose of positioning the aircraft at a maintenance facility (see Chapter 1). This policy may vary and requires prior co-ordination with appropriate ATC centres so that 2,000 ft separation can be applied between the non-compliant aircraft and other aircraft. These requests must be co-ordinated with the initial OACG. The dispatcher must be aware of the policy for such operations, as published in NOTAMS, AIPs and other appropriate documents. States of Registry also vary in their policies on Maintenance Ferry Flights. Dispatchers should ensure that they fully understand any additional restrictions or limitations that may be imposed by their State of Registry.

Delivery and Humanitarian Flights

ATS providers allow limited operations by aircraft not approved for RVSM but which are engaged on delivery or humanitarian flights. For such flights, the dispatcher must also comply with the policies published in State AIPs, NOTAMS and other appropriate documents. Co-ordinate directly with appropriate ATC facilities and the aircraft's State of Registry.

*En Route Equipage Failures***Prior to entering NAT RVSM airspace**

The following equipment is required to be operational:

- i) two independent primary altimetry systems;
- ii) one automatic altitude control system; and
- iii) one altitude alerting device.

If any required equipment fails prior to entering NAT RVSM airspace, the pilot-in-command will notify ATCS and obtain an amended ~~new oceanic~~ clearance to fly above or below NAT RVSM airspace. The flight crew should accept the new clearance contingent upon review by the dispatcher. Dispatcher actions are based on the options, identified as OPTION 1 to OPTION 3, outlined later in this chapter.

After entering NAT RVSM airspace.

The appropriate State RVSM guidance material provides for flight crew and controller actions if RVSM required aircraft equipment fails after entry into NAT RVSM airspace, or the aircraft encounters turbulence that affects the aircraft's ability to maintain its level. Should any required RVSM equipment fail, or turbulence greater than moderate be encountered, then the pilot-in-command is expected to notify ATS of the intended course of action.

Pilot-in-command options are to:

- (1) continue with the original clearance if ATC can apply another form of aircraft separation (i.e. lateral, longitudinal or 2,000 ft vertical separation); or
- (2) request ATC clearance to climb above or descend below NAT RVSM airspace if ATC cannot provide adequate separation from other traffic; or
- (3) execute contingency procedures to offset from track and flight level if ATC cannot provide adequate separation from other aircraft.

Dispatcher Actions

OPTION (1) – if the pilot-in-command elects for Option (1) then no Dispatcher's action is required.

OPTION (2) – if the pilot-in-command elects to follow Option (2) then the pilot-in-command should contact the dispatcher who will evaluate the clearance with due consideration for the effect on fuel consumption, time enroute, any MEL/CDL issues and/or other operational factors. The dispatcher shall make a recommendation to the pilot-in command on whether to continue on to the destination, or the dispatcher will amend the release to allow the aircraft to proceed to an intermediate airport or return back to the departure airport. The flight crew will then either confirm the new clearance with ATC or request a new clearance to another airport. The final decision rests with the pilot-in command.

OPTION (3) – if the pilot-in-command elects to follow Option (3), then when time permits, the pilot-in command will advise the dispatcher of any offset made from track or/and flight level. No action by the dispatcher is required since the effect on performance should be minimal.

Checklist for Aircraft Dispatch into NAT RVSM Airspace.

The dispatcher must:

- i) Determine the minimum and maximum flight levels plus the horizontal boundaries of NAT RVSM airspace;
- ii) Verify that the airframe is RVSM approved;
- iii) Determine if any operating restrictions (e.g. speed or altitude limitations) apply to the aircraft for RVSM operation;
- iv) Check the MEL for system requirements related to RVSM;
- v) Check Item 10 (Equipment) of the ICAO ATS flight plan to ensure that it correctly reflects RVSM approval status. For North Atlantic operation, insertion of letter "W" indicates that the operator and aircraft are RVSM approved;
- vi) Review reported and forecast weather enroute, with specific emphasis on conditions such as turbulence, which may affect an aircraft's ability to maintain its level; and
- vii) Determine if TCAS/ACAS is operational.

Flight of non-RVSM compliant aircraft

The dispatcher must comply with any ATS requirements regarding flight of non-RVSM compliant aircraft for maintenance, aircraft delivery or humanitarian flights (See Chapter 1).

CHAPTER 17

FLIGHT OPERATIONS BELOW THE NAT HLA

17.1 INTRODUCTION

17.1.1 This guidance is meant to assist international general aviation (IGA) flight crews with flight planning and operations across the North Atlantic. It is not intended to be a detailed listing of procedures or air regulations of the various States that provide air traffic service in the North Atlantic (NAT) region, and does not in any way replace the information contained in various national Aeronautical Information Publications (AIP's). Flight crews must consult relevant AIPs and Notices to Airmen (NOTAMs) when planning the flight and prior to departure.

17.2 ENVIRONMENTAL CONSIDERATIONS

Below FL 290

17.2.1 For flights at FL 290 and below, the North Atlantic weather can be far from benign. Extreme seasonal weather variations and rapidly changing weather conditions including severe icing, severe turbulence, and heavy precipitation are common, particularly in winter. Changes are often so rapid that they are difficult, if not impossible, to forecast. These harsh weather conditions, along with the rugged terrain and sparsely populated areas, make preparation, including route and emergency situation planning, important components for a successful flight. Attachment 7 provides further details of the general North Atlantic climate and the weather conditions and associated operational issues in particular areas.

17.3 NORTH ATLANTIC FLIGHT OPERATIONS

17.3.1 Most of the airspace in oceanic FIRs/OCACTAs is high seas airspace within which the Rules of the Air (ICAO Annex 2) apply without exception. The majority of the airspace is also controlled airspace, and instrument flight rules (IFR) apply when above FL 055.

17.3.2 This controlled airspace includes:

1. New York Oceanic East, Gander Oceanic, Shanwick Oceanic, Santa Maria Oceanic, Reykjavik Oceanic, GOTA and NOTA, and Bodø;
2. Bodø Oceanic above FL 195 and when operating more than 100 NM seaward from the shoreline;
3. Nuuk FIR when operating above FL 195;
4. Faroes Islands above 7500 ft;
5. Jan Mayen 2000 ft above ground level.

17.3.3 Canada, Denmark and Iceland require that the flight crew and aircraft be IFR rated for trans-oceanic flight, regardless of the altitude to be flown. It is highly unlikely that the flight will remain VMC when transiting the Atlantic.

17.4 REQUIREMENTS

17.4.1 Regulatory requirements are established by all States providing Air Traffic Services in the NAT. It is the responsibility of all operators to comply with these requirements and any others that may be separately imposed by the State of Registry of the aircraft or the State of the operator. Most eastbound trans-Atlantic flights by light aircraft commence their oceanic crossing from Canada. Transport Canada Aviation

Regulations (CARs) detail requirements for all flights beginning their trans-Atlantic crossing from Canada. Flights entering the NAT from any ANSP must review requirements as listed in each State AIP.

17.5 OPERATIONAL CONSIDERATIONS

Sparsely Settled Areas

17.5.1 The potential dangers associated with operating in sparsely settled areas should not be underestimated. The fact is that in sparsely settled areas, aircraft operations require special considerations. In this area radio aids to navigation, weather information, fuel supplies, aircraft servicing facilities, accommodations and food are usually limited and often non-existent.

17.5.2 In addition to the regulations concerning flight crew qualifications and experience, it is recommended that the flight crew have:

- a) flight experience with significant cross country, night and actual instrument time;
- b) experience in using the same navigational equipment that will be used to cross the Atlantic; and
- c) experience in the same type of aircraft that will be used to cross the Atlantic.

Icing Conditions

17.5.3 Freezing levels at or near the surface can be expected at any time of year over the NAT region. The dangers of airframe and/or engine icing must always be taken into account, so flight crews/planners should be prepared to wait for favourable conditions. If the flight is to be conducted when there is a threat of icing, keep clear of clouds, unless the aircraft is certified for operations in icing conditions. Remember, as a general rule, the freezing level should be 3,000 feet AGL or higher to allow for ridding the aircraft of ice, if it becomes necessary.

17.6 FLIGHT PLANNING

17.6.1 It is rare to be able to conduct a flight across the Atlantic and remain in visual meteorological conditions (VMC) for the entire flight. VFR flight in this airspace deprives the flight crew of the flexibility of using the altitudes above FL 055. The higher altitudes may enable a smoother flight, free of precipitation, icing or turbulence

17.6.2 IFR Flights (i.e. those operating in the NAT region at FL 060 or above), or VFR Flights intending to cross an international border, need to file an ICAO flight plan. Detailed instructions for completion of the ICAO flight plan are found in the PANS-ATM (Doc 4444), Appendix 2; and in State AIPs. Chapter 4 also provides necessary guidance, with particular emphasis on NAT flight requirements.

17.6.3 Generally all eastbound or westbound aircraft in the NAT region must flight plan so that specified tens of degrees of longitude (60°W, 50°W, 40°W, 30°W, etc.) as applicable, are crossed at whole or half degrees of latitude. Generally northbound or southbound aircraft must flight plan so that specified parallels of latitude spaced at five degree intervals (65°N, 60°N, 55°N, 50°N, etc.) are crossed at whole degrees of longitude. More detailed information can be found in NAT provider State AIPs.

17.6.4 Plan the flight using current aeronautical charts, the latest edition of pertinent flight supplements, and NOTAMs, both domestic and international.

Note: *Flight crews should familiarize themselves with the nature of the terrain over which the flight is to be conducted. If unfamiliar with the area, the flight crew should consult the aviation authority officials at appropriate local aviation field offices before departure. Such officials, as well as flight crews and operators, can provide a great deal of useful advice, especially on the ever-changing supply situation, the location and condition of possible emergency landing strips, potential hazards, and enroute*

weather conditions. Pre-flight planning must ensure the availability of fuel, food, and services that may be required at intermediate stops and at destination.

17.6.5 Planning a trans-Atlantic flight for the summertime will allow the flight crew/operator to take advantage of the most favourable conditions. Not only are the ground (and water) temperatures less menacing, but also the amount of available daylight is considerably greater.

17.6.6 Depth perception is poor at night. North of 60°N Latitude, which includes the most common trans-Atlantic routes flown by general aviation aircraft, there are only about 4 hours of daylight during December. To this is added an additional complication: VFR flights at night are prohibited in Greenland. Given also the increased possibility of storms during the winter it is earnestly recommended that flight crews plan to make trans-Atlantic flights preferably during the summer months.

17.7 PHYSIOLOGICAL FACTORS

17.7.1 Crossing the North Atlantic in a general aviation aircraft is a long and physically demanding task. Provisions must be made to eat, drink, and take care of all necessary bodily functions.

17.8 CLEARANCES

17.8.1 All flights entering planned at or above FL 055 in OCAsoceanic CTAs (outside of southern Greenland) are required to have obtain an IFR clearance prior to entering the NAT. When transitioning from uncontrolled airspace into controlled airspace, an IFR clearance must be obtained before entering controlled airspace.

~~Note: The airspace over Greenland above FL 195 is controlled by Gander OACC south of 63°30'N and Reykjavik OACC north of 63°30'N.~~

17.8.2 When operating on an IFR clearance, any change of altitude requires re-clearance from ATC. Clearances for VMC climb or descent will not be granted. Changes in true airspeed must be coordinated. Review specific AIPs for details. Weather deviations of a mileage that exceeds the limits outlined in the Strategic Lateral Offset Procedure (SLOP) i.e. 2 NM right of track, requires a re-clearance from ATC. If a flight crew cannot obtain a clearance in a timely manner and needs to execute pilot-in-command authority for safety of flight, they shall so inform ATC of the maneuver as soon as practicable.

17.8.3 Obtaining a Clearance

17.8.3 Flight crews are required to obtain a clearance from the ATS unit responsible for their area of operation prior to entering controlled airspace and to follow the procedures specified in appropriate AIPs. Where possible, clearance to enter controlled airspace should be obtained prior to take-off, as communication problems are often encountered at low altitudes.

~~Canada—~~

~~Oceanic clearances for eastbound IGA NAT flights, departing from many of the airports in Eastern Canada, are obtained from the control tower or the flight service station at the aerodrome of departure prior to departure. Eastbound IGA NAT over flights may obtain their oceanic clearance directly from Gander ACC, Moncton ACC, Montreal ACC, through a flight service station, or from Gander Clearance Delivery.~~

~~United Kingdom/Ireland—~~

~~At some airports situated close to oceanic boundaries, the oceanic clearance can be obtained before departure e.g. Prestwick, Shannon, Glasgow, Dublin. Westbound aircraft operating within the UK FIR should request oceanic clearance from Shanwick Oceanic on VHF at least 30 minutes before point of entry. Aircraft unable to get clearance on VHF should request clearance on NARTEL HF (North Atlantic Enroute HF RTL~~

Network). Aircraft unable to contact Shanwick, as detailed above, should request the ATC authority for the airspace in which they are operating to relay their request for oceanic clearance to Shanwick. Flights planned to enter the Reykjavik OCA from the Scottish FIR east of 10°W, should request oceanic clearance from Reykjavik via Iceland Radio or data link.

United States—

~~Prior to entering oceanic airspace you must receive a specific oceanic clearance, detailing the oceanic entry point, route, landfall (or oceanic exit point), and airways to destination. The routing portion of the oceanic clearance shall be considered to be the routing received in the clearance at the originating aerodrome prior to takeoff. The final altitude, and if required, speed assignment, shall be the last assigned clearance issued by ATC prior to progressing the Oceanic entry fix. If you do not receive an oceanic clearance approaching the oceanic entry fix, REQUEST ONE.~~

Norway—

~~Flights planning to enter Bodo Oceanic should request oceanic clearance from Bodo on VHF or via data link. Flights planning to enter Reykjavik Oceanic at or south of 63N000W (ISVIC), should request oceanic clearance from Iceland Radio or via data link.~~

Portugal—

~~Flights departing from Azores Islands will receive the oceanic clearance in a three-step process. The appropriate Tower must be informed of the intended flight level for oceanic crossing and will issue an initial flight level clearance. After departure, Santa Maria Radar will assure the climb to the approved final level. The pilot will only receive the oceanic route and speed clearance later on, usually through Santa Maria Radio on HF.~~

Departing aerodromes within the NAT Region—

~~Flights departing aerodromes within the NAT region should request oceanic clearance from the tower/AFIS serving the aerodrome before departure.~~

17.9 NAVIGATION

17.9.1 Navigation in the North Atlantic, or in any oceanic area for that matter, is considerably more difficult than over land. There are no landmarks, and short range navigational aids (VOR/NDB) are few and far between. Aircraft must be equipped with some type of Long Range Navigation (LRNS) equipment. (See applicable AIPs and ICAO Annexes for details.)

17.10 ROUTE CONCERNS

17.10.1 There are a few VOR/NDB routes in the North Atlantic. These routes are sometimes known as "Blue Spruce" routes and are depicted on navigation charts from Jeppesen and other sources. Details are also included in this Manual in Chapter 12 and in relevant national AIPs. Other than on the Blue Spruce routes, there is little NAVAID coverage at the low altitudes in the NAT.

17.11 COMMUNICATIONS

17.11.1 The following text highlights a number of issues particular to air-ground ATS communications in the NAT region. Further referral should be made to Chapter 6.

17.11.2 As mentioned earlier, VHF radio coverage is very limited in the NAT. Charts in section 10.5 depict theoretical VHF coverage in the NAT HLA. Refer to State AIPs for detailed surveillance and

communication coverage including coverage in the low level airspace. Radio equipment should be tested prior to departure. For VHF equipment this is best done by calling the tower or ACC on the proper frequency for a ground radio check. HF equipment can be tested by calling the nearest Aeronautical Radio or Flight Service Station for a ground radio check. If contact cannot be made on the initial test frequency, try others. If no contact is made, have the equipment checked. Do not leave the ground until everything is working satisfactorily.

17.11.3 Flight crews should be aware that on most occasions when they communicate with Oceanic Air Traffic Control Centres on HF and, on some occasions VHF, they do not talk directly to controllers. Radio Communicator staff, i.e., Aeronautical Radio Inc. (ARINC) or an international flight service station (IFSS), relay messages between aircraft and ATC. Such units are not always co-located with an ACC. For example, Shanwick Radio is in the Republic of Ireland while Shanwick Control is based at Prestwick, Scotland. Also, it is important to note that controller workload associated with low level IGA flights is usually high, so some delays can be expected for responses to requests for a change of flight level, route, etc.

17.11.4 Remember, flights above FL 055 must be operated under IFR procedures and therefore a continuous air-ground communication watch on appropriate frequency must be maintained.

17.11.5 An HF SELCAL device will ease the strain of a continuous air-ground communication watch on the designated HF R/T Frequency. Ensure that the SELCAL code selected in the aircraft is valid for the NAT region (see Chapter 6). Also ensure that the Code is included in Item 18 of the filed ICAO flight plan.

17.11.6 Aeronautical Mobile Satellite (Route) Service (AMS(R)S), more commonly referred to as SATVOICE, may be used for any routine, non-routine or emergency ATS air/ground communications throughout the NAT region. Remember to carry the SATVOICECOM numbers for the areas (both ATC and radio) you are flying through. Requirements and procedures for use are detailed in Chapter 6.

17.11.7 A continuous air-ground communication listening watch should be maintained on the 121.500 MHz emergency frequency unless communications on another frequency prevents it. 121.500 MHz is not authorized for *routine* use.

Communications failures

17.11.8 Procedures to follow in the event of radio communications failures in the NAT region **are not** those which are used in domestic airspaces. Chapter 6 and relevant national AIPs provide detail of the procedures to follow here.

17.11.9 Although HF coverage exists throughout the NAT, there are a few associated problems. Depending on atmospheric conditions, it can be relatively noisy with the signal fading in and out. Sometimes several attempts are required to successfully transmit or receive a single message. Additionally, sunspot activity can completely disrupt HF communications for considerable periods of time, varying from a few minutes to several hours. Notices are published whenever disruptive sunspot activity is expected. It may be possible to relay VHF or UHF communications through other aircraft operating in the NAT. 123.450 MHz should be used for air-to-air communications. Do not plan to use other aircraft as primary means of communication. There is no guarantee there will be another aircraft within range when needed. Consider this an emergency procedure and plan accordingly.

17.12 SURVEILLANCE

17.12.1 Radar and/or ADS-B coverage in the NAT region is limited. All aircraft operating as IFR flights in the NAT region shall be equipped with a pressure-altitude reporting SSR transponder. Some radar sites that do cover portions of the NAT are secondary radar equipped only. In any emergency situation (lost, out of fuel, engine failure, etc.) your chances of survival are vastly increased if you are radar or ADS-B identified and SAR services can be vectored to your position. NAT ATS Surveillance is discussed in Chapter 10 and coverage charts are shown in section 10.5 and in individual national AIPs.

17.13 SEARCH & RESCUE (SAR)

17.13.1 SAR alert procedures are initiated when:

- a) no communication has been received from an aircraft within a period of thirty minutes after the time a communication should have been received, or from the time an unsuccessful attempt to establish communication with such aircraft was first made, whichever is the earlier, or when,
- b) an aircraft fails to arrive within thirty minutes of the estimated time of arrival last notified to or estimated by air traffic services units, whichever is the later except when,
- c) no doubt exists as to the safety of the aircraft and its occupants.

17.13.2 Flight crews should request advisories or assistance at the earliest indication that something may be wrong. Most search and rescue facilities and international air carriers monitor VHF frequency 121.500 MHz continuously. SAR aircraft are generally equipped with homing devices sensitive to VHF 121.500 MHz. If unable to reach any facility, flight crews should attempt contact with other aircraft on the NAT air-to-air frequency 123.450 MHz or distress frequency 121.500 MHz. Most international carriers are also able to receive Emergency Locator Transmitter (ELTs) transmissions. In the event that manual activation of your ELT is possible, the ELT should be activated and left on continuously. The 406.000 MHz beacon provides a more accurate position and identification data, improving SAR response efficiency.

17.13.3 With excellent satellite coverage of the region, SAR services can ordinarily determine the general location of an aircraft in distress, provided that the ELT functions. Search and recovery may be conducted by various craft. Helicopters operate out to a maximum of 300 NM from base without air-to-air refueling and the latter is a very scarce enhancement. Long range SAR aircraft can localize an ELT, but their time on task in the area, on low level visual search, should that be necessary, is only in the order of 2 to 3 hours. A 24 hour search would require 8 aircraft and a visual search for a single seat life raft, even with a comparatively good datum, is a needle-in-a-haystack problem. Oceanic Air Traffic Control Centres will contact rescue coordination centres with all available details. SAR coordination centres may request other aircraft assistance while also utilizing surface craft in the area. This would often include ships or boats. The further section below on aircraft ditching provides more insights.

Hypothermia

17.13.4 Hypothermia is the most significant danger to the survivors of any ditching or forced/precautionary landing in the NAT region. The causes, symptoms and preventative measures are covered in detail in Attachment 7.

17.14 IN-FLIGHT CONTINGENCIES

17.14.1 Do not deviate from your current flight plan unless you have requested and obtained approval from the appropriate air traffic control unit, or unless an emergency situation arises which necessitates immediate action. After such emergency authority is exercised, the appropriate air traffic services unit must be notified of the action taken and that the action has been taken under emergency authority.

17.14.2 Make all position reports, as required, and report any problems to Air Traffic Control agencies as soon as possible. It is also good policy to report fuel remaining in hours and minutes when passing position or other relevant flight information.

17.14.3 If you encounter difficulty, report immediately on the appropriate VHF/HF frequency or on VHF 121.500 MHz, VHF 123.450 MHz, SATVOICE or any other communication device you may have. Don't delay in making this call, as it could take SAR forces up to four hours to reach your position.

17.14.4 Remember that commercial airline traffic over the North Atlantic is heavy. Do not hesitate to enlist the assistance of these aircraft in relaying a position report or discussing a problem. The VHF frequency 123.450 MHz is for exclusive use as an air-to-air communications channel. The bulk of this commercial traffic uses the Organised Track Structure (Chapter 2). During daylight hours a Westbound OTS is in effect and at night an Eastbound structure is used. The location/coordinates of these structures changes each day. Knowledge of the location of the OTS structure which is active during your flight may provide re-assurance of the proximity of such assistance. The moral support alone may be enough to settle nerves and return the thought processes to normal.

17.14.5 The weather at your destination should be well above IFR minimums and forecast to remain so or improve. After 10 to 14 hours at altitude, your ability to handle marginal weather conditions may be in serious doubt. Therefore, your personal weather minimums should be well above the published minimums. Alternate airports should be chosen with the same care.

ATTACHMENT 1

SAMPLE OF ERROR INVESTIGATION FORM

(Name and address of reporting agency):				
Please complete Parts 2 and 3 (and Part 4 if applicable) of this investigation form. A copy, together with copies of all relevant flight documentation (fuel flight plan, ATC flight plan and ATC clearance) should then be returned to the above address and also to: the North Atlantic Central Monitoring Agency, -c/o National Air Traffic Services - Room G41 - Scottish & Oceanic Area Control Centre, Sherwood Road,- Prestwick, Ayrshire - KA9 2NR				
Part 1 – General Information				
Operator's name				
Aircraft identification				
Date/time of observed deviation				
Position (latitude and longitude)				
Observed by (ATC unit)				
Aircraft flight level				
Part 2 – Details of Aircraft and Navigation Equipment Fit				
Number Type	INS	GNSS	IRS/FMS	OTHER (please specify)
Single				
Dual				
Triple				
Model No				
Navigation system Programme No				
State which system coupled to autopilot				
Aircraft Registration and Model/Series				

Part 3 – Detailed description of incident <i>Please give your assessment of the actual track flown by the aircraft and the cause of the deviation (continue on a separate sheet if required)</i>													
Part 4 – Only to be completed in the event of Partial or Full Navigation failure													
Indicate the number of equipment units which failed	INS			GNSS			IRS/FMS			OTHER			
Circle estimated longitude at which equipment failed	60°W	55°W	50°W	45°W	40°W	35°W	30°W	25°W	20°W	15°W	10°W	5°W	0°E/W
Give an estimate of the duration of the equipment failure	Time of failure : Time of exit from NAT HLA: Duration of failure in NAT												
At what time did you advise ATC of the failure													

Thank you for your co-operation

ATTACHMENT 2
ALTITUDE DEVIATION REPORT FORM

MESSAGE FORMAT FOR A REPORT TO THE CENTRAL MONITORING AGENCY OF AN ALTITUDE DEVIATION OF 300 FT OR MORE, INCLUDING THOSE DUE TO ACAS/TCAS ADVISORIES, TURBULENCE AND CONTINGENCY EVENTS

1. REPORT OF AN ALTITUDE DEVIATION OF 300 FT OR MORE
2. REPORTING AGENCY
3. DATE AND TIME
4. LOCATION OF DEVIATION
5. RANDOM / OTS¹
6. FLIGHT IDENTIFICATION AND TYPE
7. FLIGHT LEVEL ASSIGNED
8. OBSERVED / REPORTED¹ FINAL FLIGHT LEVEL² MODE "C" / PILOT REPORT¹
9. DURATION AT FLIGHT LEVEL
10. CAUSE OF DEVIATION
11. OTHER TRAFFIC
12. CREW COMMENTS WHEN NOTIFIED
13. REMARKS³

1. State one of the two choices.
2. In the case of turbulence, state extent of deviation from cleared flight level.
3. In the event of contingency action, indicate whether prior clearance was given and if contingency procedures were followed

When complete send this form to:

North Atlantic Central Monitoring
Agency c/o National Air Traffic
Services
Room G41
Scottish & Oceanic Area Control Centre,
Sherwood Road,
Prestwick, Ayrshire - KA9 2NR

nacma@nats.co.uk

ATTACHMENT 3

WAKE TURBULENCE REPORT FORM

For use by pilots involved in Wake Vortex incidents which have occurred in the NAT HLA.

This information is requested by the North Atlantic Central Monitoring Agency and will be forwarded for inclusion in the UK National Air Traffic Services Limited Wake Vortex database.

SECTION A

DATE OF OCCURRENCE	TIME (UTC) *DAY/NIGHT	OPERATOR	FLIGHT NUMBER
AIRCRAFT TYPE & SERIES		REGISTRATION	AIRCRAFT WEIGHT (KG)
ORIGIN & DESTINATION	POSITION IN LAT & LONG	CLEARED TRACK CO-ORDINATES	
FLIGHT LEVEL	SPEED/MACH NBR.	FLIGHT PHASE: *CRUISE/CLIMB/DESCENT	WERE YOU TURNING? *YES/NO
DID YOU APPLY A TRACK OFFSET? *YES/NO	SIZE OF TRACK OFFSET? Nautical Miles	WAS ATC INFORMED? *YES/NO	
MET CONDITIONS IMC VMC	ACTUAL WEATHER WIND VISIBILITY CLOUD TEMPERATURE	DEGREE OF TURBULENCE *LIGHT/MODERATE/SEVERE	
OTHER SIGNIFICANT WEATHER?			

(*Circle the appropriate

reply only) SECTION B

- 1 What made you suspect Wake Vortex as the cause of the disturbance? _____

- 2 Did you experience vertical acceleration? *YES/NO
If YES please describe briefly _____

- 3 What was the change in attitude? (please estimate angle)
Pitch _____° Roll _____° Yaw _____°
- 4 What was the change in height if any? _____ *INCREASE/DECREASE

5 Was there buffeting? *YES/NO

6 Was there stick shake? *YES/NO

7 Was the Autopilot engaged? *YES/NO

8 Was the Auto throttle engaged? *YES/NO

9 What control action was taken?

Please describe briefly _____

10 Could you see the aircraft suspected of causing the wake vortex? *YES/NO

11 Did you contact the aircraft suspected of causing the vortex? *YES/NO

12 Was the aircraft suspected of causing the vortex detected by ACAS/TCAS? *YES/NO

If YES to any of questions 10 to 12, what type of aircraft was it? _____

and where was it relative to your position? _____

(Estimated separation distance) _____

Were you aware of the preceding aircraft before the incident?

*YES/NO OTHER INFORMATION

13 Have you any other comments that you think may be useful? _____

Signed _____

Name (BLOCK CAPITALS) _____ DATE _____

(*Circle the appropriate reply only)

When complete send this form to:

North Atlantic Central Monitoring Agency
c/o National Air Traffic Services
Room G41
Scottish & Oceanic Area Control Centre,
Sherwood Road,
Prestwick, Ayrshire - KA9 2NR

natcma@nats.co.uk

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ATTACHMENT 4

SAMPLE OCEANIC CHECKLIST **KEEP ON ONE PAGE**

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 review Chapter 68 NAT HLA FLIGHT OPERATIONS & NAVIGATION PROCEDURES.

FLIGHT PLANNING

- Communication/Navigation/Surveillance (CNS) Flight Plan Codes and planning documents
 - Plotting/Orientation Chart/EFB/Tablet – plot route OEP to OXP
- Equal Time Points (ETP) - plot
- EDTO (/ETOPS) – Complete analysis
- Track message (current copy available for all crossings)
- Note nearest tracks on plotting chart/EFB/Tablet
- Weather Analysis – Note enroute temperature and turbulence forecasts as well as divert airport weather
- Review possible navigation aids for accuracy check prior to OEP (AS / IF APPLICABLE)
 - 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)
- Master Flight Plan (check routing, fuel load, times, groundspeeds)
- Dual Long Range NAV System (LRNS) for remote oceanic operations
- LRCS (HF, SATVOICE/COM) check (including SELCAL)
- Confirm Present Position coordinates (best source)
- Master Flight Plan (symbols ②, ✓, \, X)
- LRNS programming
 - Check currency and software version
 - Independently verify waypoint entries
 - Check expanded coordinates of all oceanic waypoints
 - Check course and distance ($\pm 2^\circ$ 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 FL 180

PRIOR TO OCEANIC ENTRY

- If required, ~~obtain oceanic clearance from appropriate agency~~ send an RCL message. Verify and crosscheck any route amendment ~~clearance~~ 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/EFB/Tablet, 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~~ 130 minutes after entry, if applicable except for Reykjavik OCA
- Maintain assigned Mach, or RESUME NORMAL SPEED if cleared
- VHF radios - set to air-to-air (123.450 MHz) and guard frequency (121.500 MHz)
- Strategic Lateral Offset Procedures (SLOP) – SOP fly centreline or up to 2NM to the **right** of ATC cleared track (in 0.1 NM increments); left offsets are **prohibited-not-approved**
- Altimeter checks - hourly (AS / IF APPLICABLE)
- 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 (AS / IF APPLICABLE)
- Confirm ETA

COAST IN

- Compare ground based NAVAID to LRNS (AS / IF APPLICABLE)
- Remove SLOP offset prior to oceanic exit point
- Confirm routing beyond oceanic airspace

DESTINATION/BLOCK IN

- Navigation Accuracy Check (AS / IF APPLICABLE)
- RVSM write-ups

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ATTACHMENT 5

NORTH ATLANTIC FLIGHT LEVEL ALLOCATION SCHEME

Flight Level Availability

1. Introduction

Following statistical analysis and discussions NAT FLAS was developed to:

- (i) Utilise additional levels, made available by RVSM expansion.
- (ii) Standardise the flight level profiles available for eastbound traffic, originating in the New York East/ Santa Maria OCA areas, during the eastbound flow, with a view to incorporating the functionality of ADT links.
- (iii) Ensure that economic profiles are available for westbound aircraft routing from Reykjavik OCA.

The procedures entail the establishment of a Night Datum Line, south of which is reserved principally for traffic originating in New York East/ Santa Maria OCAs.

The procedures entail the establishment of a North Datum Line, on or north of which is reserved for late running westbound traffic from Reykjavik OCA to Gander OCA.

Aircraft operators are advised that the altitude scheme described herein should primarily be used for flight planning using the flight levels specified in this document, relative to their particular flight(s). However, final altitude assignments will be assigned tactically by ATC, reference traffic, and that any requested altitude profile changes will be processed and approved if available.

Procedures

2. General

The westbound OTS tracks are published by Shanwick OAC using FL 310 to FL 390. Gander OAC publishes the eastbound OTS tracks using FL 310 to FL 400. However, FL 310 will only be used for “New York Tracks” which are eastbound OTS tracks that originate in the New York OCA East area and are separated from the main OTS by more than one degree at 030°W.

The activation times of the westbound OTS shall be published as 1130 UTC to 1900 UTC at 30W.

The activation times of the eastbound OTS shall be published as 0100 UTC to 0800 UTC at 30W.

3. Delegated Opposite Direction Levels (ODLs)

Gander OAC will accept FL 310 as a westbound level H24 subject to eastbound CAR/SAM traffic, as described in “Eastbound Traffic originating in New York/Santa Maria, during the eastbound OTS” shown below.

During the westbound OTS, FL 330 is delegated to Shanwick OAC for westbound traffic.

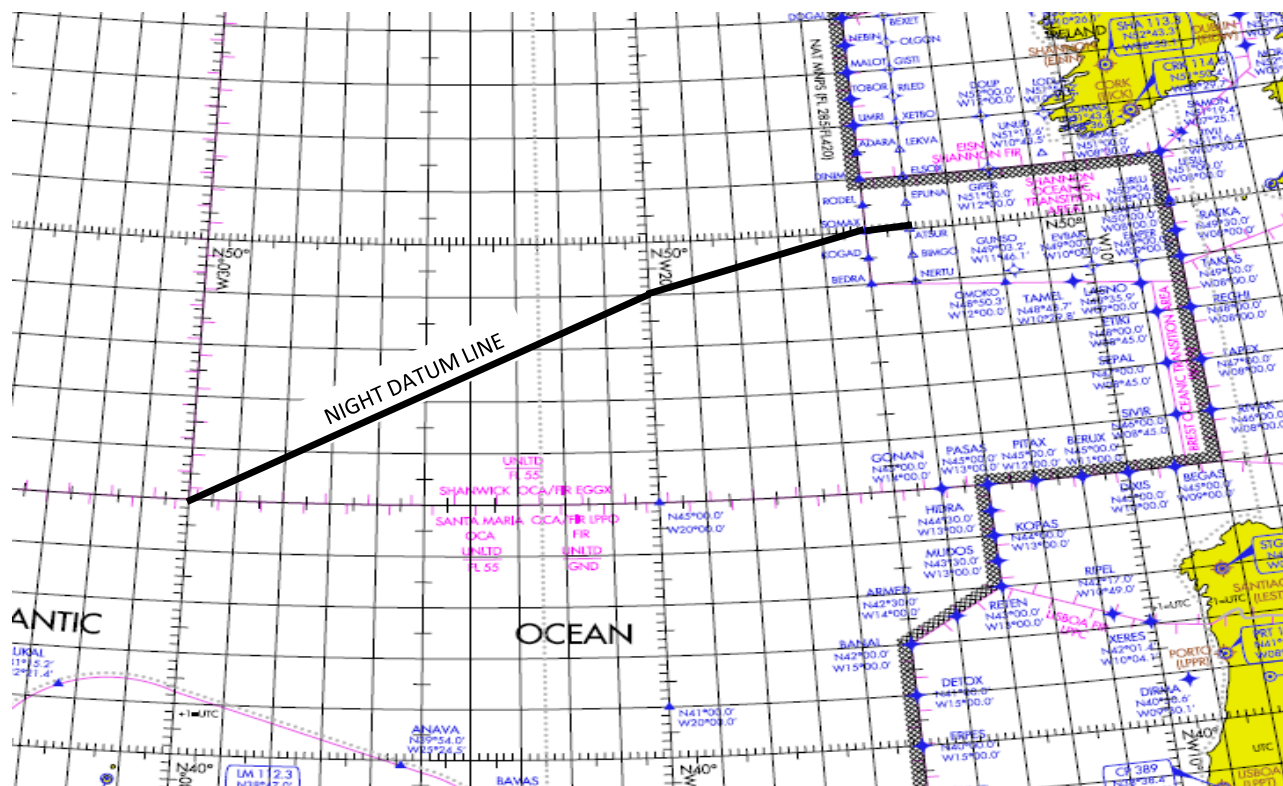
Night Datum Line, is established with the following coordinates:

45N030W 49N020W SOMAX ATSUR.

North of the Night Datum Line FL 340 and FL 380 are delegated to Gander OAC for eastbound traffic.

South of the Night Datum Line FL 340 will not be used for Gander OCA eastbound traffic.

To the south of the Night Datum Line or the eastbound OTS, whichever is further south, FL 340 and FL 380 will not be used for Gander OCA eastbound traffic.

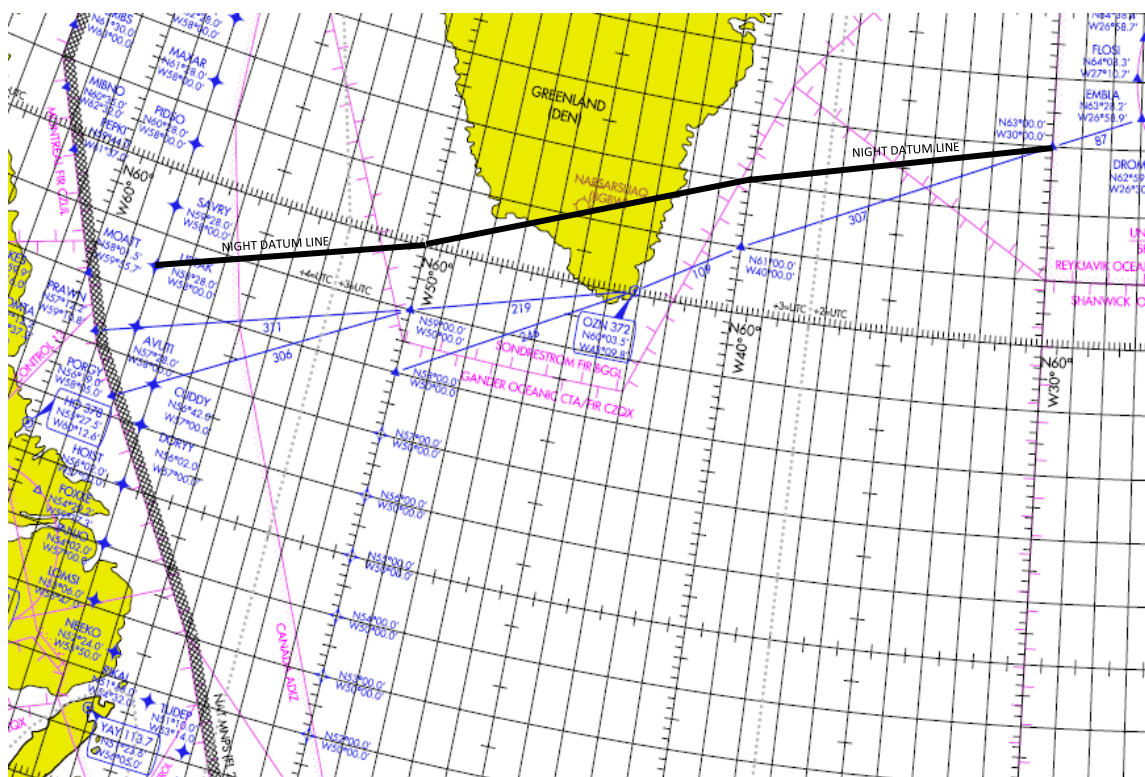


North Datum Line, is established between 0300 UTC and 0700 UTC with the following coordinates:

URTAK 60N050W 62N040W 63N030W

On and north of the North Datum Line FL 380 is delegated to Reykjavik OAC for westbound traffic.

In the event of a high volume of North Random Flights and/or OTS tracks the North Datum Line may be suspended to accommodate the dominant eastbound flow.



4. *Eastbound Traffic originating in New York/Santa Maria, during the eastbound OTS*

Eastbound traffic routing, both south of the Night Datum Line, and the main OTS, should flight plan using FL 310, FL 340, FL 360 or FL 380.

Eastbound traffic remaining south of the Night Datum Line should flight plan using FL 310, FL 340 FL 380 or FL 400.

The flight levels allocated to New York tracks entering Shanwick OCA which cross, or route south of, the Night Datum Line, may be any combination of FL 310, FL 340, FL 360, FL 380, or as otherwise agreed between Santa Maria OAC and New York OAC. Additional levels will be allocated to New York tracks if the core OTS is located in that area.

For this procedure, “New York Tracks” are any eastbound OTS tracks which originate in the New York area and enter Gander or Shanwick OCAs.

OTS Design & Use

For all westbound tracks which landfall at or north of AVUTI, Reykjavik OAC require FL340 to be omitted from that track to allow profiles for aircraft originating in the Reykjavik OCA.

During the westbound OTS validity times, Shanwick OAC shall not clear westbound aircraft which landfall at or north of AVUTI at FL340, except random flights that remain clear of the OTS and Gander OCA. Such flights may be cleared at FL340 without prior coordination with Reykjavik OAC.

Note: The effect of this particular ATS co-ordination restriction on operators is that NAT flights originating from the Shanwick OCA which landfall at or between AVUTI and AVPUT should not be flight planned at FL340.

FL320 on eastbound OTS lying south of Shannon Oceanic Transition Area (SOTA) and which exit the Shanwick OCA at positions OMOKO or south, will be published as not being available as track levels after 0600 UTC at 30W.

Note that Shanwick OAC may tactically release FL320 back to Gander OAC should there be insufficient demand on the TANGO routes, or that the demand on the eastbound tracks is sufficiently greater.

5. Summary

The availability of RVSM flight levels, between 0100 UTC and 0800 UTC (at 30W), is summarised in the following diagrams.

Diagram 1 below illustrates the use of the Night Datum line (coloured red) in a situation when there are no Gander eastbound NAT tracks in the vicinity.

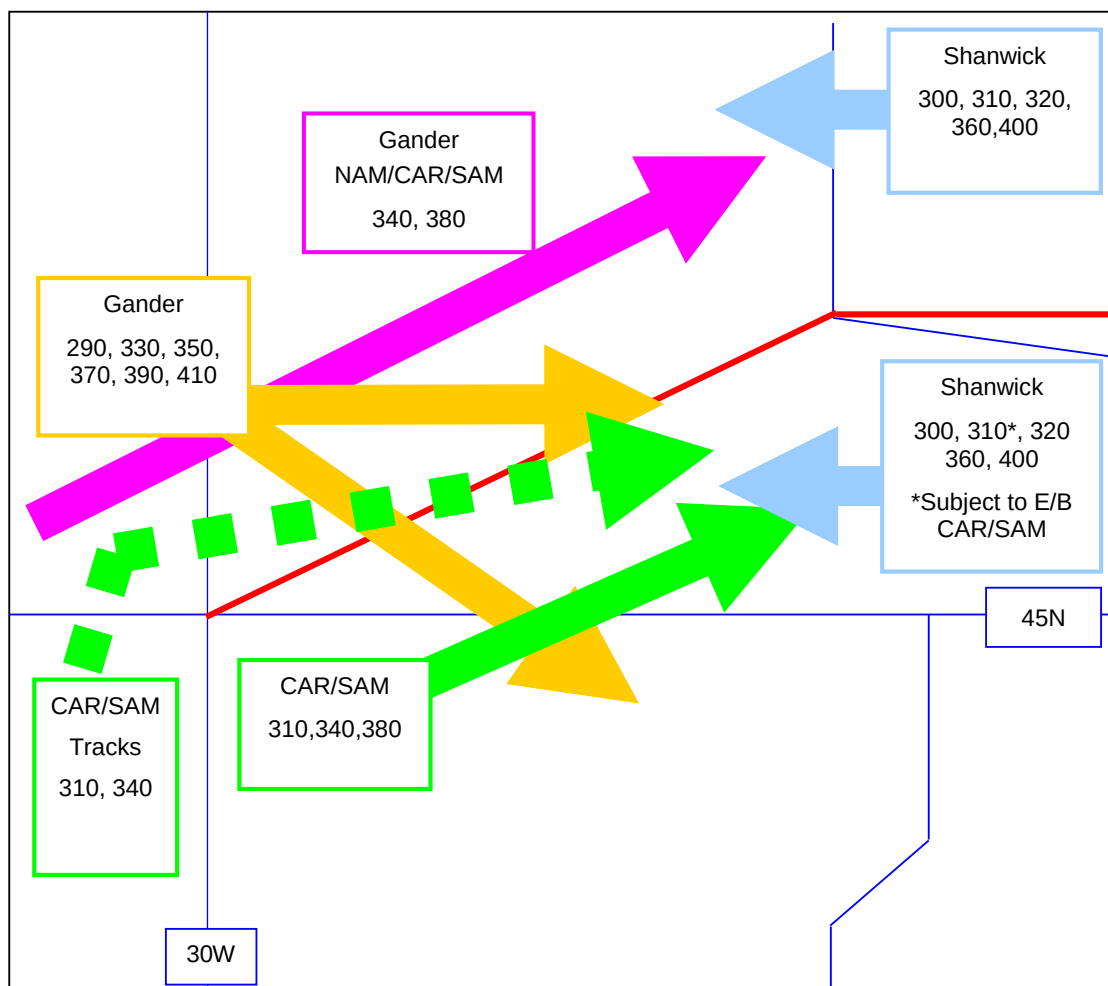


Diagram 1

Diagram 2 illustrates the situation when there are Gander eastbound NAT tracks in the vicinity.

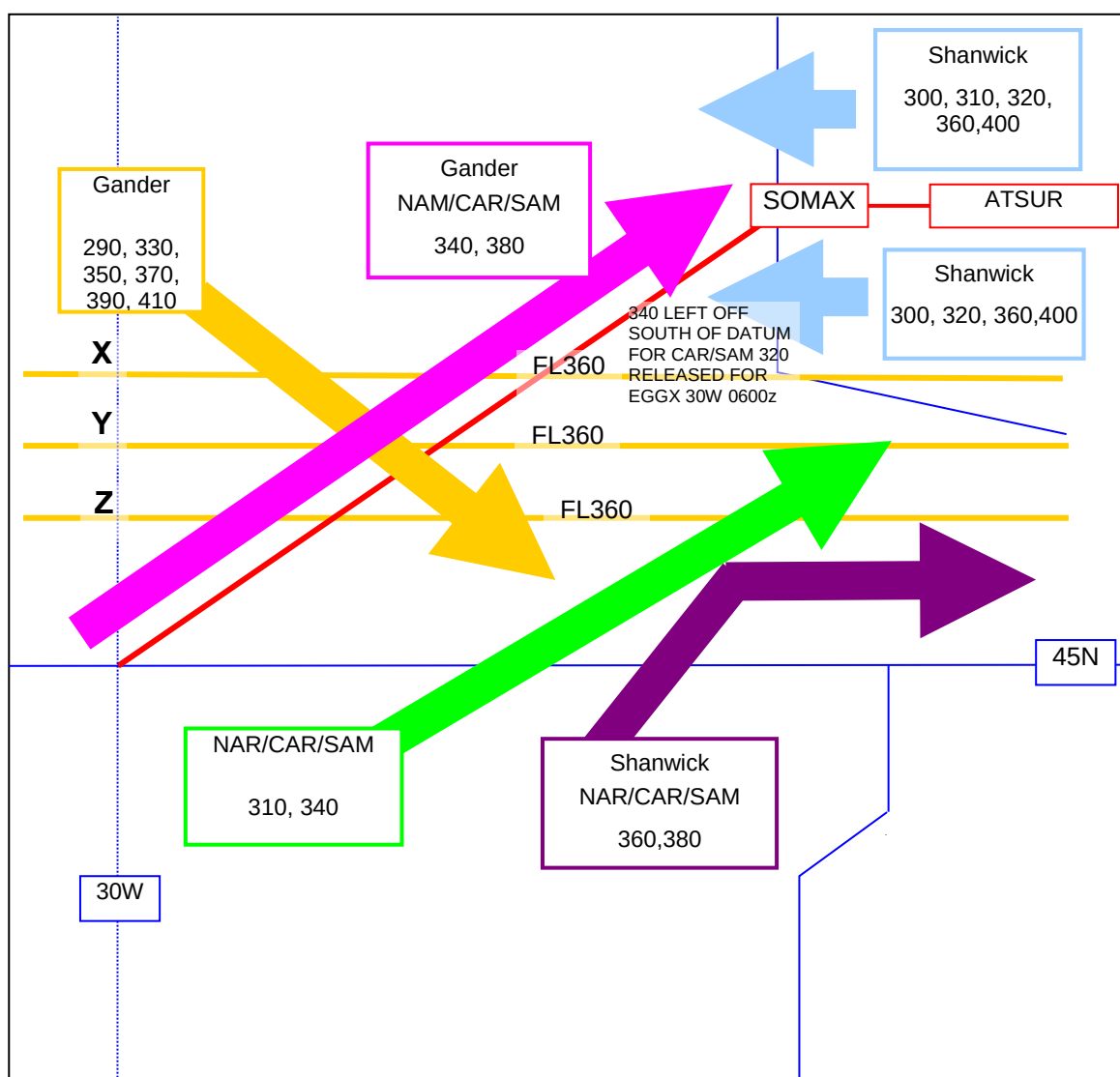


Diagram 2

6. Transition Periods

The time period between one set of OTS expiring and another set commencing is known as the transition period. The following procedures are in place to accommodate the majority of aircraft:

7. Basic Principles:

All times relate to 30W.

OTS Transition rules apply between 0801 UTC to 1129 UTC and 1901 UTC to 0059 UTC. During these times flight levels shall be applied in accordance with direction of flight other than as stated below.

8. General principles:

Westbound traffic crossing 30W, 2230 UTC to 0059 UTC, shall remain clear of the incoming OTS and shall not use delegated ODLs (FL 340 and FL 380). After 2230 UTC, the OTS and ODLs (FL 340 and FL 380) are released to Gander OAC, who may clear eastbound aircraft, taking cognisance of, and giving priority to,

already cleared westbound aircraft.

Eastbound traffic crossing 30W 1000 UTC to 1129 UTC, shall remain clear of the incoming OTS at FL 350 and shall not use delegated ODL (FL 330). After 1000 UTC, the OTS (at FL 330 and FL 350) and ODL (FL 330) are released to Shanwick OAC, who may clear westbound aircraft, taking cognisance of, and giving priority to, already cleared eastbound aircraft.

Eastbound traffic, at FL 370 and FL 390, crossing 30W 1030 UTC to 1129 UTC, shall remain clear of the incoming OTS. After 1030 UTC, the OTS (at FL 370 and FL 390) are released to Shanwick OAC, who may clear westbound aircraft, taking cognisance of, and giving priority to, already cleared eastbound aircraft.

At the day-OTS end-time, Westbound aircraft crossing 30W up to 1900 UTC, at ODL (FL 330) or on the OTS, shall have priority over eastbound aircraft. Eastbound aircraft shall be cleared, taking cognisance of, and giving priority to, already cleared westbound aircraft.

At the night-OTS end-time, Eastbound aircraft crossing 30W up to 0800 UTC, at ODLs (FL 340, FL 380) or on the OTS, shall have priority over westbound aircraft. Westbound aircraft shall be cleared, taking cognisance of, and giving priority to, already cleared eastbound aircraft.

The table below summarises the above:

Level	Time (UTC)	Direction
FL430	H24	Westbound. May be Flight Planned as eastbound by non-RVSM aircraft.
FL410	H24	Eastbound.
FL400	0801 – 2229 2230 – 0059 0100 – 0800	Westbound. Westbound (avoiding OTS). Eastbound OTS (subject to westbounds). Westbound (avoiding OTS). Eastbound (OTS).
FL390	1901 – 1029 1030 – 1129 1130 – 1900	Eastbound. Eastbound (avoiding OTS). Westbound OTS (subject to eastbounds). Eastbound (avoiding OTS). Westbound (OTS).
FL380	0300 – 0700 0801 – 2229 2230 – 0059 0100 – 0800	Westbound (ODL, on and to the North of the North datum line). Westbound. Eastbound (subject to westbounds). Eastbound (OTS and ODL).
FL370	1901 – 1029 1030 – 1129 1130 – 1900	Eastbound. Eastbound (avoiding OTS). Westbound OTS (subject to eastbounds). Eastbound (avoiding OTS). Westbound (OTS).
FL360	0801 – 2229 2230 – 0059 0100 – 0800	Westbound. Westbound (avoiding OTS.) Eastbound OTS (subject to westbounds). Westbound (avoiding OTS). Eastbound (OTS).
FL350	1901 – 0959 1000 – 1129 1130 – 2000	Eastbound. Eastbound (avoiding OTS). Westbound OTS (subject to eastbounds). Eastbound (avoiding OTS). Westbound (OTS).
FL340	0801 – 2229 2230 – 0059 0100 – 0800	Westbound. Eastbound (subject to westbounds). Eastbound OTS (subject to westbounds). Eastbound (OTS and ODL).
FL330	1901 – 0959 1000 – 1129 1130 – 1900	Eastbound. Westbound (subject to eastbounds). Westbound (OTS and ODL).

Level	Time (UTC)	Direction
FL320	0801 – 2229	Westbound.
	2230 – 0059	Westbound (avoiding OTS). Eastbound OTS (subject to westbounds).
	0100 – 0800	Westbound (avoiding OTS). Eastbound (OTS).
FL310	H24	Westbound. (ODL).
FL300	H24	Westbound.
FL290	H24	Eastbound.

ATTACHMENT 6

~~OCEANIC CLEARANCES DELIVERY/FORMAT/CONTENT~~~~OCEANIC CLEARANCE~~

~~There are three elements to an oceanic clearance: Route, Level, and Speed (if required). These elements serve to provide for the three basic elements of separation: lateral, vertical, and longitudinal.~~

~~Specific information on how to obtain oceanic clearance from each NAT OACC is published in State AIPs. Various methods of obtaining oceanic clearances include:~~

- ~~a) — use of published VHF clearance delivery frequencies;~~
- ~~b) — by HF communications to the OACC through the appropriate radio station (in accordance with specified timeframes~~
- ~~c) — a request via domestic or other ATC agencies;~~
- ~~d) — by data link, when arrangements have been made with designated airlines to request and receive clearances using on board equipment (ACARS). Detailed procedures for its operation may vary. Gander, Shanwick, Santa Maria and Reykjavik OACCs provide such a facility and the relevant operational procedures are published in national AIPs and also as NAT OPS Bulletins which are available for download from the ICAO EUR/NAT Office website (see) New York OACC uses the FANS 1/A CPDLC function to uplink oceanic clearances to all aircraft utilising CPDLC~~

~~Format of Oceanic Clearance messages delivered via voice~~

~~Oceanic clearances delivered via voice in the NAT region will normally have the following format:~~

~~“OCEANIC CLEARANCE [WITH A <list of ATC info>]. <ate unit> CLEARS <ACID> TO
<clearance limit>, VIA <route>, FROM <entry point> MAINTAIN <level> [<speed>] [.<free text>]”~~

~~Note: Fields in [] are optional. In particular when the delivered clearance conforms with the “as filed” or “as requested” clearance (RCL) the Element [WITH A <list of ATC info>] is omitted.~~

~~The following <list of ATC info> will advise a difference in the clearance from the filed or requested details. It will normally be in accordance with the table below:~~

~~Condition~~	~~List of ATC info~~	~~#~~
~~The controller changes, deletes or adds a waypoint other than the entry point.~~	~~REROUTE~~	~~1~~
~~Flight level in the clearance message is not the same as the flight level in the RCL.~~	~~LEVEL CHANGE~~	~~2~~
~~Speed in the clearance message is not the same as the speed in the RCL.~~	~~SPEED CHANGE~~	~~3~~
~~The first waypoint in the clearance message is not the same as in the RCL.~~	~~ENTRY POINT CHANGE~~	~~4~~
~~The controller changes the clearance limit.~~	~~CLEARANCE LIMIT CHANGE~~	~~5~~

~~Multiple elements in the “<list of ATC info>” will normally be separated with the word “AND”.~~

~~Delivery method for Oceanic Clearance messages delivered via voice~~

~~In the first contact the Controller/Radio Operator will alert the Pilot to the intention to deliver an oceanic clearance, so that the Pilot can be prepared to accept and copy the detail. When the clearance to be delivered (CPL) differs in any way from the filed/requested flight plan (RCL) the controller/radio operator will denote in this first contact which of the elements have been changed. After the Pilot responds with his/her readiness to receive the detailed clearance, the controller/radio operator will provide the details of the clearance in the format described above.~~

~~Example exchange~~

~~1. Controller/radio operator:~~

~~“DLH458 (ATC/radio operator’s unit callsign) OCEANIC CLEARANCE WITH A LEVEL CHANGE AND SPEED CHANGE.”~~

~~Pilot:~~

~~“(ATC/radio operator’s unit callsign) DHL485”~~

~~2. Controller/radio operator:~~

~~“REYKJAVIK OACC CLEARS DLH458 TO CYVR, VIA GUNPA 65 NORTH/010 WEST 69 NORTH/0 20 WEST 71 NORTH/030 WEST 72 NORTH/040 WEST 73 NORTH/060 WEST MEDPA, FROM GUNPA MAINTAIN F340 M083. UNABLE YOUR REQUESTED LEVEL. UNABLE YOUR REQUESTED SPEED”~~

REVISIONS/AMENDMENTS

When delivering any subsequent Revisions/Amendments to previous delivered clearances which include changes to the level and/or route and/or speed the controller/radio operator will utilise the following format and will provide a “heads-up” to the Pilot on first contact, as to which elements are being revised.

~~Format of an amended Oceanic Clearance Revision delivered via voice~~

“AMENDED <change> CLEARANCE. <atc unit> CLEARS <acid>, <clearance>”

where <change> can be one or more of the following:

LEVEL, ROUTE, SPEED.

Multiple <change> elements will normally be separated with the word “AND”.

~~Delivery Method for an Oceanic Clearance Revision delivered via voice~~

1. Controller/radio operator:

“DLH458- (ATC/radio operator’s unit callsign) - AMENDED LEVEL AND SPEED CLEARANCE.”

Pilot:

“(ATC /radio operator’s unit callsign) DLH458.”

2. Controller/radio operator:

“REYKJAVIK OACC CLEARS DLH458, CLIMB TO F350, MAINTAIN M082, REPORT LEAVING, REPORT REACHING”

EXAMPLE CLEARANCES:

Following are examples of typical clearances that could be received by flights operating in NAT region oceanic airspace. These examples have been chosen with a view to explaining certain elements that are unique to the ICAO NAT region operational environment, or which have been shown to be subject to errors or misinterpretation.

Example 1 — Oceanic clearance to follow a NAT track when the details are “as filed” or “as requested”.

Example 1a — Oceanic clearance delivered via voice (radio or clearance delivery), for a flight cleared on a NAT track GANDER OCEANIC CLEARS ABC123 TO PARIS CHARLES DE GAULLE VIA CARPE, NAT TRACK WHISKEY. FROM CARPE MAINTAIN FLIGHT LEVEL 330, MACH 082.	Meaning ABC123 is cleared to destination LFPG via oceanic entry point CARPE and NAT track W. The cleared oceanic flight level is FL 330. The flight should ensure that an air traffic control clearance is obtained in sufficient time to allow the flight to cross CARPE at FL 330. If the flight is unable to cross CARPE at FL 330 air traffic control must be advised immediately. The assigned true Mach number is M082. The flight must maintain this Mach from CARPE until landfall at BEGID. Any required or unexpected deviation must be immediately reported to air traffic control.
Example 1b — Oceanic clearance delivered via voice (DCPC), for a flight cleared on a NAT track (abbreviated clearance) ABC123 CLEARED TO PARIS CHARLES DE GAULLE VIA CARPE, NAT TRACK WHISKEY. FROM CARPE MAINTAIN FLIGHT LEVEL 330, MACH 082.	Meaning ABC123 is cleared to destination LFPG via oceanic entry point CARPE and NAT track W. The cleared oceanic flight level is FL 330. The flight should ensure that an air traffic control clearance is obtained in sufficient time to allow the flight to cross CARPE at FL 330. If the flight is unable to cross CARPE at FL 330 air traffic control must be advised immediately. The assigned true Mach number is M082. The flight must maintain this Mach from CARPE until landfall at BEGID. Any required or unexpected deviation must be immediately reported to air traffic control. The flight crew must include the TMI in the read back.

Example 1c — the same clearance delivered via data link using the ED/106 Standard ~~CLX 1259 060224 CYQX CLRNCE 026 ABC123 CLRD TO LFPG VIA CARPE NAT W CARPE 54N050W 56N040W 57N030W 57N020W BILTO BEGID FM CARPE/1348 MNTN F330 M082 END OF MESSAGE~~	Meaning ~~Data link clearance number 026, sent from the Gander Area Control Centre at 1259 UTC on 24 February 2006. ABC123 is cleared to destination LFPG via oceanic entry point CARPE and NAT track W. NAT track W is defined as CARPE, 54N050W, 56N040W 57N030W 57N020W BILTO to the landfall point BEGID. The clearance is based upon an expectation that ABC123 will reach CARPE at 1348 UTC. If the flight crew estimate differs from this time by 3 minutes or more, the flight should advise the current air traffic controller. The cleared oceanic flight level is FL 330. The flight should ensure that an air traffic control clearance is obtained in sufficient time to allow the flight to cross CARPE at FL 330. If the flight is unable to cross CARPE at FL 330 air traffic control must be advised immediately. The assigned true Mach number is M082. The flight must maintain this Mach from CARPE until landfall at BEGID. Any required or unexpected deviation must be immediately reported to air traffic control.~~

Example 2 — Oceanic clearance to follow a random route when the details are “as filed” or “as requested”.

Example 2a — Oceanic clearance delivered via voice (radio or clearance delivery) for a flight cleared on a random route. ~~GANDER CENTRE CLEARs ABC456 TO LONDON HEATHROW VIA CRONO, 52 NORTH 050 WEST, 53 NORTH 040 WEST, 53 NORTH 030 WEST, 52 NORTH 020 WEST, LIMRI, XETBO. FROM CRONO MAINTAIN FLIGHT LEVEL 350, MACH 080.~~	Meaning ~~ABC456 is cleared to destination EGLL via oceanic entry point CRONO, 52N050W, 53N040W, 53N030W, 52N020W, LIMRI to the landfall point XETBO. The cleared oceanic flight level is FL 350. The flight should ensure that an air traffic control clearance is obtained in sufficient time to allow the flight to cross CRONO at FL 350. If the flight is unable to cross CRONO at FL 350 air traffic control must be advised immediately. The assigned true Mach number is M080. The flight must maintain this Mach from CRONO until landfall at XETBO. Any required or unexpected deviation must be immediately reported to air traffic control.~~

Example 2b — Oceanic clearance delivered via voice (DCPC) for a flight cleared on a random route: ABC456 CLEARED TO LONDON HEATHROW VIA CRONO, 52 NORTH 050 WEST, 53 NORTH 040 WEST, 53 NORTH 030 WEST, 52 NORTH 020 WEST, LIMRI, XETBO. FROM CRONO MAINTAIN FLIGHT LEVEL 350. MACH 080.	Meaning ABC456 is cleared to destination EGLL via oceanic entry point CRONO, 52N050W, 53N040W, 53N030W, 52N020W, LIMRI to the landfall point XETBO. The cleared oceanic flight level is FL 350. The flight should ensure that an air traffic control clearance is obtained in sufficient time to allow the flight to cross CRONO at FL 350. If the flight is unable to cross CRONO at FL 350 air traffic control must be advised immediately. The assigned true Mach number is M080. The flight must maintain this Mach from CRONO until landfall at XETBO. Any required or unexpected deviation must be immediately reported to air traffic control.
Example 2c — the same clearance delivered via data link using the ED/106 Standard CLX 1523 060530 CYQX CLRNCE 118 ABC456 CLRD TO EGLL VIA CRONO RANDOM ROUTE CRONO 52N050W 53N040W 53N030W 52N020W LIMRI XETBO FM CRONO/1632 MNTN F350 M080 END OF MESSAGE	Meaning Data link clearance number 118, sent from the Gander Area Control Centre at 1523 UTC on 30 May 2006. ABC456 is cleared to destination EGLL via oceanic entry point CRONO and then a random route. The detailed route description is CRONO 52N050W 53N040W 53N030W 52N020W LIMRI to the landfall point XETBO. The clearance is based upon an expectation that ABC456 will reach CRONO at 1632 UTC. If the flight crew estimate differs from this time by 3 minutes or more, the flight should advise the current air traffic controller. The cleared oceanic flight level is FL 350. The flight should ensure that an air traffic control clearance is obtained in sufficient time to allow the flight to cross CRONO at FL 350. If the flight is unable to cross CRONO at FL 350 air traffic control must be advised immediately. The assigned true Mach number is M080. The flight must maintain this Mach from CRONO until landfall at XETBO. Any required or unexpected deviation must be immediately reported to air traffic control.

Example 2d — Similar clearance, delivered via HF, relayed through ARINC ATC CLEARS ABC123 CLEARED DESTINATION AIRPORT UDD DIRECT BALOO 36N060W 38N050W 43N045W 47N040W 52N030W 56N020W BALIX UP59 NINEX. MAINTAIN FLIGHT LEVEL 330. MAINTAIN MACH POINT EIGHT TWO.	Meaning ABC123 is cleared to Moscow via the route specified. The altitude, route and speed elements of the oceanic clearance are derived from the aircraft's current route, altitude and speed. These may change prior to entering or exiting oceanic airspace via an ATC clearance to do so. At all times, the aircraft is expected to maintain the route, altitude and speed last assigned by ATC.
Example 2e — Oceanic clearance delivered on ground for a flight departing from an airport within the NAT region (in this example BIKF) ABC456 CLEARED TO COPENHAGEN VIA OSKUM3A 62 NORTH 010 WEST GUNPA. CLIMB VIA SID TO FLIGHT LEVEL 290. MACH 080. SQUAWK 3457.	Meaning ABC456 is cleared to destination EKCH via standard instrument departure OSKUM3A, 62N010W, to the boundary point GUNPA. The initial cleared oceanic flight level is FL 290, level revision will be issued during climb. The flight is to follow altitude restriction of the SID and after the last altitude restriction continue normal climb to FL 290. The assigned true Mach number is M080. The flight must maintain this Mach after conversion until boundary at GUNPA. Any required or unexpected deviation must be immediately reported to air traffic control. The squawk code assigned is 3457.

Example 3 — Oceanic clearance, change to the flight plan route

Example 3a — Oceanic clearance delivered via voice (radio or clearance delivery), where the route differs from the flight plan route OCEANIC CLEARANCE WITH A REROUTE. GANDER OCEANIC CLEARS ABC456 TO LONDON HEATHROW VIA CRONO, 52 NORTH 050 WEST, 53 NORTH 040 WEST, 53 NORTH 030 WEST, 52 NORTH 020 WEST, LIMRI, XETBO. FROM CRONO MAINTAIN FLIGHT LEVEL 350, MACH 080.	Meaning The route included in the oceanic clearance is not the same as the flight plan route. ABC456 is cleared to destination EGLL via oceanic entry point CRONO, 52N050W, 53N040W, 53N030W, 52N020W, LIMRI to the landfall point XETBO. The cleared oceanic flight level is FL 350. The flight should ensure that an air traffic control clearance is obtained in sufficient time to allow the flight to cross CRONO at FL 350. If the flight is unable to cross CRONO at FL 350 air traffic control must be advised immediately. The assigned true Mach number is M080. The flight must maintain this Mach from CRONO until landfall at XETBO. Any required or unexpected deviation must be immediately reported to air traffic control.

Example 3b—Oceanic clearance delivered via voice (DCPC), where the route differs from the flight plan route ~~OCEANIC CLEARANCE WITH A- REROUTE. ABC456 CLEARED TO LONDON HEATHROW VIA CRONO, 52 NORTH 050 WEST, 53 NORTH 040 WEST, 53 NORTH 030 WEST, 52 NORTH 020 WEST, LIMRI, XETBO. FROM CRONO MAINTAIN FLIGHT LEVEL 350, MACH 080.~~	Meaning The route included in the oceanic clearance is not the same as the flight plan route. ~~ABC456 is cleared to destination EGLL via oceanic entry point CRONO, 52N050W, 53N040W, 53N030W, 52N020W, LIMRI to landfall point XETBO.~~ The cleared oceanic flight level is FL 350. The flight should ensure that an air traffic control clearance is obtained in sufficient time to allow the flight to cross CRONO at FL 350. If the flight is unable to cross CRONO at FL 350 air traffic control must be advised immediately. The assigned true Mach number is M080. The flight must maintain this Mach from CRONO until landfall at XETBO. Any required or unexpected deviation must be immediately reported to air traffic control.
Example 3c—the same clearance delivered via data link using the ED/106 Standard ~~CLX 1523 060530 CYQX CLRNCE 118 ABC456 CLRD TO EGLL VIA CRONO RANDOM ROUTE CRONO 52N050W 53N040W 53N030W 52N020W LIMRI DOLIP M CRONO/1632 MNTN F350 M080 ATC/ ROUTE AMENDMENT END OF MESSAGE~~	Meaning Data link clearance number 118, sent from the Gander Area Control Centre at 1523 UTC on 30 May 2006. ~~ABC456 is cleared to destination EGLL via oceanic entry point CRONO and then a random route.~~ The detailed route description is ~~CRONO 52N050W 53N040W 53N030W 52N020W LIMRI to landfall point XETBO.~~ The clearance is based upon an expectation that ABC456 will reach CRONO at 1632. If the flight crew estimate differs from this time by 3 minutes or more, the flight should advise the current air traffic controller. The cleared oceanic flight level is FL 350. The flight should ensure that an air traffic control clearance is obtained in sufficient time to allow the flight to cross CRONO at FL 350. If the flight is unable to cross CRONO at FL 350 air traffic control must be advised immediately. The assigned true Mach number is M080. The flight must maintain this Mach from CRONO until landfall at DOLIP. Any required or unexpected deviation must be immediately reported to air traffic control.

Example 3d — Revised oceanic clearance delivered via data link using the ED/106 Standard ~~CLX 1558 060530 CYQX CLRNCE 135 ABC456 CLRD TO EGLL VIA CRONO RANDOM ROUTE~~ ~~CRONO 52N050W 53N040W 53N030W 53N020W LIMRI XETBO~~ ~~FM CRONO/1702 MNTN F340 M082 ATC/ ROUTE AMENDMENT LEVEL CHANGE MACH CHANGE~~ ~~RECLEARANCE 1- END OF MESSAGE~~	Meaning Data link clearance number 135 sent from the Gander Oceanic Area Control Centre at 1558 UTC on 30 May 2006. ABC456 is cleared to destination EGLL via oceanic entry point CRONO and then a random route. The detailed route description is CRONO 52N050W 53N040W 53N030W 52N020W LIMRI to landfall point XETBO. The clearance is based upon an expectation that ABC456 will reach CRONO at 1702 UTC. If the flight crew estimate differs from this time by 3 minutes or more, the flight should advise the current air traffic controller. The cleared oceanic flight level is FL 340. The flight should ensure that an air traffic control clearance is obtained in sufficient time to allow the flight to cross CRONO at FL 340. If the flight is unable to cross CRONO at FL 340 air traffic control must be advised immediately. The assigned true Mach number is M082. The flight must maintain this Mach from CRONO until landfall at XETBO. Any required or unexpected deviation must be immediately reported to air traffic control. The cleared route, oceanic flight level and assigned true Mach number have been revised from those contained in the previously sent oceanic clearance. This is the first revision to the originally sent oceanic clearance.
Example 3e — Similar clearance, delivered via HF, relayed through ARINC ~~ATC — CLEARS — ABC123 — CLEARED DESTINATION AIRPORT UDD DIRECT BALOO 36N060W 38N050W 43N045W 47N040W 52N030W 54N020W DOGAL BEXET.~~ ~~MAINTAIN FLIGHT LEVEL 330. MAINTAIN MACH POINT EIGHT TWO, ROUTE HAS BEEN CHANGED.~~	Meaning ABC123 is cleared to Moscow via the route specified. The altitude and speed elements of the oceanic clearance are derived from the aircraft's current altitude and speed. These may change prior to entering or exiting oceanic airspace via an ATC clearance to do so. At all times, the aircraft is expected to maintain the route, altitude and speed last assigned by ATC. In this particular case, the route of flight that is issued in the oceanic clearance is not the same as that filed in the FPL. The aircraft is advised of the fact that it is receiving an airborne reroute by the statement "ROUTE HAS BEEN CHANGED".

Example 14 – Re-route clearances

Example 14a –Revised route clearance delivered via voice (radio) ABC123 AMENDED ROUTE CLEARANCE SHANWICK OCEANIC RE-CLEARs ABC123 AFTER 57 NORTH 20 WEST TO REROUTE VIA 58 NORTH 015 WEST, GOMUP, GINGA.	Meaning The previously cleared route is to be followed until 57N020W. After passing 57N020W the flight is cleared direct to 58N015W, then direct to GOMUP and then direct to GINGA
Example 14b –Revised route clearance delivered via voice (DCPC) ABC123 AMENDED ROUTE CLEARANCE ABC123 AFTER PASSING 57 NORTH 20 WEST CLEARED REROUTE VIA 58 NORTH 015 WEST, GOMUP, GINGA.	Meaning The previously cleared route is to be followed until 57N020W. After passing 57N020W the flight is cleared direct to 58N015W, then direct to GOMUP and then direct to GINGA.
Example 14c – Revised route clearance delivered via CPDLC ABC123 ROUTE HAS BEEN CHANGED AT 44N030W CLEARED 47N020W OMOKO GUNSO	Meaning The previously cleared route is to be followed until 44N030W. After passing 44N030W the flight is cleared direct to 47N020W, then direct to OMOKO and then direct to GUNSO.
Example 14d – Revised route clearance delivered by CPDLC using UM79 ABC123 CLEARED TO 42N040W VIA ROUTE 42N020W 42N030W	Meaning The previously cleared route is to be followed until 42N020W. After passing 42N020W the flight is cleared direct to 42N030W, then direct to 42N040W

Example 25 – level clearances – no restrictions

Example 25a –Revised level clearance delivered via voice (radio) ABC456 AMENDED LEVEL CLEARANCE. SANTA MARIA OCEANIC CLEARs ABC456 CLIMB TO AND MAINTAIN FLIGHT LEVEL 340. REPORT LEAVING, REPORT REACHING. Note- the instruction to “Report Leaving” is not a requirement, and may not always be included in clearances issued by New York ARTCC	Meaning ABC456 is cleared to climb to and maintain FL 340. If the instruction to “report leaving” is included, flight is to report leaving its current level. The flight is to report reaching FL 340.
Example 25b –Revised level clearance delivered via voice (DCPC) ABC456 CLIMB TO AND MAINTAIN FLIGHT LEVEL 340. REPORT LEAVING, REPORT REACHING. Note- the instruction to “Report Leaving” is not a requirement, and may not be included in all clearances	Meaning ABC456 is cleared to climb to and maintain FL 340. If the instruction to “report leaving” is included, flight is to report leaving its current level. The flight is to report reaching FL 340.

Example 25c – the same clearance delivered via CPDLC CLIMB TO AND MAINTAIN F340 REPORT LEAVING F320 REPORT LEVEL F340 Note- the instruction to “Report Leaving” is not a requirement, and may not always be included in clearances issued by New York ARTCC	Meaning ABC456, which is currently at FL 320, is cleared to climb to and maintain FL 340. The flight is to send a CPDLC downlink message to report leaving FL 320 and to send another CPDLC downlink message to report when the flight has levelled at FL 340.

Example 36 – level clearances – with geographic restrictions/conditions

Example 36a –Revised level clearance delivered via voice (radio) – geographic restriction to reach level by POINT ABC123 AMENDED LEVEL CLEARANCE. SANTA MARIA OCEANIC CLEARS ABC123 CLIMB TO REACH FLIGHT LEVEL 320 BEFORE PASSING 41 NORTH 020 WEST. REPORT LEAVING, REPORT REACHING.	Meaning ABC123 is cleared to climb to and maintain FL 320. Climb must be arranged so that the flight is level in sufficient time to cross 41N020W already level at FL 320. The flight is to report leaving its current level and also to report reaching FL 320.
Example 36b – clearance with the same intent, using different phraseology ABC123 AMENDED LEVEL CLEARANCE. GANDER OCEANIC CLEARS ABC123 CLIMB TO AND MAINTAIN FLIGHT LEVEL 320. CROSS 20 WEST LEVEL. REPORT LEAVING, REPORT REACHING.	Meaning ABC123 is cleared to climb to and maintain FL 320. Climb must be arranged so that the flight is level in sufficient time to cross 41N020W level at FL 320. The flight is to report leaving its current level and also to report reaching FL 320.
Example 36c –Revised level clearance delivered via voice (DCPC) – geographic restriction to reach level by POINT ABC123 CLIMB TO REACH FLIGHT LEVEL 320 BEFORE PASSING 41 NORTH 020 WEST. REPORT LEAVING, REPORT REACHING.	Meaning ABC123 is cleared to climb to and maintain FL 320. Climb must be arranged so that the flight is level in sufficient time to cross 41N020W already level at FL 320. The flight is to report leaving its current level and also to report reaching FL 320.
Example 36d - same clearance delivered via CPDLC CLIMB TO AND MAINTAIN F320 CROSS 41N020W AT F320 REPORT LEAVING F310 REPORT LEVEL F320	Meaning ABC123, which is currently at FL 310, is cleared to climb to and maintain FL 320. Climb must be arranged so that the flight is level in sufficient time to cross 41N020W already level at FL 320. The flight is to send a CPDLC downlink message to report leaving FL 310 and to send another CPDLC downlink message to report when the flight has levelled at FL 320.

Example 36e – Revised level clearance delivered via voice (radio) – geographic restriction to maintain current level until POINT ABC456 AMENDED LEVEL CLEARANCE. SANTA MARIA OCEANIC CLEARS ABC456 MAINTAIN FLIGHT LEVEL 300. AFTER PASSING 41 NORTH 020 WEST CLIMB TO FLIGHT LEVEL 320. REPORT LEAVING, REPORT REACHING. Note- the initial phrase “maintain flight level 300” is not a requirement, and may not always be included in such clearances delivered via voice	Meaning ABC456, which is currently at FL 300, is cleared to climb to and maintain FL 320; however, climb must not commence until after the flight has passed 41N020W. The flight is to report leaving its current level and also to report reaching FL 320. The initial phrase “MAINTAIN FLIGHT LEVEL 300” may be included to bring attention to the fact that the clearance is a conditional level clearance; the level change cannot commence until the specified condition has been met.
Example 36f – Revised level clearance delivered via voice (DCPC) – geographic restriction to maintain current level until POINT ABC456 MAINTAIN FLIGHT LEVEL 300. AFTER PASSING 41 NORTH 020 WEST CLIMB TO FLIGHT LEVEL 320. REPORT LEAVING, REPORT REACHING. Note- the initial phrase “maintain flight level 300” is not a requirement, and may not always be included in such clearances delivered via voice	Meaning ABC456, which is currently at FL 300, is cleared to climb to and maintain FL 320; however, climb must not commence until after the flight has passed 41N020W. The flight is to report leaving its current level and also to report reaching FL 320. The initial phrase “MAINTAIN FLIGHT LEVEL 300” may be included to bring attention to the fact that the clearance is a conditional level clearance; the level change cannot commence until the specified condition has been met.
Example 36g – the same clearance delivered via CPDLC MAINTAIN F300 AT 41N020W CLIMB TO AND MAINTAIN F320 REPORT LEAVING F300 REPORT LEVEL F320	Meaning ABC456, which is currently at FL 300, is cleared to climb to FL 320; however, climb must not commence until the flight reaches 41N020W. The flight is to send a CPDLC downlink message to report leaving FL 300 and to send another CPDLC downlink message to report when the flight has levelled at FL 320. The initial message element “MAINTAIN F300” is intended to bring attention to the fact that the clearance is a conditional level clearance; the level change cannot commence until the specified condition has been met.

Example 47 – level clearances – with time restrictions/conditions

Example 47a – Revised level clearance delivered via voice (radio) –restriction to reach level by TIME ABC123 AMENDED LEVEL CLEARANCE. SANTA MARIA OCEANIC CLEARS ABC123 CLIMB TO FLIGHT LEVEL 320 TO BE LEVEL AT OR BEFORE 1337. REPORT LEAVING, REPORT REACHING.	Meaning ABC123 is cleared to climb to and maintain FL 320. Climb must be arranged so that the flight is level at FL 320 no later than 1337 UTC. The flight is to report leaving its current level and also to report reaching FL 320.
Example 47b –Revised level clearance delivered via voice (DCPC) –restriction to reach level by TIME ABC123 CLIMB TO REACH FLIGHT LEVEL 320 AT OR BEFORE 1337. REPORT LEAVING, REPORT REACHING.	Meaning ABC123 is cleared to climb to and maintain FL 320. Climb must be arranged so that the flight is level at FL 320 no later than 1337 UTC. The flight is to report leaving its current level and also to report reaching FL 320.
Example 47c – the same clearance delivered via CPDLC CLIMB TO REACH F320 BY 1337 REPORT LEAVING F310 REPORT LEVEL F320	Meaning ABC123, which is currently at FL 310, is cleared to climb to and maintain FL 320. Climb must be arranged so that the flight is level at FL 320 no later than 1337 UTC. The flight is to send a CPDLC downlink message to report leaving FL 310 and to send another CPDLC downlink message to report when the flight has levelled at FL 320.
Example 47d – Revised level clearance delivered via voice (radio) –restriction to maintain current level until TIME ABC456 AMENDED LEVEL CLEARANCE. SANTA MARIA OCEANIC CLEARS ABC456 MAINTAIN FLIGHT LEVEL 300. AT 1337 OR AFTER CLIMB TO AND MAINTAIN FLIGHT LEVEL 320. REPORT LEAVING, REPORT REACHING. Note- the initial phrase “maintain flight level 300” is not a requirement, and may not always be included in such clearances delivered via voice.	Meaning ABC456, which is currently at FL 300, is cleared to climb to and maintain FL 320; however, climb cannot be commenced until 1337 UTC, or later. The flight is to report leaving its current level and also to report reaching FL 320. The initial phrase “MAINTAIN FLIGHT LEVEL 300” may be included to bring attention to the fact that the clearance is a conditional level clearance; the level change cannot commence until the specified condition has been met.

Example 47e – Revised level clearance delivered via voice (DCPC) –restriction to maintain current level until TIME ABC456 MAINTAIN FLIGHT LEVEL 300. AT OR AFTER 1337 CLIMB TO AND MAINTAIN FLIGHT LEVEL 320. REPORT LEAVING, REPORT REACHING. Note- the initial phrase “maintain flight level 300” is not a requirement, and may not always be included in such clearances delivered via voice	Meaning ABC456, which is currently at FL 300, is cleared to climb to and maintain FL 320; however, climb cannot be commenced until 1337 UTC, or later. The flight is to report leaving its current level and also to report reaching FL 320. The initial phrase “MAINTAIN FLIGHT LEVEL 300” may be included to bring attention to the fact that the clearance is a conditional level clearance; the level change cannot commence until the specified condition has been met.
Example 47f – the same clearance delivered via CPDLC MAINTAIN F300 AT 1337 CLIMB TO AND MAINTAIN F320 REPORT LEAVING F300 REPORT LEVEL F320	Meaning ABC456, which is currently at FL 300, is cleared to climb to FL 320; however, climb must not commence until 1337 UTC. The flight is to send a CPDLC downlink message to report leaving FL 300 and to send another CPDLC downlink message to report when the flight has levelled at FL 320. The initial message element “MAINTAIN F300” is intended to bring attention to the fact that the clearance is a conditional level clearance; the level change cannot commence until the specified condition has been met.

Example 58 – time restrictions/conditions – reach a point no later than a specified time

Example 58a – time restriction delivered via voice (radio), speed amended – AT OR BEFORE ABC123 AMENDED SPEED CLEARANCE. REYKJAVIK OAC€ CLEARS ABC123 CROSS 63 NORTH 030 WEST AT OR BEFORE 1428.	Meaning ABC123 is to adjust its speed to ensure that the flight will reach 63N030W no later than 1428 UTC.
Example 58b – time restriction delivered via voice (DCPC), speed amended – AT OR BEFORE ABC123 AMENDED SPEED CLEARANCE. ABC123 CROSS 63 NORTH 030 WEST AT OR BEFORE 1428. Note - the initial phrase “amended speed clearance” may not always be included in clearances issued via DCPC	Meaning ABC123 is to adjust its speed to ensure that the flight will reach 63N030W no later than 1428 UTC.
Example 58c – the same clearance delivered via CPDLC CROSS 63N030W AT OR BEFORE 1428	Meaning ABC123 is to adjust its speed to ensure that the flight will reach 63N030W no later than 1428 UTC.

Example 58d – time restriction delivered by radio via voice (using different phraseology) – AT OR BEFORE, then a speed instruction GANDER OCEANIC CLEARS ABC123 CROSS 50 NORTH 040 WEST AT TIME 1428 OR BEFORE. AFTER 40 WEST RESUME MACH 082.	Meaning ABC123, which is currently assigned Mach 082, is to adjust its speed to ensure that the flight will reach 50N040W no later than 1428 UTC. After reaching 50N040W, the flight is to resume maintaining Mach 082.
Example 58e – the same clearance delivered via CPDLC ABC123 CROSS 50N040W AT OR BEFORE 1428 AFTER PASSING 50N040W MAINTAIN MACH 082	Meaning ABC123 is to adjust its speed to ensure that the flight will reach 50N040W no later than 1428 UTC. After passing 50N040W, the flight is to maintain Mach 082.

Example 69 – time restrictions/conditions – cross a point no earlier than a specified time

Example 69a– time restriction delivered via voice (radio) – AT OR AFTER ABC456 AMENDED SPEED CLEARANCE. REYKJAVIK OACG CLEARS ABC456 CROSS 63 NORTH 030 WEST AT OR AFTER 1337.	Meaning ABC456 is to adjust its speed to ensure that the flight will not reach 63N030W earlier than 1337 UTC.
Example 69b– time restriction delivered via voice (DCPC) – AT OR AFTER ABC456 AMENDED SPEED CLEARANCE. ABC456 CROSS 63 NORTH 030 WEST AT OR AFTER 1337. Note - the initial phrase “amended speed clearance” may not always be included in clearances issued via DCPC	Meaning ABC456 is to adjust its speed to ensure that the flight will not reach 63N030W earlier than 1337 UTC.
Example 69c – the same clearance delivered via CPDLC CROSS 63N030W AT OR AFTER 1337	Meaning ABC456 is to adjust its speed to ensure that the flight will not reach 63N030W earlier than 1337 UTC.
Example 69d – time restriction delivered by radio via voice (using different phraseology) – AT OR LATER, then a speed instruction GANDER OCEANIC CLEARS ABC456 CROSS 50 NORTH 040 WEST AT 1337 OR LATER. AFTER 40 WEST RESUME MACH 082.	Meaning ABC456, which is currently assigned Mach 082, is to adjust its speed to ensure that the flight will not reach 50N040W earlier than 1337 UTC. After reaching 50N040W, the flight is to resume maintaining Mach 082.
Example 69e – same clearance delivered via CPDLC CROSS 50N040W AT OR AFTER 1337 AFTER PASSING 50N040W MAINTAIN MACH 082	Meaning ABC456 is to adjust its speed to ensure that the flight will not reach 50N040W earlier than 1337 UTC. After reaching 50N040W, the flight is to maintain Mach 082.

ATTACHMENT 7**WEATHER CONDITIONS & CONSIDERATIONS****1. GENERAL**

1.1 The following text is concerned primarily with the North Atlantic region north of 27°N. The general flow of air masses and weather systems through the Atlantic are described. Followed by more detailed information on the anticipated local conditions in Greenland, Iceland and the United Kingdom.

2. NORTH ATLANTIC WEATHER SYSTEMS

2.1 The weather situations affecting the safety of aviation weather services in the northern part is mainly dominated by depressions and frontal systems, but in the southern part by hurricanes and tropical storms, particularly in the Caribbean sector and the area between Cape Verde and the Leeward and Windward Islands.

2.2 *Semi-permanent Pressure Systems*

2.2.1 The Azores or Bermuda High is a region of subsiding warm air, usually oriented in an east-west line near 30°N in the winter and about 40°N during the summer. This high reaches its peak intensity in the summer months.

2.2.2 The Icelandic Low is a feature of the mean pressure charts of the North Atlantic. It is the result of frequent low pressure systems which, after deepening off the east coast of North America, move into the Iceland region.

2.2.3 The statistical average will show low pressure, but on a daily chart it may not even exist. On occasions the subtropical high is greatly displaced. This alters the main storm track resulting in abnormal weather conditions over large sections of the Atlantic.

2.3 *Migratory Pressure Systems*

2.3.1 Most in-flight weather is produced by frontal depressions. The North Atlantic is a region where new storms intensify or old storms redevelop. New storms may form off the Atlantic Seaboard and intensify as they move north-eastward across the ocean. These storms in particular are most intense in the winter months and have a wide variation in their tracks. Hurricane force winds may be expected near the surface. Sudden deepening of the depressions or changes in the estimated tracks can cause dramatic changes in upper air winds and consequently serious errors in wind forecasts. Winter storms over the North Atlantic should lead to extra careful planning of flights.

2.3.2 Sometimes storms develop west of the Azores and move northward or north-eastward toward Iceland and the United Kingdom. These storms are usually associated with warm highs over western Europe.

2.3.3 Secondary lows often develop west of Greenland when a low moves northeastward across the southern tip. These lows in the Davis Strait-Baffin Bay area result in poor weather conditions in the southeastern Arctic. With the tracks of the main low pressure systems lying to the south of Greenland and Iceland from east to west towards Scotland, cold and often stationary lows form frequently over the Greenland Sea between Iceland and South Greenland. Although these lows are without typical frontal zones, active CB-clouds with snow showers often tend to join into the "semi-front" with continuous snowfall. The same happens in the so-called polar-lows which during winter may develop in arctic air masses around Iceland and between Iceland and Norway.

2.3.4 Tropical storms and hurricanes originate in the Caribbean or eastern Atlantic during the late summer and early fall. They often curve northward around the Bermuda High onto the northern portions of the Atlantic producing severe in-flight and terminal weather.

2.3.5 High pressure areas found over the Atlantic have a variety of paths. Those that move eastward off the North American continent are usually cold domes. In winter these weaken or disappear entirely after they reach the warmer waters of the Gulf Stream. During the summer they generally merge with the Bermuda-Azores High. Occasionally, a high moving eastward off the Labrador coast will continue to build up for two or three days and spread more or less straight eastward to Europe.

2.3.6 Another important facet of the North Atlantic is the effect of the Siberian High. In winter this high may extend southwestward so that its western point reaches across northern Europe and out over the northeastern Atlantic. On rare occasions this high may dominate the entire region of the North Atlantic from Greenland to Europe.

2.3.7 The Azores low is a development that is most widely divergent from the normal conditions. During periods of meridional flow, cold air from northern Canada will advance well southward into the region between Bermuda and the Azores, breaking away from the main body and causing a cold low to develop in that region. These lows usually move very slowly and can become extensive. At the same time high pressure may build up to the Iceland area producing easterly winds over the entire region north of 30N.

2.3.8 On occasions an extensive high pressure area builds up over Europe. This blocks the eastward motion of lows and forces them to curve northward, resulting in the trough over the eastern Atlantic. A ridge then develops in the mid-Atlantic. This ridge in turn blocks lows moving off North America and causes a trough to form near the east coast. These troughs and ridges may persist for days with little motion. In the trough, lows develop, deepen, move northward, and occlude. Development of these low pressure systems is often very rapid, causing sudden, unpredictable weather to occur. One of the most treacherous situations for eastern Canadian terminals occurs when lows deepen or form rapidly south of the Maritimes with a trough northward over the Gulf of St. Lawrence and Labrador.

2.4 Upper Air Circulation

2.4.1 The main flow is generally from west to east but many variations do exist. The winds are stronger in winter when greater horizontal gradients exist. Inevitably, the strongest winds will be located in the western Atlantic. As the air masses traverse the oceanic area, considerable modification occurs resulting in weaker thermal gradients, producing lighter winds over the eastern Atlantic.

2.5 Air Masses

2.5.1 The air masses usually found over the Atlantic are those that have moved across the eastern United States, or southeastward across Canada or the Davis Strait. As these air masses move out over the Atlantic they rapidly assume maritime characteristics. The greatest change in these air masses occurs while crossing the Gulf Stream or the North Atlantic Drift either northward or southward. This modification may be sharp and very noticeable especially during winter months, when the air becomes very unstable with snow or hail showers or even thunderstorms.

2.6 Oceanic Currents and Temperatures

2.6.1 The dominant feature of the North Atlantic is the warm Gulf Stream and its eastward extension, the North Atlantic Drift. As the drift reaches the European sector it branches out. One portion moves northward along the Norwegian coast, known as the Norwegian Current. Another branch flows into the English Channel area. This produces relatively warm sea temperatures along the European shores during the winter months.

2.6.2 A southward flowing branch of the North Atlantic Drift, combined with up-welling, results in a cool current along the west coast of Africa, called the Canarias Current. Cold Arctic water from the Davis Strait reaches the North American coast as far south as New England. This current is referred to as the Labrador Current.

2.6.3 The effect of these currents on the terminal weather around the coastal area of the Atlantic varies with the time of year, the type of air mass involved, and the direction of flow.

3. GREENLAND LOCAL CONDITIONS

3.1 *Seasonal Variation*

3.1.1 Within the Søndrestrøm FIR, Arctic weather conditions such as intense storms, severe icing, severe turbulence, heavy precipitation, snow and water in various forms may be encountered throughout the year. Weather conditions change rapidly. Due to the mixture of warm air over the oceans and cold air over the icecap, heavy fog may build up over the coasts, closing down all of Greenland's airports simultaneously. Changes will often take place within a few minutes and will not always be included in the forecast received in your briefing prior to departure.

3.2 *Sea Conditions*

3.2.1 The waters around Greenland are not influenced by warmer waters such as the Gulf Stream. They are arctic waters with winter temperatures close to 0° Celsius. During the summer period the water temperatures may rise to 3-6° Celsius at the warmest. This is why you may encounter huge amounts of floating ice in the form of icebergs and ice floes at any time of year.

3.3 *Terrain*

3.3.1 The elevation of the highest point in Greenland is 13,120 ft, (4,006m), and the general elevation of the icecap is about 10,000 ft, (3,053m). The combination of low temperatures and high winds may under certain conditions create a lowest usable flight level of FL 235 in the area near the highest terrain, and FL 190 over the icecap. On the route between Søndrestrøm and Kulusuk the lowest usable flight level in general is about FL 130. An equally high flight level can be encountered to and from Narsarsuaq from Canada or Iceland, as crossing the icecap will require a minimum altitude of FL 130. On the route from Nuuk/Godthaab towards Iceland either direct or via Kulusuk NDB, the lowest usable flight level will often be FL 150. On the direct route via the Prince Christian Sound NDB (OZN) to and from Canada or Iceland, the lowest usable flight level to be expected and planned is FL 110.

3.4 *Wintertime Darkness/Summertime Daylight*

3.4.1 VFR flight at night is not allowed in Greenland. This means you are prevented from flying into Narsarsuaq or Kulusuk VFR at night. VFR flight is only permitted from the beginning of the morning civil twilight until the end of civil twilight. Civil twilight ends in the evening when the centre of the sun's disc is 6 degrees below the horizon, and begins in the morning when the centre of the sun's disc is 6 degrees below the horizon. Additional information may be acquired from the airport of your destination or your flight planned alternate.

4. ICELAND LOCAL CONDITIONS

4.1 *Seasonal Variation*

4.1.1 The climate in Iceland is largely influenced by both warm subtropical air and cold polar air currents, as well as ocean currents. The mean January (the coldest month) temperature is about 2°C to 0°C (28°F to 32°F). The mean July (the warmest month) temperature is 9°C to 11°C (48°F to 52°F).

4.1.2 Do not be misled, however, into expecting balmy temperatures and unlimited visibility. Extreme seasonal variations are to be anticipated. Like the majority of the North Atlantic, rapidly changing weather conditions involving severe icing, severe turbulence, and heavy precipitation are common, particularly during the wintertime. Again, these rapid changes make accurate forecasts extremely difficult.

4.2 *Sea Conditions*

4.2.1 Iceland is located near the border between warm and cold ocean currents. The North Atlantic Drift passes just to the south on its course northeastwards, and one of its branches, the Irminger Current encircles

the south, west and partly the north coasts. On the other hand, a branch of the cold East Greenland Current, known as the East Iceland Current, flows in a southerly and south-easterly direction along the east coast. The sea surface temperatures are highest off the south and southwest coasts, 7°C to 8°C in winter, but 8°C to 12°C in summer.

4.3 Terrain

4.3.1 Iceland is a mountainous country with an average elevation of about 1,650 ft. The highest peak is 6,952 ft. (2119 m.) located near the southernmost edge of the island's largest glaciers. Due to the extreme variances in barometric pressure, coupled with high winds, the lowest usable flight level may be FL 120.

4.4 Wintertime Darkness/Summertime Daylight

4.4.1 The shortest period of daylight falls in December. A typical day includes approximately 4 hours of daylight with long twilight periods. During summer nights, the sun remains 6° or more above the horizon, thus experiencing continuous daylight from 2 May to 25 July.

5. UNITED KINGDOM (SCOTLAND) LOCAL CONDITIONS

5.1 Seasonal Variation

5.1.1 The climate over Scotland and the northern part of the UK is influenced by warm maritime and cold polar air masses, modified by the Gulf Stream current. Seasonal variations are to be anticipated, particularly during the wintertime with severe icing, high winds, severe turbulence and heavy precipitation.

5.2 Sea Conditions

5.2.1 The average Mean Sea Surface Temperatures extrapolated for 60N 10W range from 8°C (47°F) in February to 12°C (54°F) in August.

5.3 Terrain

5.3.1 The whole of Scotland is designated as a "sparsely populated area". To the west of the mainland are many groups of islands with few airstrips or NAVAIDS. Scotland is mountainous with the highest peak 4,406 ft. The lowest usable flight level may be FL 075.

6. WATER TEMPERATURES

6.1 In conjunction with changeable weather, the water in the North Atlantic is cold. The following temperatures were taken from the Bunkor Climate Atlas of the North Atlantic and represent average temperatures based on data assembled between 1941 and 1972. All values are in degrees Celsius.

	Frobisher	Goose Bay	Labrador Sea	South Greenland
JAN	0°	0°	2°	2-4°
FEB	0°	0°	2°	2-4°
MAR	0°	0°	2°	2-4°
APR	0°	0°	2°	2-4°
MAY	2°	2°	2°	2-4°
JUN	2°	4°	2°	2-4°
JUL	4°	6°	2°	2-4°
AUG	6°	6-8°	8-10°	6-8°
SEP	6°	6°	2°	2-4°
OCT	4°	4°	2°	2-4°

	Frobisher	Goose Bay	Labrador Sea	South Greenland
NOV	2°	2°	2°	2-4°
DEC	0°	0°	2-4°	2-4°

7. HYPOTHERMIA

7.1 Causes

7.1.1 Hypothermia can develop quickly and kill you. Sometimes referred to as exposure sickness, it is a condition of the body when its inner-core temperature falls to a level at which the vital organs no longer function effectively.

7.1.2 Hypothermia is caused by cold, wetness, and/or wind chilling the body so that it loses heat faster than it can produce it. Frequently the advent of hypothermia is hastened by a deficiency of energy producing food in the body. However, the greatest single contributing factor to hypothermia is improper clothing.

7.1.3 Hypothermia can occur anywhere that the environmental temperature is low enough to reduce the body temperature to a dangerous level. It occurs most frequently at sea or in rugged mountain terrain where a person on foot can pass from a calm and sunny valley to a wind and rain-lashed mountain ridge in a few hours. Most hypothermia accidents occur in outdoor temperatures between 1° and 10° C (30° to 50°F).

7.2 Symptoms

7.2.1 Fortunately the approach of hypothermia is easily noticeable and its advance marked by recognizable steps or stages. If the warning signs are heeded and counter-measures taken, tragedy can be avoided.

7.2.2 Noticeable symptoms normally occur in the following stages:

1. A person feels cold and has to exercise to warm up.
2. He starts to shiver and feel numb.
3. Shivering becomes more intense and uncontrollable.
4. Shivering becomes violent. There is a difficulty in speaking. Thinking becomes sluggish and the mind begins to wander.
5. Shivering decreases and muscles begin to stiffen. Coordination becomes difficult and movements are erratic and jerky. Exposed skin may become blue or puffy. Thinking becomes fuzzy. Appreciation of the seriousness of the situation is vague or nonexistent. However, the victim may still be able to maintain the appearance of knowing where he is and what is going on.
6. The victim becomes irrational, loses contact with the environment, and drifts into a stupor.
7. Victim does not respond to the spoken word. Falls into unconsciousness. Most reflexes cease to function and breathing becomes erratic.
8. Heart and lung centres of the brain stop functioning. The individual is now a fatality.

Note: *Although the above symptoms are those typically noted, one of the editors of this manual has experienced hypothermia and he recalls that his symptoms were NOT easily noticeable. In fact, he was not aware at all that he was slipping into hypothermia. His symptoms were observed by a climbing partner who took appropriate action.*

7.3 *Treatment*

7.3.1 A person who is alert and aware of the potential dangers can help himself in stages 1 through 3. But once the condition has advanced to stage 4 and the person's mind begins to wander, he may not realize what is happening and may well need assistance. Further deterioration will definitely require outside aid. Anyone showing any of the above-mentioned symptoms, including the inability to get up after a rest, is in trouble and needs your help. He may not realize and deny there is a problem. Believe the symptoms, not the victim. Even mild symptoms demand immediate and positive treatment.

1. Get the victim out of the cold, wind, and rain.
2. Strip off all wet clothes.
3. If the person is only mildly impaired;
 - (a) give him warm, non-alcoholic, drinks.
 - (b) get him into dry clothes and a warm sleeping bag;
4. If the victim is semi-conscious or worse;
 - (a) try to keep him awake and give him warm drinks.
 - (b) leave him stripped: put him in a sleeping bag with another person (also stripped); skin to skin contact is the most effective treatment.
5. If he has recovered sufficiently to eat, feed him. Make sure he is dressed in warm clothing and well rested before starting on again.
6. If the victim has to be carried out, make sure his body temperature has been brought up to normal and wrap him in a good sleeping bag before starting out.

7.4 *Prevention*

7.4.1 With the exception of cases involving bodily injury, most hypothermia accidents may be prevented. The first thing to remember is that hypothermia can occur anywhere and at any time that the air temperature drops low enough so that if a body is exposed, its inner-core temperature can be reduced to the danger level. Remember, wind chills the air.

7.4.2 Wet clothing in cold weather extracts heat from the body nearly 200 times faster than dry clothing. Wool clothing provides better protection than cotton in wet weather. In inclement weather, an uncovered head can account for up to 60% of body heat loss. A good wool cap is essential. The most common contributors of the development of problems during cold, wet, and windy weather are lack of proper clothing, inadequate shelter, and exhaustion. The best defense against the advent of hypothermia is to avoid exposure by being prepared.

1. Dress appropriately.
2. Carry rainwear, extra dry clothes, food, and matches.
3. Bring potential dangers to the attention of anyone inappropriately dressed. It could save their life.
4. Make the basic rules of conduct for trail safety clear, and that you expect them to be observed.
5. Travel at the speed of the slowest member of your party.

6. Break frequently for rest and gear check.
7. Distribute candies or other nibble food.
8. Keep watching all members of your party for signs of fatigue or discomfort.

Note: *Items 5. and 6. above refer to the action of journeying on foot. In the case of having had to land or crash-land an aircraft in inhospitable and unpopulated territory, unless circumstances dictate otherwise, it is generally better to remain with the aircraft rather than attempting a trek to safety. The aircraft hull may be able to provide some degree of shelter and importantly, SAR services will have an easier job of locating a downed aircraft than a small group of individuals.*

ATTACHMENT 8

CHECKLIST FOR PRIVATE PILOTS

This Attachment supplements the information in this manual by providing a general checklist for pre-flight preparation, inspection and in-flight contingencies.

Be prepared for systems failure. Know what to do in advance. Always plan a way out of a situation. If a borderline decision must be made, take the safest course of action. Don't exceed pilot or aircraft limitations. If anything, including weather, equipment, or your health, is not up to par, DON'T GO.

Position survival gear so that it is readily available, but clear of controls. The best survival techniques include thorough planning, knowledge of the route, and reliable weather information. There is no room for error in trans-oceanic flight, so plan accordingly, then re-check.

Allow sufficient time for a thorough briefing, planning, and administrative details. Have airplane ready the night before, avoiding the possibility of last minute mistakes.

Pre-Flight Preparation

The following checklist, cross-referenced to text appearing in this manual, will assist you during the preparation stages of your oceanic flight.

1. Current departure, en-route, arrival and topographical charts (Chapter 17)
2. An instrument rating (Chapter 17)
3. Long range NAVAIDS (Chapter 8)
4. Available daylight on your route (Chapter 17)
5. Aircraft inspected by a licensed mechanic for suitability for a long, over water crossing. The necessary aircraft documents (Chapter 17)
6. If transiting Canadian airspace, the required Sea/Polar Survival equipment necessary to adhere to Canadian Air Regulation 540 (Chapter 17)
7. Format to be used when filing an oceanic flight plan (Chapter 4)
8. The proper procedures to be used in obtaining an IFR oceanic clearance (Chapter 6 & Chapter 17 ~~Chapter 5 & Attachment 6~~)
9. How to prevent hypothermia (Chapter 17)
10. VHF radio coverage in the NAT Region (Chapter 6 & State AIPs)
11. A position report and a revised estimate (Chapter 6)
12. SELCAL Code (Chapter 6)
13. Flight planned for FL 285 or above approval from the State of Registry (Foreword & Chapter 1)
14. Approval for flight in ADS-B airspace (Chapter 10).
15. Search and Rescue services. The importance of an ELT (Chapter 1 & Chapter 17)
16. The relevant meteorological information (Chapter 17)
17. Current NOTAMs with special regard to the status of radio-navigation aids and airport restrictions. (Chapter 17)

Pre-Flight Inspection

Pull the cowlings and inspect for leaks and general overall condition.

Inspect:

1. Fuel system and management
2. Radio equipment and condition
3. Engine condition
4. Oil pressure, temperature, and consumption
5. Instruments

Check compass on nearest runway heading to your course.

1. Swing compass with radios and navigation lights ON
2. Check compass deviation with master switch off
3. Check compass deviation with VHF off
4. Check compass deviation with HF both ON and OFF
5. Check compass deviation with pilot heat ON
6. Check compass deviation with rotating beacon ON and OFF
7. Make notes on all deviations
8. Keep alternator load at 50% or less if possible
9. DO NOT assume compass card is accurate ADF may be affected by the alternator, VHF, HF, pilot heat, rotating beacon, autopilot, coastal refraction, or atmospheric conditions. Check and re-check all NAVAIDs receivers.

After a long flight, pilot's ability to handle marginal weather conditions may be in serious doubt. Therefore, weather minimums should be well above the published minimums. Alternate airports should be chosen with the same care.

In-flight contingencies.**Deviations:**

Obtain clearance for deviations unless in an emergency, then the appropriate air traffic services unit must be notified of the action taken and that the action has been taken under emergency authority.

Reports:

Report any problems to Air Traffic Control agencies or on VHF 121.500 MHz as soon as possible. Use the VHF frequency 123.450 MHz as an air-to-air communications channel to ask for assistance if needed.

ATTACHMENT 9

CHECKLIST FOR DISPATCHERS

This Attachment supplements the guidance found in the Guidance for Flight Dispatchers Chapter of NAT Doc 007. It is intended as a checklist for those planning and monitoring/tracking flights in the NAT.

Index

1. Know your Airspace - Regulatory requirements and consequential routing limitations
2. Minimum Equipage (Navigation/Altimetry/Communications)
3. Special non-compliance routings
4. Flight planning
5. Flight Monitoring
6. En-route Equipage Failures
7. Document References
8. Separation Requirements

Checklist for Flight Dispatchers

1. Know your Airspace - Regulatory requirements and consequential routing limitations

Recall Item	Check	Timelines	Reference	
HLA Boundaries	Does my Routing enter the vertical & lateral boundaries of HLA Airspace	4 February 2016	Ensure: » HLA Ops Specs Approval	
PBCS Compliance - I	Understand PBCS requirements	29 March 2018	These standards require your airline to be in compliance with the required communication performance (RCP) 240 and required surveillance performance (RSP) 180.	ICAO Doc 9869, Performance-based Communication and Surveillance (PBCS) Manual Appendices B and C
PBCS Compliance - II	Is my aircraft and crew PBCS Compliant?	29 March 2018	ICAO FPL Filings: PBC : Insert the appropriate descriptor (P2) in Item 10a PBS : Insert relevant required surveillance performance (RSP) specification(s) (RSP180) in Item 18 of the flight plan following the SUR/indicator. CPDLC : Insert the appropriate descriptor (J5 or J7) in Item 10a	

Recall Item	Check	Timelines	Reference	
			of the FPL (unchanged) ADS-C: Automatic Dependent Surveillance — Contract (ADS-C) services shall insert the D1 descriptor in Item 10b of the FPL.	
Mandatory ADS-B Carriage	~~Tango-9~~ ~~Tango-290~~ Northern boundary: 65N000W - 67N010W - 69N020W - 68N030W - 67N040W - 69N050W - 69N060W - BOPUT. Southern boundary: GUNPA (61N000W) - 61N007W - 6040N010W - RATSU (61N010W) - 61N020W - 63N030W - 64N040W - 64N050W - EMBOK		Aircraft not equipped with FANS 1/A (or equivalent) systems will be allowed to operate within this area at DLM designated flight levels, provided the aircraft is suitably equipped (transponder with/ ADS-B extended squitter transmitter).	
~~Tango-9~~ and ~~Tango-290~~ Requirements	a) VHF 8.33 KHz equipped (Item 10a: 'Y') b) NAT HLA certified (Item 10a: 'X') c) RNP 2 certified: -Item 10a: GNSS – 'G' -Item 10a: RNP – 'R' -Item 10a: Other Info – 'Z' -Item 18: 'NAV/RNP2' d) Surveillance equipment - SSR Mode S - Item 10d: E Transponder - Mode S, including aircraft identification, pressure altitude			

Recall Item	Check	Timelines	Reference	
	and extended squitter (ADS-B) capability ADS-B B1 ADS-B with dedicated 1090 MHz ADS-B 'out' capability			
Datalink Mandate Compliance	FL 290 to FL 410 (inclusive) throughout the ICAO NAT Region.		CPDLC: Insert the appropriate descriptor (J5 or J7) in Item 10a of the FPL (unchanged) ADS-C: Automatic Dependent Surveillance — Contract (ADS-C) services shall insert the D1 descriptor in Item 10b of the FPL.	

- State Approvals (NAT HLA /RVSM) See: Chapter 1.
- Approval for flight in NAT ADS-B airspace. See: Chapter 1.

2. Minimum Equipage (Navigation/Altimetry/Communications)

- ✓ NAT HLA See: Chapter 1
- ✓ RVSM. See: Chapter 1 and Chapter 16
- ✓ HF Communications. See: OpSpecs
- ✓ DLM. ADS-C (Automatic Dependent Surveillance Contract) and CPDLC (Controller Pilot Data Link Communications). See: OpSpecs
- ✓ ETOPS/EDTO. See Annex 6 Part 1
- ✓ MEL provisions. See: OpSpecs

3. Special non-compliance routings

- ✓ Long Range Navigation Systems. See : Chapter 1 and Chapter 12.
- ✓ Not approved for NAT HLA /RVSM . See Chapter 1.
- ✓ Routings without functioning HF Communications. See: Chapter 4.
- ✓ Maintenance Flights, temporarily non-RVSM. See: State AIPs.
- ✓ Delivery and Humanitarian Flights. See: State AIPs.

4. Flight planning

- ✓ Eastbound or westbound flights should be flight planned by significant points at whole degrees of latitude at each crossed ten degrees of longitude (10°W, 20°W, 30°W, 40°W etc.);
- ✓ Northbound or southbound flights should be flight planned by parallels of latitude spaced at five degree intervals (65°N, 60°N, 55°N etc.). See Chapter 4 and Chapter 16.
- ✓ Separate Organised Track System (OTS) structures. See: Chapter 2 and Chapter 3.
- ✓ North American Region., transitional airspaces and linking route structures in and through NAM Region. See: Chapter 3 and AIS of the relevant State authorities and/or via their websites.
- ✓ Flight Levels on OTS Track may plan at any of the levels as published for that track. Aircraft on a random route may plan any flight level(s) irrespective of direction. See: North Atlantic Flight Level Allocation Scheme (NAT FLAS Attachment 5). States AIPs and NOTAMs.
- ✓ Mach Number and cost index (ECCON) See: Chapter 4Chapter 7.

- ✓ FPL completion. A free text editor is available on the EUROCONTROL website.
- ✓ Approvals:
 - NAT HLA, the letter 'X', in addition to the letter 'S', within Item 10.
 - RVSM operations, the letter 'W' must also be included in Item 10.
 - RNP approval; in Item 10 (Equipment) with the letter "R" and annotate Item 18, PBN/A1 (RNAV 10 (RNP 10) Approval) or PBN/L1 (RNP 4 Approval). See: Chapter 4.
 - ADS-B, B1 or B2 in Item 10b.
 - PBCS operations, P2 in Item 10a and RSP180 in Item 18 following SUR/.

5. Flight Monitoring

- ✓ ATC Oceanic clearances. See: Chapter 6 Chapter 5
- ✓ Transponder Use. See: Chapter 16
- ✓ Re-Routes. See: Chapter 16
- ✓ En-route Contingencies. Chapter 16
- ✓ Loss of communications and HF failure. See Chapter 16 and Chapter 6.
- ✓ Normal Flight Tracking. See ICAO Annex 6 Part 1 Chapter 3.5.1
 - 3.5.1 For appropriate aircraft, track every 15 minutes
 - 3.5.4 Retention of tracking data
 - Note to 3.5.4 regarding 3rd party normal aircraft tracking...must comply with the policies and procedures of the operator
 - ICAO Circular 347 Normal Flight Tracking – Guidance for Operators

6. En-route Equipage Failures

- ✓ Prior to entering NAT RVSM Airspace See: OPTION 1 to OPTION 3, Chapter 16
- ✓ After entering NAT RVSM Airspace. See: State AIPs.

7. Document References

Reference	Check
PBCS Manual (ICAO Doc 9869)	
PANS ATM Doc.4444	
ICAO Global Operational Data Link (GOLD) Manual (Doc 10037).	
EUR-NAT Supps. Doc 7030	
ICAO Annex 6 Part I	
ICAO Circular 323	
ICAO Circular 347 Normal Flight Tracking	

ATTACHMENT 10

BIBLIOGRAPHY AND OTHER REFERENCE MATERIAL

ICAO Annex 2* – Rules of the Air

www.icao.int

ICAO Annex 6* Operation of aircraft

www.icao.int

ICAO Annex 10* Aeronautical communications

www.icao.int

ICAO Doc 4444* Procedures for Air Navigation Services – Air Traffic Management (PANS–ATM)

www.icao.int

ICAO Doc 7030* (Regional Supplementary Procedures (SUPPS))

www.icao.int

ICAO Doc 8168* Procedures for Air Navigation Services – Aircraft Operations (PANS–OPS)

www.icao.int

ICAO Doc 8643* Aircraft Type designators

www.icao.int

ICAO Doc 9574* Manual on Implementation of a 300 m (1 000 ft) Vertical Separation Minimum Between FL 290 and FL 410 Inclusive

www.icao.int

ICAO Doc 9613* Performance-Based Navigation Manual (PBN)

www.icao.int

ICAO Doc 10037* Global Operational Data Link (GOLD) Manual

www.icao.int

ICAO Doc 9869* Performance-based Communication and Surveillance (PBCS) Manual

www.icao.int

* ICAO saleable documents - Please contact ICAO Headquarters, Montreal sales@icao.int

ICAO Doc 9849* Global Navigation Satellite System (GNSS) Manual

www.icao.int

ICAO Doc 10100* Manual on Space Weather Information In Support of International Air Navigation

www.icao.int

ICAO NAT HF Guidance Material (NAT Doc 003)

www.icao.int/EURNAT/ > [EUR & NAT Documents](#) > [NAT Documents](#) > [NAT Doc 003](#)

Oceanic Errors Safety Bulletin

www.icao.int/EURNAT/ > [EUR & NAT Documents](#) > [NAT Documents](#) > [NAT OES Bulletins](#)

NAT OPS Bulletins

www.icao.int/EURNAT/ > [EUR & NAT Documents](#) > [NAT Documents](#) > [NAT OPS Bulletins](#)

ICAO NAT Planning Documents Supporting Separation Reductions and Other Initiatives

www.icao.int/EURNAT/ > [EUR & NAT Documents](#) > [NAT Documents](#) > [Planning documents supporting separation and other initiatives](#)

Canada AIP

www.NAVCANADA.ca/

Canadian Flight Supplement - A saleable document which can be ordered via:

<http://products.navcanada.ca>

EASA CS-ACNS - Certification Specifications and Acceptable Means of Compliance for Airborne Communications, Navigation and Surveillance

<https://www.easa.europa.eu/en/document-library/easy-access-rules/easy-access-rules-airborne-communications-navigation-and-surveillance> and <https://www.easa.europa.eu/en/certification-specifications/cs-acns-airborne-communications-navigation-and-surveillance>

EASA AMC 20-24

<https://www.easa.europa.eu/en/certification-specifications/amc-20-general-acceptable-means-compliance-airworthiness-products-parts>

ETSO- CS-ETSO

<https://www.easa.europa.eu/en/certification-specifications/cs-etso-european-technical-standard-orders>

Iceland AIP

<http://eaip.samgongustofa.is/>

* ICAO saleable documents - Please contact ICAO Headquarters, Montreal sales@icao.int

Ireland AIP

http://iaip.iaa.ie/iaip/IAIP_Frame_CD.htm

RTCA DO 260/A/B

<https://standards.globalspec.com/std/1994503/rtca-do-260>

UK AIP

<https://nats-uk.ead-it.com/cms-nats/opencms/en/Publications/AIP/>

USA FAA TSO-C14529, TSO-C146, TSO-C196 or later standard (GPS Certification)

<https://drs.faa.gov>

USA FAA AC 20-138() (Airworthiness Approval of GPS)

<https://drs.faa.gov>

USA FAA AC 20-165() (Airworthiness Approval of ADS-B)

<https://drs.faa.gov>

USA FAA AC91-85() (RVSM MASPSs)

https://www.faa.gov/regulations_policies/advisory_circulars/index.cfm/go/document.information/documentID/1035328

USA FAA NAT Resource Guide for U.S. Operators

<https://www.faa.gov/about/officeorg/headquartersoffices/avs/nat-resource-guide>

USA US Airport Facility Directory (NARs)

https://www.faa.gov/air_traffic/flight_info/aeronav/productcatalog/supplementalcharts/
https://www.faa.gov/air_traffic/flight_info/aeronav/digital_products/dafd/

USA US AIP

https://www.faa.gov/air_traffic/publications/

USA US Coastguard GPS advisoryNOTAMs

<http://navcen.uscg.gov/gps-nanu-almanacs-opsadvisores-sof>

— END —

APPENDIX H — NAT ANNUAL SAFETY (ASR) REPORT 2022

(paragraph 3.3.3 refers)

Starts on next page

**SAFETY**

NORTH ATLANTIC SYSTEMS PLANNING GROUP (NAT SPG)

2022 Annual Safety Report DRAFT



2023 Edition

International Civil Aviation Organization (ICAO) North Atlantic Region

2022 Annual Safety Report

Safety Policy

Safety is the NAT SPG's core business function. The NAT SPG is committed to developing, implementing, maintaining and constantly improving strategies and processes to ensure that all our aviation activities take place under a balanced allocation of organizational resources. The NAT SPG aims to achieve the highest level of safety performance and meet regional safety objectives in line with national and international standards, the Global Aviation Safety Plan (GASP), and the Global Air Navigation Plan (GANP).

Objective

The objective of the NAT SPG member States is to maintain and, where possible, improve the agreed safety standards in all activities supporting the provision of air navigation services in the NAT Region:

- All involved States are accountable for the delivery of the agreed level of safety performance in the provision of air navigation services in the North Atlantic Region.
- All involved States are accountable for the delivery of the agreed level of safety performance in aircraft operations in the North Atlantic Region.
- Safety in the NAT Region is managed through the organization and activities of the relevant implementation and oversight groups established by the NAT SPG, in coordination with the non-member States and observers, to achieve its Safety Objective.

Guiding Principles

The NAT SPG will act to:

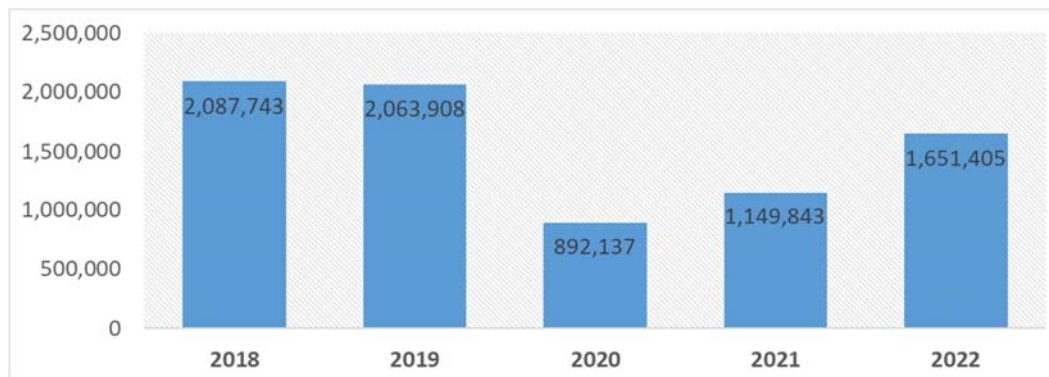
- **Clearly** define all accountabilities and responsibilities for the delivery of safety performance with respect to the provision of air navigation services and participation in the NAT SPG and its contributory bodies;
- **Support** the safety management activities that will result in an organizational culture that fosters safe practices, encourages effective safety reporting and communication, and actively manages safety within the NAT Region;
- **Share** safety related data, knowledge and expertise with concerned stakeholders;
- **Disseminate** safety information and NAT operating requirements to stakeholders;
- **Establish and implement** hazard identification and risk management processes in order to eliminate or mitigate the safety risks associated with air navigation services supporting aircraft operations in the North Atlantic Region;
- **Establish and measure** NAT Region safety performance against agreed safety standards; and
- **Continually improve** our safety performance through safety management processes.

All of the NAT member States contribute experts to the NAT SPG, or one or more of its various subgroups, and so support the overall management of safety in the Region. The NAT safety policy is enhanced by the agreement of member States to use the information shared at NAT SOG meetings for the purposes of education and for making safety improvements within the Region. This has paved the way for members to discuss and share information and act upon it within the framework of the NAT SPG.

Executive Summary

This North Atlantic Region's Annual Safety Report (APR) is issued by ICAO's North Atlantic (NAT) Systems Planning Group (SPG) and covers performance for calendar year 2022.

The NAT SPG structure is established to study, monitor, and evaluate the air navigation system in the NAT region taking into account changes to technology, changing traffic characteristics and traffic forecasts. The number of flight hours in the NAT HLA in 2022 was 1,651,405. This is an increase from that reported in 2021 (1,149,843 flight hours) and reflects the growth of traffic experienced in the NAT throughout the year as traffic begins its recovery to pre-pandemic levels. The busiest recorded week in 2022 (12,247) was approximately 90% of the busiest recorded week for 2019 (13,733).



Safety Performance in the NAT HLA continues to be monitored by the measures and targets associated with Safety Key Performance Indicators (SKPIs) with targets based on three years of rolling data.

While 9 out of 11 SKPIs were met in 2021, 2022 data indicates a reduction to 6 from the agreed set of SKPIs. The SKPIs indicate a reducing performance in the vertical dimension and an increase in the number of reported losses of separation. The SKPIs also indicate positive but stabilising performance in the lateral dimension.

The SKPI performance in the lateral dimension appears to be contradictory with the observed decrease in lateral performance when considering the CRE which indicates a mathematically significant change from 1.0×10^{-9} to 12.9×10^{-9} fatal accidents per flight hour (fapfh). The performance in the lateral dimension is similar to that reported prior to COVID-19.

A year-on-year increase was also observed in the vertical dimension marking an increase on the reported CRE since 2021 at 8.8×10^{-9} (although the 2022 CRE still remains better than pre-pandemic performance levels).

Both lateral and vertical performance metrics are sensitive and can be adversely affected by a single event. With the exclusion of two individual events (one lateral and one vertical) from the calculation, the CRE in both dimensions would be at, or marginally above the target of 5×10^{-9} fapfh. Work continues to identify root causes and implement relevant corrective actions.

As traffic recovers, the number of events reported in 2022 has doubled when compared to that reviewed in 2021 with the profile of root causes similar. The benefits of near, real-time surveillance capability in the NAT has delivered significant benefits in the early detection and mitigation of deviations in the vertical and lateral planes.

The North Atlantic Scenario

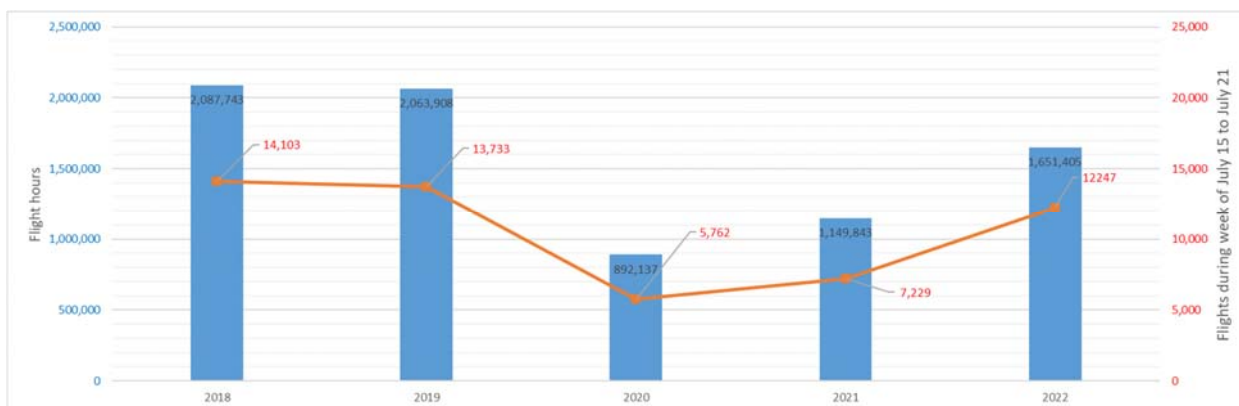
The airspace of the North Atlantic, which links Europe and North America, is the busiest oceanic airspace in the world. The NAT Region is a pioneer in the implementation of advanced procedures and technology supporting the progress of the global air navigation and aviation safety plans.

Traffic mainly flows in a broadly East-West orientation in a twice daily pattern where a daily organized track system takes account of airspace users' needs and weather patterns. NAT core traffic flow is almost exclusively jet transport aircraft that operate in the upper airspace in the en-route phase of flight.

Since March 2019, approximately 70% of the core NAT traffic has been able to make use of the surveillance capability offered by space based Automatic Dependent Surveillance-Broadcast (ADS-B) augmenting an increasing use of Automatic Dependent Surveillance-Contract (ADS-C). The number of flights eligible for the separation standards enabled by ADS-B has increased steadily since the capability was introduced.

Communication is, to a large extent, based on satellite-based data link, also referred to as Controller-Pilot Data Link Communications (CPDLC) with High Frequency radio being utilized less often. This leads to air traffic management and operation that is fundamentally different in concept to typical domestic operations, with a greater focus on strategic rather than tactical techniques although, as the NAT embraces new technologies this balance has begun to change.

The number of flight hours in the NAT HLA in 2022 was 1,651,405, which is an increase from the 1,149,843 in 2021. It is still below the flight hours before the COVID-19 pandemic. The NAT Economic, Financial and Forecast Group (NAT EFFG) estimates that in 2022, during the peak week of July 15 to July 21, approximately 12,247 flights crossed the North Atlantic. This actual figure was 7,229 for that same week in 2021.



Safety Performance Monitoring and Measurement

Collision Risk Estimates

The estimated risk of a mid-air collision, referred to as Collision Risk Estimate (CRE), is reported in terms of fatal accidents per flight-hour (fafh) and is calculated in the lateral and vertical planes. The model used for computation essentially assumes each aircraft is a box having a fixed x, y, and z orientation and approximates the risk of collision by integrating the crossing rate over the period when two boxes are close to each other in each dimension.

Estimates of Vertical and Lateral Collision Risk for 2022 in the NAT HLA are based on risk bearing events reported to the NAT Central Monitoring Agency (CMA) for the period January to December 2022. Flight activity data from five NAT Oceanic Control Areas (OCAs) was used in deriving an estimate of Vertical and Lateral Collision Risk. The risk estimates were calculated for the Middle zone (Gander and Shanwick OCAs), the North zone (the Reykjavik OCA), and the South zone (the New York East and Santa Maria OCAs) and then combined to derive a risk estimate for NAT HLA.

As depicted in figure 1 below, the Vertical Collision Risk Estimate for 2022 was estimated to be 8.8×10^{-9} fafph for all NAT HLA, which is higher in comparison to 2021 estimate (when taking into account SLOP). This increase in collision risk estimate in the vertical dimension is mostly attributed to one 60-minute event in the South zone. Removing this one event would bring the calculated vertical CRE down to 5.0×10^{-9} fafph.

Figure 1 also presents the 2022 lateral risk estimate of 12.9×10^{-9} fatal accidents per flight hour. This represents a significant increase compared to 2021, when that CRE was only 1.0×10^{-9} fatal accidents per flight hour. The main contributor was a 16-minute event in the middle zone on OTS. If this event was removed, the calculated lateral CRE would reduce to 5.6×10^{-9} fafph.

The vertical and lateral CREs are greater than the Target Level of Safety (TLS) for operational and technical errors of 5×10^{-9} fatal accidents per flight hour (fafh).



Figure 1 - Collision Risk Estimates in the NAT HLA (2016-2022)

Safety Key Performance Indicators (KPIs)

The NAT SPG has established Safety KPIs and associated targets for the NAT HLA. The NAT HLA performance in 2022 is shown the table below. The 2022 figures are shown in green where the performance meets the targets and red otherwise.

Safety KPI		Target	Previous rolling three-year period of performance (2019-2020-2021)	2019 Performance	2020 Performance	2021 Performance	2022 Performance
NAT.SKI.01	Number of accidents	0	n/a	0	0	0	0
NAT.SPKI.02a	Number of LHD events divided by number of flight hours flown in the NAT HLA	Reduction over previous rolling three-year period of performance	4.30×10^{-5}	3.59×10^{-5}	4.71×10^{-5}	4.61×10^{-5}	5.87×10^{-5}
NAT.SKPI.02b	Overall time of LHDs at unprotected flight level divided by total duration of flights in minutes	Reduction over previous rolling three-year period of performance	0.697×10^{-6}	0.95×10^{-6}	0.52×10^{-6}	0.623×10^{-6}	1.01×10^{-6}
NAT.SKPI.03a	Number of Lateral deviations divided by number of flight hours flown in the NAT HLA	Reduction over previous rolling three-year period of performance	5.66×10^{-5}	5.71×10^{-5}	6.39×10^{-5}	4.87×10^{-5}	5.57×10^{-5}
NAT.SKPI.03b	Overall time of lateral deviations on an unprotected profile divided by total duration of flights in minutes	Reduction over previous rolling three-year period of performance	1.04×10^{-6}	1.70×10^{-6}	0.82×10^{-6}	0.61×10^{-6}	0.83×10^{-6}
NAT.SKPI.04	Number of losses of separation events divided by number of flight hours flown in the NAT HLA	Reduction over previous rolling three-year period of performance	0.91×10^{-5}	1.65×10^{-5}	0.56×10^{-5}	0.522×10^{-5}	1.27×10^{-5}
NAT.SKPI.05a	Number of coordination errors divided by number of flight hours flown in the NAT HLA	Reduction over previous rolling three-year period of performance	1.85×10^{-5}	0.82×10^{-5}	2.91×10^{-5}	1.83×10^{-5}	1.15×10^{-5}
NAT.SKPI.05b	Overall time of coordination errors spent at unprotected profile divided by total duration of flights in minutes	Reduction over previous rolling three-year period of performance	1.09×10^{-6}	0.16×10^{-6}	2.8×10^{-6}	0.30×10^{-6}	0.03×10^{-6}
NAT.SKPI.06a	Collision Risk Estimate (CRE) in the vertical dimension	5×10^{-9} fapfh	n/a	12×10^{-9}	5.5×10^{-9}	6.1×10^{-9}	8.8×10^{-9}
NAT.SKPI.06b	Collision Risk Estimate (CRE) in the lateral dimension	5×10^{-9} fapfh	n/a	13.6×10^{-9}	3.6×10^{-9}	1.0×10^{-9}	12.9×10^{-9}
NAT.SKPI.07	Regional Effective Implementation (EI) score in ANS for NAT provider States	-Maintain 85% or above until 2026 -Reach 95% by 2030	n/a	n/a	n/a	89.21%	88.58%

Table 1 – Safety Key Performance Indicators (SKPIs) and associated targets (2019-2022)

Scrutiny of events (numbers in brackets are 2021 figures)

The NAT SG carried out the scrutiny of 292 (166) events which were reported to the NAT CMA as occurring in the NAT High Level Airspace (HLA) of the Oceanic Control Area (OCA) of Shanwick, Santa Maria, Reykjavik, New York East, Gander and Bodo during the year 2022. These events were categorized as follows:

- 97 (53) Large Height Deviations (LHDs)
- 100 (56) actual lateral deviations, including:
 - o 38 (23) GNEs and
 - o 36 (5) ATC Interventions where when the Air Traffic Controller (ATCO) caught and corrected a lateral deviation before it developed into a GNE
- 19 (21) coordination events, where coordination between two Units has not been correctly carried out, leading to a vertical, lateral or time event.
- 6 (4) longitudinal loss of separation events.
- 100 (53) prevented events where the ATCO prevented a deviation or an uncoordinated flight profile entering the airspace of another ANSP.

Note : It is important to note that the sum of the values will not equal to the number of events as one event can be counted in one or more dimensions.

It is worth noting that ATC interventions and preventions are positive indicators that the ATC system has recognized an error, often through data link equipage capabilities, warning the controllers in sufficient time to take pre-emptive action. Underlying causes of all lateral deviations (incipient or actual) are often identical – the magnitude depends upon the timeliness of identification and corrective action.

The review of these 292 events of 2022 showed that the top 10 contributing issues allocated to all events were (Arrows indicate relative position from 2021 report):

1. *Flight Plan vs. Clearance* where flying, or intending to fly the planned route instead of the cleared route contributed in 85 (29%) of the events of 2022. In most cases (59 out of the 85), deviations did not actually occur as they were prevented by an ATCO. 
2. *Did not adhere to ATC clearances* in either the vertical or the lateral dimension where a crew, for no identifiable reason, operated a flight profile different to the ATC clearance (e.g. changed vertical profile or routed to a different waypoint which was not contained in the clearance or the filed flight plan or due to contingency) contributed to 40 (14%) of the 2022 events. 
3. *Weather* where weather conditions experienced during the flight contributed in 35 (12%) of the events of 2022. 
4. *ATC coordination* where an error occurring during the coordination between two ATC sectors or ANSPs contributed in 35 (12%) of the events of 2022. 
5. *ATC Clearance*, where a clearance issue contributed in 30 (10%) of the 2022 events. This can for example be caused by ATC not issuing a clearance to an aircraft to match the coordinated profile or by the lack of an appropriate clearance. 

6. *Crew CPDLC uplink message* where crew misunderstood or misread a CPDLC message, or indicated an issue with a CPDLC uplink message, or acknowledged a CPDLC uplink message but did not action it, contributed in 25(9%) of the events in 2022. ↑
7. *ATC Pertinent message not actioned* where ATC response, on receipt of a pertinent message, was not actioned or a message was erroneously discarded contributed in 25 (9%) of the events of 2022. ↔
8. *Crew-Other*, where a crew action contributed to 22 (8%) of the 2022 events but there is insufficient information or evidence to allocate any of the currently scrutinized causal factors. ↔
9. *Incorrect Weather Contingency action* where crew deviated from their assigned clearance to avoid adverse meteorological conditions, but did not follow the correct procedures for in-flight contingencies in Oceanic Airspace contributed to 14 (5%) of the 2022 events. ↔
10. *Truncated Display/ARINC 424* where the FMS does not display the full LAT/LONG waypoints contributed to 13 (4%) of the 2022 events.

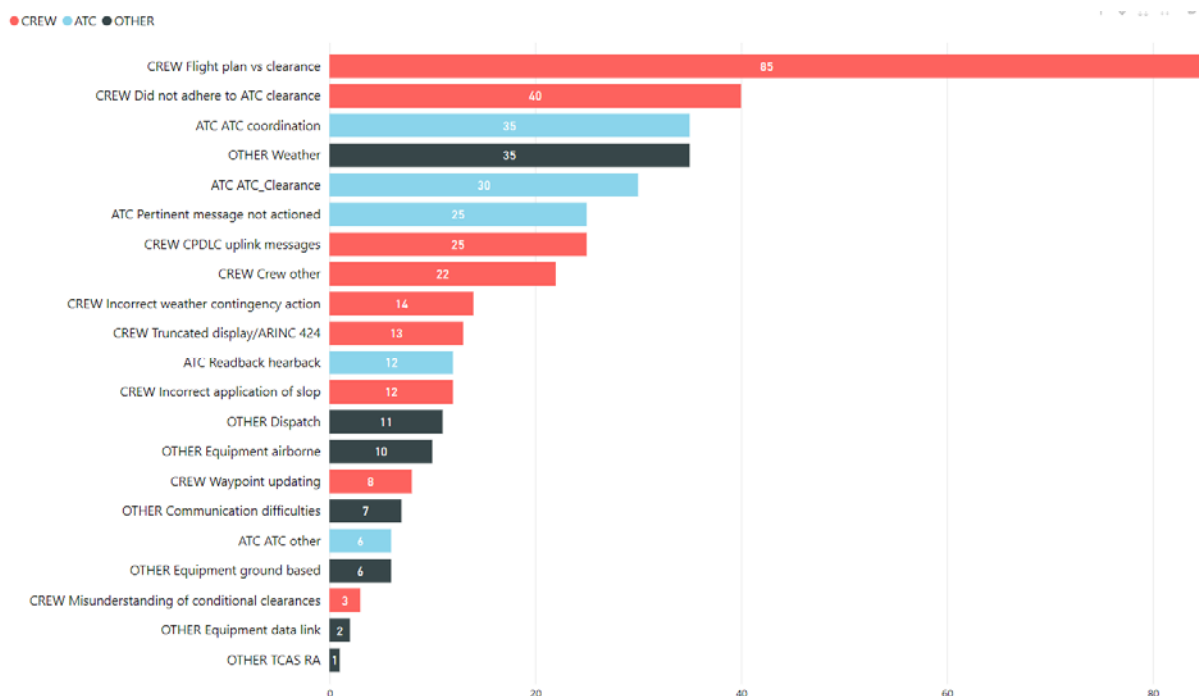


Figure 2: Contributing issues to events in the NAT HLA in 2022

Prevented deviations for all event types were classified according to the implemented mitigations used to avert a deviation. The results of this classification are presented in Figure 3, demonstrating that the practice of requiring position reporting of “NEXT and NEXT +1” and the “CONFIRM ASSIGNED ROUTE” CPDLC message sets (UM137/DM40) are proving to be of benefit.

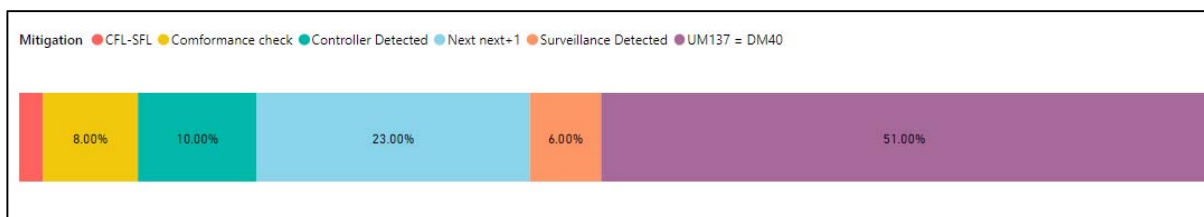


Figure 3: Mitigations used for prevented deviation events in 2022

NAT regional priorities

Early in 2023, a workshop held at the ICAO EUR/NAT office in Paris proposed to refine the NAT vision 2030 high level statement and update the goals and objectives contained therein. Noting that the Vision is now not timebound, it reflects the continued, but ever-changing priorities of the region to adapt to the needs of aviation and deliver a safe operating environment. The NAT Vision Statement is expected to be endorsed at the next meeting of the NAT Systems Planning Group held in mid-2023 and states: “Through collaboration and by leveraging innovation, the NAT SPG leads the way for the provision of safe, secure, efficient, sustainable and resilient Air Traffic Management Services to ensure an optimized seamless service.”

The NAT Vision is evidence of the willingness of all organisations within or bordering the region to work collaboratively to improve the operating environment. The Vision is sympathetic to the changing environment and allows the deliverables to be flexed and reprioritised to deliver the widest benefit for the region over the next decade.

The focus for 2022 has been to rebuild the operating environment and support the growth in traffic demand as the year progressed in its recovery from COVID-19 restrictions. However, the NAT has continued to seek leverage from the benefits that Space-Based ADS-B can offer, by reducing the OTS footprint and exploring innovate “target to target” separations in the Reykjavik CTA. The NAT is working towards the removal of Oceanic Clearances in early 2024 and its enhanced use of “user preferred routings” in its ambition to create seamless boundaries and make a positive impact on some of the causal factors.

Handling today’s traffic profile in more effective ways needs to be done at the same time as developing policies and procedures to facilitate new entrant operators into our system such as those seeking supersonic and hypersonic integration and those developing systems for access to space.

All of this needs to be done while continually seeking to reduce the environmental impacts of the NAT and building resilient and secure systems that can withstand natural and man-made interference while preparing for an ever-developing future.

The NAT vision provides the framework for the region to continue to adapt its services and develop new ways of working to leverage emerging and innovative technologies. The NAT SPG structure ensures that the region implements improvements to its airspace provision while building and enhancing the levels of safety the region has become accustomed to.

Appendix A

ADS-B	Automatic Dependent Surveillance - Broadcast
ADS-C	Automatic Dependent Surveillance – Contract
ANS	Air Navigation Service
ATC	Air Traffic Control
CPDLC	Controller-pilot data link communications (data link)
fapfh	Fatal Accidents per Flight Hour
GASP	Global Aviation Safety Plan
GNE	Gross Navigation Error
HLA	High Level Airspace
ICAO	International Civil Aviation Organization
KPI	Key Performance Indicator
LHD	Large Height Deviation
NAT	North Atlantic
NAT CMA	North Atlantic Central Monitoring Agency
NAT EFFG	North Atlantic Economic, Financial and Forecast Group
NAT MWG	North Atlantic Mathematicians Working Group
NAT SG	North Atlantic Scrutiny Group
NAT SOG	North Atlantic Safety Oversight Group
NAT SPG	North Atlantic Systems Planning Group
OCA	Oceanic Control Area
OTS	Oceanic Track System
SKPI	Safety Key Performance Indicator
SLOP	Strategic Lateral Offset Procedure

— **END** —

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APPENDIX I — PROPOSED AMENDMENTS TO THE *NAT SPG HANDBOOK* (NAT DOC 001)

(paragraphs 5.1.4 and 5.2.2 refer)

Starts on next page



European and North
Atlantic Office

NAT Doc 001

NAT SPG HANDBOOK

Second Edition

~~Version 2.7.0 – 2022~~ Version 2.8.0 – 2023

Approved by NAT SPG/59

Prepared by the ICAO European and North Atlantic Office

on behalf of the North Atlantic Systems Planning Group (NAT SPG)

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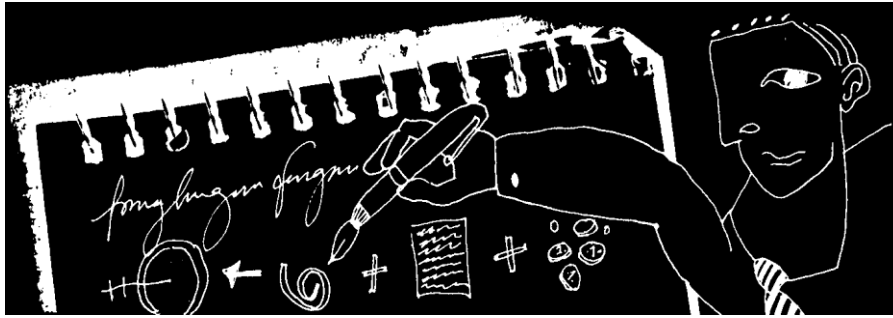
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Appendix A—NAT Regional Safety Case Template 1

List of Acronyms a



*And so while the great ones depart for their dinner
The secretary stays, growing thinner and thinner
Racking his brain to record and report
What he thinks that they think that they ought to have thought.*

(Anstey)

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RECORD OF AMENDMENTS

As of December 2015, the *NAT SPG Handbook* is published as

2nd Edition, V2.0.0, December 2015, introduced the following changes*

- Update to Canada’s representatives
- Updates to Terms of Reference (ToR):
 - NAT IMG (*NAT SPG Conclusion 51/01 & NATSPG/51 Report*, Appendix B refer);
 - NAT EFFG (*NAT SPG Conclusion 51/02 & NATSPG/51 Report*, Appendix E refer);
 - NAT MWG (*NAT SPG Conclusion 51/03 & NATSPG/51 Report*, Appendix F refer).
- Removal of mention of NAT TFG, replaced by NAT EFFG where referenced (*NAT SPG Conclusion 51/02 & NATSPG/51 Report*, Appendix E refer);
- Update to NAT Document configuration management (*NAT SPG Conclusion 51/17 & NATSPG/51 Report*, Appendix N and Appendix O refer);
- Update to NAT SPG policies (*NAT SPG Conclusion 51/18 & NATSPG/51 Report*, Appendix P refer);
- Inclusion of NAT Doc 010 (*NAT SPG Conclusion 51/24 & NATSPG/51 Report*, Appendix R refer);
- Insertion of a new section *Projects and Project Teams for the NAT SPG Working Structure*, starting at page 22, from NAT SPG agreement (*NAT SPG/52 report*, paragraphs 1.1.12 refers), and adapted from NAT IMG text (*NAT IMG47 Summary of Discussions*, paragraphs 3.7 and 3.8), (approved by NAT SPG by correspondence, silence procedure – EUR/NAT SL 15-0590.TEC refers);
- Updates to the NAT IMG working structure (*NAT IMG Decision 47/01*, with approval from NAT SPG by correspondence, silence procedure – EUR/NAT SL 15-0590.TEC refers):
 - Removal of NAT ATMG, NAT CNSG, NAT SARSIG, their contributory groups (NAT ACSG and NAT OPS/AIR), and NICE ToRs;
 - Insertion of NAT POG and NAT TIG ToRs;
 - Reference made to NAT POG instead of NAT ATMG, and NAT TIG instead of NAT CNSG, and to POG and/or TIG, as appropriate, in replacement of reference to NAT ACSG, NAT OPS/AIR, and NAT SARSIG.
- Regrouping of NAT CMA, NAT DMO, and NAT DLMA as “NAT SPG Services”, starting at page 38;
- Correction to NAT CMA ToRs: the text have been corrected to be that endorsed by NAT SPG Conclusion 50/30;
- Update to the NAT SPG Working Structure, at page 13;
- Update to the following, due to NAT Doc 002 having been superseded by the “*Pan-Regional (APAC and NAT) Interface Control Document for ATS Inter-facility Data Communication (PAN ICD AIDC)*” (*NAT IMG Decision 45/6* refers, approved by correspondence):
 - *Documents promulgated by the NAT SPG* at page 52; and
 - *Status of Documents* (Appendix A).
- Editorial corrections:
 - Change of EUR/NAT Office public website: www.icao.int/EURNAT

* *The numbering scheme (NAT SPG Conclusion 51/19 refers), being mostly editorial, will be inserted in a future revision*

Amendment 1, V2.1.0, July 2016, introduced the following changes

- Numbering of paragraphs (*NAT SPG Conclusion 51/19* refers);
- Inclusion of IFAIMA (International Federation of Aeronautical Information Management Association) in section 1 — 3 (*NAT SPG Conclusion 52/21* refers);
- Update to Portugal’s representatives, in section 1 — 15;
- Precision that project leads should be members of project supervisory body and are to report to parent group, in section 1 — 14, 14.1 (*NAT SPG Conclusion 52/13* refers);
- Correction that the parent group is the one that agrees on its contributory groups’ programmes, in section 1 — 14, 14.2 a) (*NAT SPG Conclusion 52/13* refers);
- Updates to *Documents promulgated by the NAT SPG*, in section 6:A (*NAT SPG Conclusion 52/13* refers):
 - section title changed to reflect that not all documents in the section have a NAT reference;;
 - maintenance of NAT Doc 003 under NAT POG responsibility, in coordination with NAT TIG;
 - inclusion of NAT eANP volume III in the list, for future reference; and
 - precision that NAT SDR (NAT Doc 009) to eventually be discontinued once NAT eANP Volume III approved.
- As a consequence of Proposal for Amendment (PfA) EUR/NAT-S 16/02:
 - Replaced MNPS by HLA in the Terms of Reference (ToR) of the NAT SG, in section 3 — 3:D;
 - Mention of “MNPS” completed to become “MNPS / NAT HLA in Detailed Oceanic Event Reports Content, in Section 6 — 6:B; and
 - Mention of “MNPS airspace” completed to become “MNPS airspace (NAT HLA)” in Occurrence Classification Codes, in section 6 — 6:C.
- Updates to the *Status of documents promulgated by the NAT SPG*, in Appendix A (*NAT SPG Conclusion 52/13* refers);
- Inclusion of a list of acronyms.

Amendment 2, V2.2.0, June 2017, introduced the following changes [C 53/23]

- Updates in section 1 — 18: Representatives of Canada, Denmark and Portugal;
- Editorial update in section 2:A — Terms of Reference of the NAT IMG: deletion of reference to NAT SDR (NAT Doc 009) in paragraph 1, taking account of the incorporation of the NAT SDR in the ICAO NAT eANP Volume III (*NAT SPG Conclusion 53/21* refers);
- Updates in section 4:A — Terms of Reference of the CMA (*NAT SPG Conclusion 53/9* refers);
- Updates in section 5:A — *Safety Related Policies*:
 - Updates to 5:A — [02] *List of safety key performance indicators for the ICAO NAT Region* (*NAT SPG Conclusion 53/15* refers); and
 - Insertion of 5:A — [04] *Definition and Components of safety cases in support of changes to the NAT air navigation system requiring NAT SPG approval* (*NAT SPG Conclusion 53/16* refers);
- In section 5:B — *Implementation Planning Policies*: deletion of [17] *Mapping of the NAT SDR with the ICAO GANP/ASBU* (C 49/10), taking account of the incorporation of the NAT SDR in the ICAO NAT eANP Volume III (*NAT SPG Conclusion 53/21* refers);
- In section 6:A — *Documents promulgated by the NAT SPG* (*NAT SPG Conclusion 53/22* refers):
 - change to format of table and deletion of Appendix A *Status of documents*;
 - clarifications on definition of NAT bulletins (NAT OPS bulletins and NAT OESB) in “Remarks” column in order to avoid duplication with provisions in NAT Doc 007;
 - updates to the status of the following documents:
 - NAT Doc 001 – *NAT SPG Handbook* – to be issued in June 2017 (*NAT SPG Conclusion 53/22* refers);
 - NAT Doc 008 – *NAT Application of Separation Minima (ASM)* – approved by NAT IMG (NAT IMG Decision 50/6 refers) and supported by the NAT SOG/16 (NAT SOG/16 SoD, paragraph 4.32 refers) and issued in June 2017;
 - NAT Doc 009 – *NAT Service Development Roadmap (SDR)* – discontinued as it has been integrated into the NAT eANP Volume III Companion Document, *NAT Global Air Navigation Plan (GANP) Aviation System Block Upgrades (ASBU) Report* (*NAT SPG Conclusion 53/21* refers), and
 - NAT OPS Bulletin 2017_002 – OESB – *NAT Oceanic Errors Safety Bulletin* – approved by NAT SOG/15 (NAT SOG Decision 15/4 refers) and issued in January 2017; and
- New Appendix A: ICAO High Seas Coordination Procedure (*NAT SPG Conclusion 53/23* refers).

Amendment 3, V2.3.0, June 2018, introduced the following changes [C 54/12 & 54/19]

- Section 1: #7 – NAT SPG duration and suggested Agenda – deleted;
- Section 1: #8 – Meeting Documentation – updated;
- Section 1: #11 – Guidelines for basic requirements for Chairpersons/ vice-Chairpersons/Rapporteurs – deleted;
- Section 1: #13 – NAT SPG representatives – updated;
- Section 2:B: #5 – Formulation of recommendations to the NAT IMG – updated;
- Section 3:B: #1 – Formulation of recommendations to the NAT SOG – updated;
- Section 3:C – Working Methods of NAT MWG – updated;
- Section 4:C – Terms of Reference of NAT DMO – updated;
- Section 5:A, 5:B, 5:C – NAT SPG Policies – updated;
- Section 6:A – Documents promulgated by the NAT SPG– updated;
- Section 6:B – Detailed Oceanic Event Reports Content – deleted;
- Section 6:C – Occurrence Classification Codes – deleted;
- Appendix A – High Seas Coordination Procedure – deleted; and
- Editorial and consequential updates to paragraph numbering and footnotes.

Amendment 4, V2.4.0, July 2019, introduced the following changes [C 55/19]

- Section 1: #3 – Observers – updated to include Trinidad and Tobago, EUROCONTROL and IFALDA;
- Section 1: #13 – NAT SPG representatives – updated;
- Section 2:C – Composition of NAT POG – updated to include EUROCONTROL and IFALDA;
- Section 2:D – Composition of NAT TIG – updated to include ARINC, EUROCONTROL, IFALDA, Inmarsat, Iridium and Sitaonair;
- Section 3:A – Terms of Reference of NAT SOG – updated;
- Section 3:D – Composition and Working Methods of NAT SG – updated;
- Section 4:A – Terms of Reference of NAT CMA – updated;
- Section 5:A – Safety Related Policies [02] Safety KPIs and [04] Definition and Components of Safety Cases – amended;
- Section 5:B – Implementation Planning Policies [07] NAT PBCS Requirements (C 55/06 refers) and [08] ASEPS phraseology and definitions (C 55/11 refers) inserted;
- In section 6:A — *Documents promulgated by the NAT SPG*, updates to the status of the following documents:
 - NAT Doc 001 – *NAT SPG Handbook* – to be issued in July 2019 (C 55/19 refers);
 - NAT Doc 006 – *Air Traffic Management Operational Contingency Plan – North Atlantic Region – Version 1.12* – to be issued in July 2019 (C 55/20 refers);
 - NAT Doc 007 – *North Atlantic Operations and Airspace Manual – Version V 2019-3* – to be issued in July 2019 (C 55/21 refers);
 - NAT Doc 008 – *Application of Separation Minima – North Atlantic Region* (NAT ASM) Version 1.8 – approved by NAT IMG (NAT IMG Decision 53/7 refers) and supported by the NAT SOG/19 (NAT SOG Decision 19/07 refers) and issued in December 2018; and
 - NAT Doc 010 – *Consolidated Reporting Responsibilities Handbook – North Atlantic Region* Version June 2019 – to be issued in July 2019 (C 55/23 refers).
- Appendix A: NAT Safety Case Template inserted.

Amendment 5, V2.5.0, February 2021, introduced the following changes [C 56-2/7]

- Section 1: #13 – NAT SPG representatives of Norway and United States – updated;
- Section 5:B: Implementation Planning Policies – [08] ASEPS phraseology and definition (C 55/11) – deleted;
- Section 6:A — *Documents promulgated by the NAT SPG*, updates to the status of the following documents:
 - NAT Doc 001 – *NAT SPG Handbook* – February 2021 (C 56-2/7 refers);
 - NAT Doc 006 – *Air Traffic Management Operational Contingency Plan – North Atlantic Region – Version 1.15* – February 2021 (C 56-2/8 refers);
 - NAT Doc 007 – *North Atlantic Operations and Airspace Manual* – Version V2021-1 – February 2021 (C 56-2/9 & C 56-2/10 refer);
 - NAT Doc 008 – *Application of Separation Minima – North Atlantic Region* (NAT ASM) Version 1.10 – approved by NAT IMG (NAT IMG Decision 57/4 refers) and supported by the NAT SOG/23 (NAT SOG/23 SoD para. 4.34 refers) – December 2020;
 - NAT Doc 010 – *Consolidated Reporting Responsibilities Handbook – North Atlantic Region* – Version 2021 – February 2021 (C 56-2/11 refers);
 - 2019 GANP ASBU Implementation Status Report – NAT Region – February 2021 (C 56-2/6 refers); and
 - NAT OESB – NAT Oceanic Errors Safety Bulletin NAT OPS Bulletin 2017_002_rev3 – December 2020 (NAT SOG Decision 23/03 refers).
- Appendix A: Section 2, part D, Regional Safety Case Checklist – inserted (C 56-2/7 refers).

Amendment 6, V2.6.0, June 2021, introduced the following changes [C 57/12]

- Section 1: #13 – NAT SPG representatives of Canada, Denmark, Norway and United Kingdom - updated;
- Section 3:A – NAT SOG Terms of Reference - updates resulting from the NAT SOG Working Methods Project Team (WMPT);
- Section 3:C – NAT MWG Terms of Reference - updates resulting from the NAT SOG Working Methods Project Team (WMPT);
- Section 3:D – NAT SG Terms of Reference - updates resulting from the NAT SOG Working Methods Project Team (WMPT);
- Section 4:C — NAT DMO Terms of Reference (C 57/9 refers) - updated;
- Section 5:A, paragraph [04] – “Definition and Components of Safety Cases in support of changes to the NAT air navigation systems requiring NAT SPG approval” - updates resulting from the NAT SOG Working Methods Project Team (WMPT);
- Section 5:A, paragraph [05] – Minimum Height Monitoring Requirements (C 56-2/05 refers) - new;
- Section 6:A — *Documents promulgated by the NAT SPG*:
 - clarifications on NAT OPS bulletins in headings: “Kept under review by” and “Amendments approved by” and “Remarks” column in order to streamline maintenance of these documents (C 57/9 refers);
 - updates to the status of the following documents:
 - NAT Doc 001 – *NAT SPG Handbook* – July 2021 (C 57/12 refers);
 - NAT Doc 006, Part II – *Volcanic Ash Contingency Plan (VACP), Europe and North Atlantic Regions – Version 2.0.1* (NAT Doc 006, Part II, VACP) – July 2021 (C 57/13 refers);

- NAT Doc 007 – *North Atlantic Operations and Airspace Manual* – Version V2021-2 – July 2021 (C 57/14 refers); and
- NAT Doc 011 - *PBCS Monitoring and Reporting Guidance* – July 2021 (C 57/7 refers).
- Appendix A “NAT REGIONAL SAFETY CASE TEMPLATE”, Section 3 “NAT Safety Case Terms and Definitions” - updates resulting from the NAT SOG Working Methods Project Team (WMPT).

Amendment 7, V2.7.0, August 2022, introduced the following changes [C 58/15]

- Section 1: #18 – NAT SPG representatives - updated;
- Section 1: NAT SPG Terms of Reference – updates to reflect C-WP/14983 Rev.2, C-DEC 219/7 (*Generic Terms of Reference for Planning and Implementation Groups and Regional Aviation Safety Groups (PIRGs/RASGs)*), approved by the President of the Council on 21 August 2020) (C 58/15 refers);
- Section 5:A, [02] *Amendments to the list of safety key performance indicators for the ICAO NAT Region, Table 1 - Safety Key Performance Indicators and related targets and Table 2 - Target Level Of Safety* - updates from the NAT SOG Safety Key Performance Indicator (SKPI) Review Project Team;
- Section 6:A — *Documents promulgated by the NAT SPG*:
 - updates to the status of the following documents:
 - NAT Doc 001 – *NAT SPG Handbook* – Version 2.7.0 – August 2022 (C 58/15 refers);
 - NAT Doc 005 – *Future ATM Concept of Operations for the North Atlantic Region* – **Discontinued** (C 58/2 [CORR] refers);
 - NAT Doc 006, Part I – *Air Traffic Management Operational Contingency Plan – North Atlantic Region* – Version 2.0 – August 2022 (C 58/16 refers);
 - Amendment to NAT Doc 011 – *PBCS Monitoring and Reporting Guidance* – Version 2022 – August 2022 and inclusion of NAT IMG to the list of groups responsible for updates of the NAT Doc 011 (C 58/18 refers);
 - NAT eANP Vol III (ICAO Doc 9634) – Volume III of the electronic Air Navigation Plan – North Atlantic Region – 2022 January 2022 (C 58/1 [CORR] refers);
 - Minimum Monitoring Requirements: North Atlantic RVSM – **Discontinued**; and
 - NAT OPS Bulletin 2017_002_rev4 NAT OESB - *NAT Oceanic Errors Safety Bulletin* and NAT OPS Bulletin 2017_005_Rev1 NAT OESB *Supplements - NAT Sample Oceanic Checklists* (NAT SOG Decisions 24/02 and 24/03 refer).

Amendment 8, V2.8.0, July 2023, introduced the following changes [C 59/16]

- Section 1: #18 – NAT SPG representatives - Canada, Denmark and Ireland updated;
- Section 5:A, paragraph [04] Definition and Components of Regional Safety Cases in support of changes to the NAT air navigation systems requiring NAT SPG approval;
- Section 5:A, paragraph [05] Minimum Height Monitoring Requirements (C 59/15 refers);
- Section 5:A, new paragraph [06] Data link communication log retention by ANSPs and CSPs (C 59/7 refers);
- Section 6:A — *Documents promulgated by the NAT SPG*:
 - updates to the status of the following documents:
 - NAT Doc 001 – *NAT SPG Handbook* – Version 2.8.0,— July 2023 (C 59/16 refers);

- NAT Doc 006, Part I – *Air Traffic Management Operational Contingency Plan – North Atlantic Region* – Edition 2.0, Amd. 1, January 2023 (C 59/1 refers);
- NAT Doc 006, Part III – *Space Weather Contingency Procedures – North Atlantic Region* – Edition 1, January 2023 (C 59/1 refers);
- NAT Doc 007 – *North Atlantic Operations and Airspace Manual* – v.2023-1, January 2023 (C 59/2 refers);
- NAT Doc 007 – *North Atlantic Operations and Airspace Manual* – v.2024-1, (publication 23 October 2023, effective 21 March 2024) (C 59/10 refers);
- NAT Doc 008 – *Application of Separation Minima - North Atlantic Region* – Edition 1, Amendment 12, July 2023 (C 59/18 refers);
- NAT Doc 011 – *PBCS Monitoring and Reporting Guidance* – Edition 1, Amendment 2, July 2023 (C 59/19 refers);
- NAT Doc 012, *NAT TIG ATSP Analyst Handbook* – Version 2023, July 2023 (C 59/20 refers); and
- NAT eANP Vol III (ICAO Doc 9634), Volume III of the electronic Air Navigation Plan – North Atlantic Region – July 2023 (C 59/5 refers).

0 — INTRODUCTION

The North Atlantic Systems Planning Group (NAT SPG) was established in 1965 by the Council of ICAO as the first regional planning group. From its Terms of Reference the NAT SPG shall continuously study, monitor and evaluate the Air Navigation system in the light of changing traffic characteristics, technological advances and updated traffic forecasts.

At the 10th Air Navigation Conference, Montreal 5 - 20 September 1991, the ICAO Communications, Navigation and Surveillance/Air Traffic Management (CNS/ATM) System was endorsed, and at the Limited North Atlantic Regional Air Navigation (LIM NAT RAN) Meeting, held in Cascais, Portugal 3 - 18 November 1992, the NAT SPG was tasked to develop proposals for CNS/ATM systems implementation actions as well as proposals for institutional arrangements.

In order to meet these new challenges, a Meeting of North Atlantic High Level Managers, held in Paris 20 - 21 January 1994, created a North Atlantic Implementation Management Group (NAT IMG) to co-ordinate and manage - on behalf of the NAT SPG itself - the NAT Implementation Plan. This led the NAT SPG to review and revise its organization and working methods.

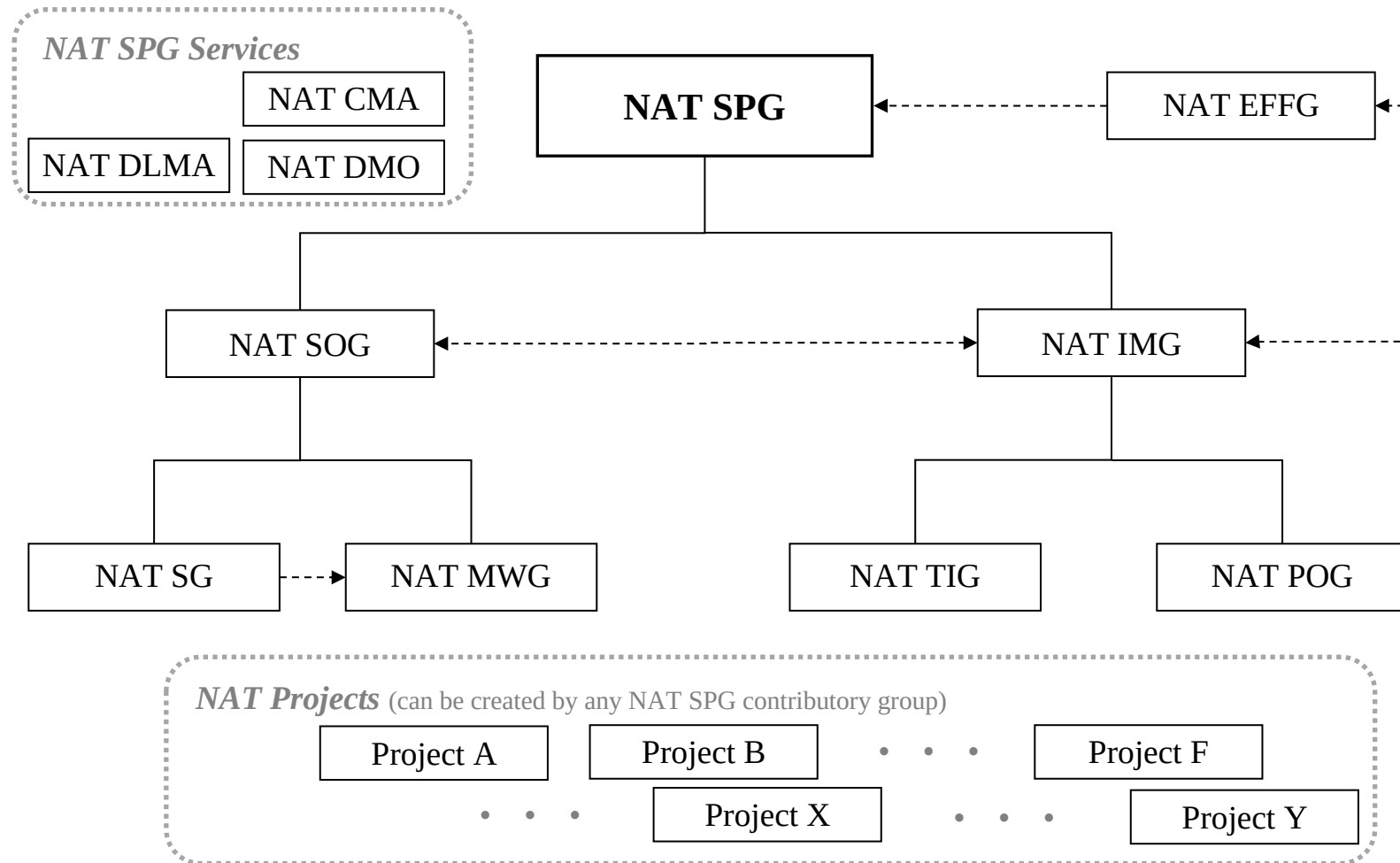
At NAT SPG/45, Paris, 23-26 June 2009, it was agreed to make adjustments to the [NAT SPG working structure](#) and to the terms of reference of its contributory bodies to accommodate the change in emphasis to performance based requirements, as driven by the Global ANP, and to take account of the Global Aviation Safety Plan (GASP). At the same time, the NAT SPG approved a high level [safety policy](#) which would be applicable to its work.

The purpose of the NAT SPG Handbook is to give an overview of the organization of the NAT SPG and its different groups, including terms of reference, working methods, participation, allocated Lines of Action from the NAT Implementation Plan and relevant Points of Contact. The handbook will be helpful to States and international organizations when planning and managing the resources for participation in the work.

The NAT SPG Handbook is published by the ICAO European and North Atlantic Office on behalf of the Chairperson of the NAT SPG and distributed to all identified Points of Contact in the NAT SPG organization.

Hlin HOLM
Chairperson of the NAT SPG

0:A — NAT SPG WORKING STRUCTURE



0:B — SAFETY POLICY STATEMENT

(As endorsed by NAT SPG/45 in June 2009, NAT SPG Conclusion 45/1 refers)

Safety is one of the NAT SPG's core business functions. The NAT SPG is committed to developing, implementing, maintaining and constantly improving strategies and processes to ensure that all our aviation activities take place under a balanced allocation of organizational resources. The NAT SPG will aim to achieve the highest level of safety performance and meet regional safety objectives in line with national and international standards, the Global Aviation Safety Plan (GASP) and the Global Air Navigation Plan.

OBJECTIVE

The objective of the NAT SPG member States is to maintain and, where possible, improve the agreed safety standards in all activities supporting the provision of air navigation services in the North Atlantic Region:

- All involved States are accountable for the delivery of the agreed level of safety performance in the provision of air navigation services in the North Atlantic Region.
- All involved States are accountable for the delivery of the agreed level of safety performance in aircraft operations in the North Atlantic Region.
- Safety in the NAT Region is managed through the organization and activities of the relevant implementation and oversight groups established by the NAT SPG, in coordination with the non-member States and observers, to achieve its Safety Objective.

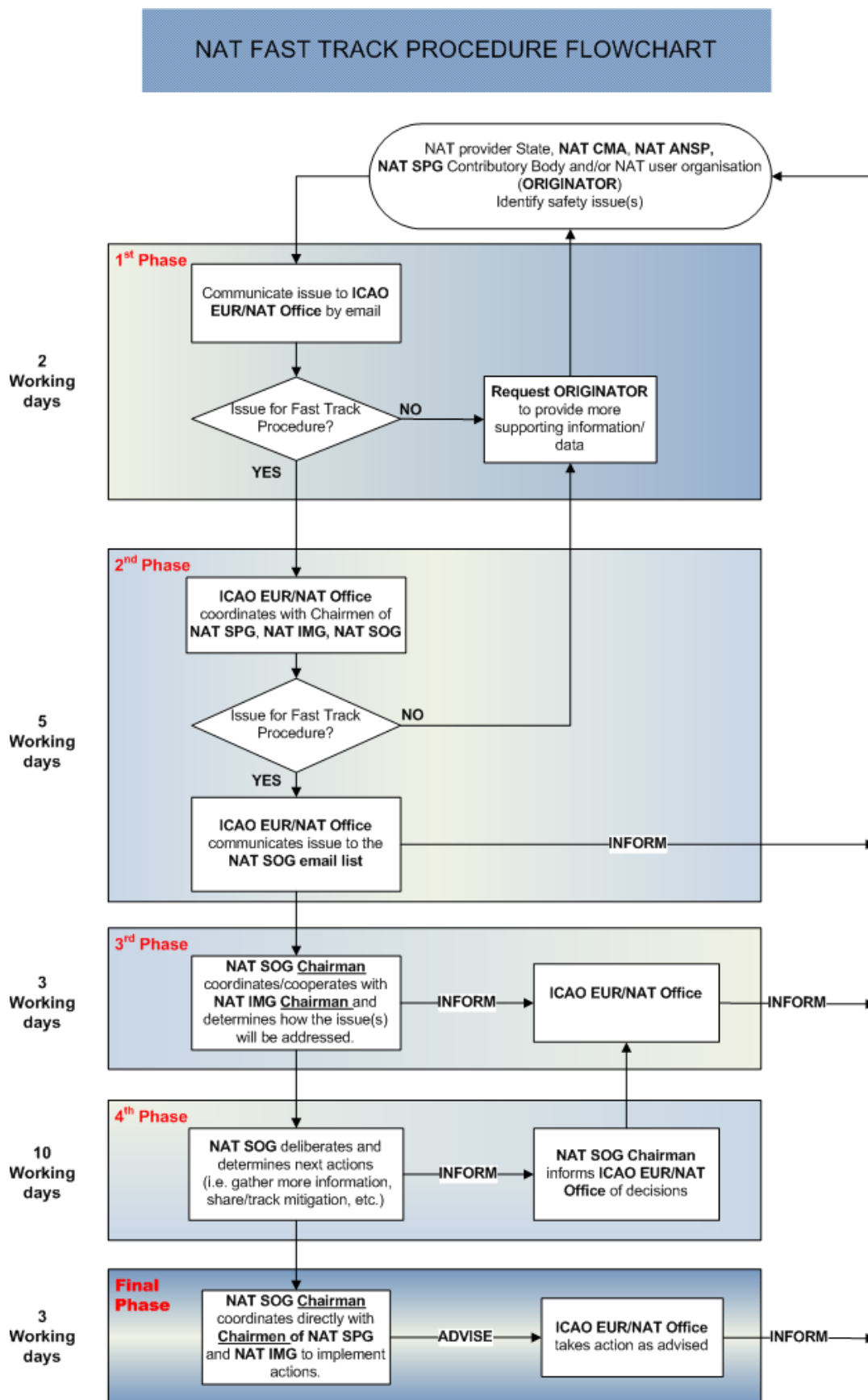
Guiding Principles

The NAT SPG will act to:

- **Clearly define** all accountabilities and responsibilities for the delivery of safety performance with respect to the provision of air navigation services and participation in the NAT SPG and its contributory bodies;
- **Support** the safety management activities that will result in an organizational culture that fosters safe practices, encourages effective safety reporting and communication, and actively manages safety within the NAT Region;
- **Share** safety related data, knowledge and expertise with concerned stakeholders;
- **Disseminate** safety information and NAT operating requirements to stakeholders;
- **Establish and implement** hazard identification and risk management processes in order to eliminate or mitigate the safety risks associated with air navigation services supporting aircraft operations in the North Atlantic Region;
- **Establish and measure** NAT Region safety performance against agreed safety standards; and
- **Continually improve** our safety performance through safety management processes

0:C — NAT FAST TRACK PROCEDURE FOR SAFETY OCCURRENCES

(As endorsed by NAT SPG/50 in June 2014, NAT SPG Conclusion 50/16 refers)





NAT FAST Track Procedure for Safety Occurrences Reporting Form

ORIGINATOR: (NAT Provider State, NAT CMA, NAT ANSP, NAT SPG Contributory Body and/or NAT user organisation)	<i>[Indicate here who is at the origin of the NAT Fast Track Procedure (NFTP) request]</i>
Contact Point: name, email, phone number	<i>[Provide here contact details on who to ask for further information on the safety issue that triggered this NFTP request, and who to report to on the progress of this NFTP request]</i>
Domain(s) affected	<i>[Indicate here the operational domains/activities affected by the safety issue that triggered this NFTP request, for example: flight plan processing, phraseology etc.]</i>
Geographical area affected	<i>[Indicate here the geographical area affected by the issue]</i>
Description of the case	<i>[Describe here the safety issue that triggered this NFTP request, in full detail, including: extensive description of the safety issue and its effect, an assessment on why this is a safety issue (e.g. what is the impact on safety). This is basically the rationale for this NFTP]</i>
Supporting data	<i>[Provide here, or in an attachment, all data/elements collected to support the case described above, (domain(s), geographical area, description, safety impact) covering all aspects listed in this form]</i>
Evaluated safety impact	<i>[Provide here, in an explicit, and if possible, in a detailed and comprehensive manner, an evaluation of the safety impact of the issue that triggered this NFTP]</i>
Proposed solution(s) or corrective/mitigation action(s)	<i>[Provide here one or several solution(s) or corrective/mitigation action(s)]</i>

1 — NORTH ATLANTIC SYSTEMS PLANNING GROUP

(NAT SPG)

(Revised to reflect C-WP/13135, C 183/9 on 18 March 2008 and PRES RK/1560 dated 30 June 2008)
(Revised to reflect C-WP/14983 Rev.2, C-DEC 219/7 and President of Council approval on 21 August 2020)

1. Terms of Reference (ToR)

The NAT SPG was established by the approval of the ICAO Council on 15 April 1965 (54/20) of Recommendation 4/1 - reproduced below - of the special North Atlantic Meeting, Montreal, 23 February - 20 March 1965, which specified within its sub-paragraphs the composition, terms of reference and method of operation of the Group.

Recommendation 4/1: North Atlantic Systems Planning Group

That, in order to ensure continuity in systems planning in the North Atlantic Region between successive North Atlantic Regional Meetings:

- a) *The governments of Canada, Ireland, France, the Netherlands, the United Kingdom and the United States be invited to designate suitably qualified experts to participate on their behalf in the work of a North Atlantic Systems Planning Group with the following terms of reference:*

“To continuously study, monitor and evaluate the system in the light of changing traffic characteristics, technological advances and updated traffic forecasts, to the end that the North Atlantic Regional Plan may be adjusted on a timely, evolutionary basis. Throughout this work the group shall give close attention to the effectiveness of any suggested changes in relation to their costs.”
- b) *Proposals by States for amendment of the North Atlantic Regional Plan that may be developed as a result of studies undertaken by the Group, be submitted for consideration by other North Atlantic States, either at ICAO North Atlantic Regional Meetings convened for the purpose, or by correspondence in accordance with established procedures.*
- c) *The Group work with the flexibility and informality required to reduce to a minimum the administrative burden imposed on States and on ICAO.*
- d) *The Group may invite, as and when it considers necessary or desirable, the co-operation and participation of other States and of public or private international organizations.*
- e) *The Group meet approximately once a year and at least once every eighteen months either at the ICAO Paris Office, the ICAO Headquarters or elsewhere at the invitation of a State and pursue its work by correspondence between successive meetings.*
- f) *All States of the North Atlantic Region be kept informed of the progress of work in the Group and be encouraged, as well as the international organizations concerned, to submit suggestions to assist the Group in its task.*

2. Members

All ICAO Contracting States, who are service providers in an air navigation region and part of that region's ANP, should be included in the membership of that region's PIRG. Furthermore, user States are entitled to participate in any other PIRG meetings as a non-member.

Representatives of Canada, Denmark, France, Iceland, Ireland, Norway, Portugal, the United Kingdom and the United States are Members of the NAT SPG.

Each State/Territory member should be represented by a senior-level delegate nominated by the State/Territory, preferably from the civil aviation authority (CAA) in order to support related policy-making within the State. A delegate may be supported by an alternate delegate and/or advisers with the requisite technical knowledge in the subject matters under consideration.

The CAAs should be supported by service providers (such as air navigation services providers, airport, operators, meteorological service providers, etc.) as advisers.

3. Observers

International organizations recognized by the Council may be invited as necessary to attend PIRG meetings as observers.

Representatives from the Russian Federation, Spain and Trinidad and Tobago as well as Observers from EUROCONTROL, IAOPA, IATA, IBAC, IFAIMA, IFALDA, IFALPA, IFATCA, Iridium and Inmarsat are invited to participate in the work of the NAT SPG.

Requests from any other ICAO Contracting State or an international organization to attend the NAT SPG meetings will be reviewed on a case-by-case basis and decided by the NAT SPG Chairperson. Such requests must be supported by the appropriate rationale to attend the meeting¹.

4. Reporting

The NAT SPG will report to Council on an annual basis.

5. The Role of the States

State CAAs, supported by service providers as necessary, should participate in the work of the NAT SPG and its contributory bodies to:

- a) ensure the continuous and coherent development and implementation of regional air navigation plans and report back on the key performance indicators (KPIs);
- b) support the regional work programme with participation from the decision-making authority with the technical expertise necessary for the planning and implementation mechanism, thus supporting policy decisions at the State level;
- c) enable coordination, at the national level, between the CAA, service providers and all other concerned stakeholders, and harmonization of the national plans with the regional and global plans;
- d) facilitate the implementation of GANP and GASP goals and targets;
- e) report on the status of implementation, within the State, on a regular basis;
- f) plan for basic services to be provided for international civil aviation in accordance with ICAO Standards, within State national plans;

¹ NAT SPG Conclusion 49/27 refers

- g) facilitate the development and establishment of Letters of Agreement and bilateral or multilateral agreements;
- h) mitigate deficiencies identified under the uniform methodology for the identification, assessment and reporting of air navigation deficiencies in a timely manner;
- i) embrace a performance-based approach for implementation as highlighted in the Global Plans; and
- j) ensure the inclusion of the regional priorities in the States' national implementation plans to the extent possible.

6. The International Organizations and Industry

Industry, in particular airspace users, professional associations and organizations should participate in the work of the NAT SPG and its contributory bodies, in order to support air navigation implementation and collaborative decision-making processes, taking into consideration the safety aspects of air navigation services.

7. Interregional Coordination

The NAT SPG shall:

- a) ensure interregional coordination through formal and informal mechanisms, including the participation in meetings established for the purpose of coordinating NAT SPG, the GANP/GASP, regional air navigation and aviation safety plans and regional supplementary procedures; and
- b) ensure coordination with informal groups, such as the South Atlantic Group, Informal South Pacific ATS Coordination Group and Informal Pacific ATS Coordination Group, Cross-Polar Working Group to assure harmonized planning and smooth transition through regional interface areas.

8. Global Plans

In regard to Global Plans, the NAT SPG and its contributory bodies shall:

- a) support implementation by States of the *Global Air Navigation Plan* (GANP, Doc 9750) and *Global Aviation Safety Plan* (GASP, Doc 10004) by ensuring effective coordination and cooperation between all States and stakeholders;
- b) monitor and report the progress on the implementation by States of the GANP and GASP, and the regional objectives and priorities;
- c) ensure continuous and coherent development of the regional air navigation plan, *Regional Supplementary Procedures* (Doc 7030) and other relevant regional documentation, and propose amendments to reflect the changes in operational requirements in a manner that is harmonized with adjacent regions, consistent with ICAO Standards and Recommended Practises (SARPs), Procedures for Air Navigation Services (PANS) and the GANP/GASP;
- d) provide feedback on the GANP and GASP implementation and propose amendments to the Global Plans as necessary to keep pace with the latest developments and ensure harmonization with regional and national plans;

- e) in line with the GANP, GASP and regional priorities, identify specific deficiencies in the air navigation field, and propose mitigating actions and timelines to resolve deficiencies; and
- f) verify the provision of air navigation facilities and services in accordance with global and regional requirements.

9. Chairperson

The Chairpersonship of the NAT SPG will be reviewed by an election every four years¹.

10. Vice-Chairperson

In accordance with NAT SPG Conclusion 49/27, the NAT IMG and NAT SOG Chairpersons will serve as NAT SPG Vice-Chairpersons¹.

11. Secretary

The ICAO Regional Director, European and North Atlantic Office, serves as the Secretary of the NAT SPG.

12. Meeting Invitation , Venue and Documentation

Invitations to NAT SPG and its contributory bodies' meetings must be issued at least three months in advance of the meeting to assist States to plan participation.

Meetings will be convened in the EUR/NAT Regional Office, to the extent possible, to facilitate proper access by States. Approval to host meetings outside of the Regional Office must be obtained from the President of the Council.

The following documentation, including proposed action as required, may be presented by States, International Organizations or the Secretariat:

- Working Papers normally contain material with a draft decision, conclusion or inviting action by the meeting. Working papers are submitted at least 2 weeks prior to the meeting,
- Information Papers are submitted in order to provide the meeting with information on which no action is required and will not necessarily be discussed at the meeting. Information papers are submitted at least 1 week prior to the meeting.
- Flimsies are documentation prepared on an ad hoc basis in the course of a meeting, normally in support of an existing working paper, and with the purpose to assist the meeting in the discussion on a specific matter or in the drafting of a text for a Conclusion or Decision.

13. Conduct of the meetings of the NAT SPG groups and sub-groups¹

Rapporteur – The Rapporteur facilitates the work of the meeting so as to encourage consensus or clearly identify barriers to consensus. The tasks of the Rapporteur include ensuring the efficient conduct of the meeting, ensuring that the tasks associated with the work programme are addressed or reported upon during the course of the meeting and reporting the findings of the meeting to the group(s) specified in the terms of reference. In the NAT SPG working structure, contributory groups to the NAT IMG and NAT SOG operate with Rapporteurs.

Chairperson – In addition to the duties of a Rapporteur, the Chairperson may make decisions regarding the conduct of the meeting and, in cases where it is not possible to reach consensus,

¹ NAT SPG Conclusion 45/3 refers

determine the recommendation(s) that will be made by the meeting. In the NAT SPG working structure, the NAT SPG, NAT IMG, NAT SOG and NAT EFFG operate with a Chairperson.

Vice-Chairperson – The vice-Chairpersons will be called upon to preside over the meeting should circumstances prevent the Chairpersons from being present at the meeting. The vice-Chairpersons may also be requested to support the Chairpersons in his/her role, taking over some of the Chairpersons's work load whenever appropriate. The vice-Chairpersons do not automatically succeed as Chairpersons at the conclusion of the term of the incumbent Chairperson. In the NAT SPG working structure, the NAT SPG, NAT IMG and NAT SOG operate with a vice-Chairperson. The NAT IMG and NAT SOG Chairpersons will serve as NAT SPG vice-Chairpersons¹.

14. Election of Chairpersons/vice-Chairpersons/Rapporteurs of the NAT SPG and its Contributory Groups²

Review of Chairpersonship will be conducted by a routine process of elections for the NAT SPG, NAT EFFG, NAT IMG, and NAT SOG every four years. In the event that a Chairperson is unable to complete a term, another election would be held.

Review of vice Chairpersonship will be conducted by a routine process of elections for the NAT IMG and NAT SOG every four years, normally at the same time as the routine elections of the NAT IMG and NAT SOG Chairpersons.

Review of rapporteurship will be conducted by a routine process of elections for the Contributory Groups of the NAT IMG and NAT SOG every four years. Efforts will be made to avoid changes in rapporteurship for multiple groups during the same year.

Chairperson – Nominations and Election for the NAT SPG

1. Candidates for election to the post of Chairperson must be from a NAT SPG member State and nominated by a member State of the NAT SPG and seconded by another member State of the NAT SPG.
2. Nominations should be submitted to the EUR/NAT Office of ICAO and be promulgated by the EUR/NAT Office of ICAO to the NAT SPG member States by e-mail two months before the next meeting of the NAT SPG.
3. The NAT SPG will elect the Chairperson from the list of candidates by open vote at the NAT SPG meeting and the newly elected Chairperson will assume his functions at the conclusion of the meeting.

¹ NAT SPG Conclusion 49/27 refers

² NAT SPG Conclusion 49/27 refers

Chairperson – Nominations and Election for the NAT EFFG, NAT IMG, and NAT SOG

1. Candidates for election to the post of Chairperson must be from a NAT SPG member State and nominated by a member State of the Group concerned and seconded by another member State of the Group.
2. Nominations should be submitted to the EUR/NAT Office of ICAO and be promulgated by the EUR/NAT Office of ICAO to the NAT SPG member States by e-mail two months before the next meeting of the Group concerned.
3. The Group will elect the Chairperson from the list of candidates by open vote at its meeting.
4. The NAT SPG will confirm the election of the Chairperson at its meeting and agree that the newly elected Chairperson will assume his functions as Chairperson at the next meeting of the Contributory Group concerned.

Note: the election of vice-Chairpersons of the NAT IMG and NAT SOG will be conducted informally by open vote at the meeting of the Group concerned following the election of the Chairperson.

Rapporteur – Nominations and appointment of the NAT IMG and NAT SOG Contributory Groups (NAT MWG, NAT POG, NAT SG, and NAT TIG)

1. Candidates for election to the post of Rapporteur must be from a NAT SPG member State and nominated by a member State of the Group concerned and seconded by another member State of the Group.
2. Nominations should be submitted to the EUR/NAT Office of ICAO and be promulgated by the EUR/NAT Office of ICAO to the NAT SPG member States by e-mail two months before the next meeting of the Group concerned.
3. The Group will elect the Rapporteur from the list of candidates by open vote at its meeting.
4. The parent Group concerned will confirm the election of the Rapporteur and agree that the newly elected Rapporteur will assume his functions at the next meeting of the Contributory Group concerned.

Note: Parent Groups of the Contributory Groups:

NAT IMG	–	NAT POG, NAT TIG
NAT SOG	–	NAT SG, NAT MWG

15. Procedure for processing of Proposals for Amendment to the NAT SUPPs

- 15.1. Proposals for amendment (PfA) to the NAT *Regional Supplementary Procedures* (SUPPs, Doc 7030) should be reviewed and endorsed by the NAT SPG before further processing by the ICAO Secretariat.
- 15.2. The ICAO Secretariat will process the PfA in accordance with the formal procedures immediately after its endorsement by the NAT SPG.
- 15.3. In exceptional cases, if a PfA requires urgent processing between two NAT SPG meetings, the ICAO Secretariat will circulate the PfA to the NAT SPG member States and Observers by correspondence for approval.

16. Formulation of recommendations to the NAT SPG¹

- 16.1. The NAT SPG contributory groups are to provide reports that are as concise as possible, whilst providing sufficient detail and supporting material for any recommendations which might be made. In order

¹ NAT SPG Conclusion 48/12 refers

to clarify the intent of contributory group recommendations they are to be formulated in the form of "draft NAT SPG Conclusions". Each draft Conclusion is to be accompanied by sufficient supporting justification, which is to include, at minimum:

- a) a concise summary of the discussion of the group, including the reasons why particular options are or are not supported;
- b) the full text of any material proposed for adoption by the NAT SPG into a NAT SPG or ICAO document;
- c) the full text of proposed revisions to text of an existing NAT SPG or ICAO document, with insertions shown in grey highlight (**text to be inserted**) and deletions shown in strikethrough (~~text to be deleted~~); and
- d) a clear description of why the NAT SPG should endorse the draft Conclusion, what is expected in order to fully address the conclusion, who should carry out the actions required and when the actions should be completed, using the tabular format described below.

16.2. The following Table 1 shall be used to summarize why the NAT SPG should endorse the draft Conclusion, what is expected to fully address the conclusion, who should carry out the actions required and when the actions should be completed:

Table 1:

Why	
What	
Who	
When	

16.3. Draft NAT SPG Conclusions shall be presented in the following format:

Draft NAT SPG Conclusion ##/NATXXXYY/Z – TITLE

That the NAT(Group designation)/ICAO Regional Director, Europe and North Atlantic:

- a) AA;
- b) BB; and
- c) CC.

Where:

TITLE is a concise description of the subject addressed by the proposed draft Conclusion. For a PfA to the SUPPs, this title shall start with "PfA to the SUPPs,";

is the designation of the next NAT SPG meeting;

NATXXXYY is the designation and meeting number of the NAT SPG contributory group proposing the draft Conclusion; and

Z is a number indicating the sequence of the proposed draft Conclusion as it appears in the contributory group report.

16.4. When formulating each (draft) NAT SPG Conclusion, all acronyms except NAT SPG shall be decoded when they are initially used. This shall be true even for acronyms which have appeared in a previous

draft Conclusion. It is acceptable to use an acronym in the title, so long as it is decoded in the body of the draft Conclusion.

17. Projects and Project Teams for the NAT SPG Working Structure

17.1. The general guiding principles to govern the establishment and the work of projects and projects teams are as follows:

- a) A Project is defined as a specific activity that is finished over an agreed period of time and intended to achieve a specific outcome of the agreed SPG work programme;
- b) The period of a Project is normally not greater than 6 months;
- c) The NAT SPG contributory groups are responsible for the identification of the Projects that will deliver the work programme in the most efficient and effective way considering, for example, expert resource availability, dependencies of outcomes from other activities, meeting efficiency;
- d) A Project Team consists of individuals/experts assembled to perform activities that contribute towards achieving the tasks related to the Project. For each Project Team a Project Lead shall be identified, responsible for the leadership of the team to deliver the required outcomes within the agreed timescales, and to report to the parent group. For practical reasons the appointed project lead should be a member of the project supervisory body; and
- e) All NAT SPG contributory groups shall establish and maintain a Project Definition document for all projects that are under their ownership for the purpose of project initiation, supervision and closure. The following elements (Table 2 refers) shall be considered as a minimum in a Project.

Table 2: Project Definition Contents

Project Title	Unique and concise project title that relates to the outcomes of the project
Parent Group	The parent body that approves the project
Project Supervisory body	The SPG contributory body that supervises the project, e.g. IMG, POG, TIG, SOG, etc.
Project Period	Forecast period for which the project will be active (specific timeframe to be used: e.g. dates, time of a specific meeting etc).
Project Objective	What is the purpose of the project and how does it relate to the delivery of the NAT strategy and Roadmap
Project Outcomes:	What will be physically delivered by the project
Membership	Who are the project team members
Coordination Requirements	Which other bodies will the project need to coordinate with to achieve the outcomes
Project High level Tasks	At a summary level what are the key tasks that this project will perform to achieve the outcomes
Project Lead	Who, from the project supervisory body, will be responsible for the leadership of the project to achieve the outcomes, and for reporting to the parent group.
Project Secretariat Support	Who will be the support from the ICAO Secretariat

17.2. The general guiding principles to help the establishment and the governance of projects and projects teams are as follows:

- a) The NAT SPG contributory groups shall identify projects that are required to deliver those aspects of the NAT SPG Work Programme that the parent group have agreed as being their responsibility;
 - b) The NAT SPG contributory groups shall form Project Teams as required to deliver the projects in the most efficient and effective manner. Project Teams are not required to have the parent group endorsement, unless they envisage physical meetings outside the NAT SPG contributory group regular meeting; when establishing a Project Team its work programme shall be established in the most efficient and effective way considering, for example, expert resource availability, dependencies of outcomes from other activities and meeting efficiency; it is expected that the Project Teams work mainly by correspondence.
 - c) The NAT SPG contributory groups are required to provide regular updates to their parent group meeting on the following:
 - i. Summary on the progress of “active” projects, including justification of those projects with a life time greater than 6 months or the need for physical meetings outside the NAT SPG contributory group regular meetings;
 - ii. Summary of those projects that have been completed; and
 - iii. Proposal of projects required to deliver the next period of the NAT SPG Work Programme, including justification of those projects with a life time greater than 6 months, for endorsement by the parent group.
 - d) The NAT SPG contributory group *Rapporteurs*, or their delegate, should provide a report of their groups to the parent group by attending, as a minimum, the respective meeting agenda item by the most efficient and convenient means, i.e. in person, telephone conference, etc. coordinated with the Secretariat.
-

18. NAT SPG REPRESENTATIVES

(Kept up-to-date by the Secretariat upon reception of nomination to the NAT SPG)

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1:A — NAT ECONOMIC, FINANCIAL AND FORECAST GROUP

(NAT EFFG)

Terms of Reference

The NAT EFFG is responsible to the NAT SPG for providing economic, financial and traffic forecasting advice to the NAT SPG in order to ensure the cost-effective management of the aviation system within the ICAO NAT Region and will:

1. Provide the NAT SPG with appropriate financial management expertise and advice in the areas of, inter alia, cost identification, cost allocation models, performance and productivity indicators, variance analyses and standardised financial reporting.
2. Provide advice to the NAT SPG as to best practice in the area of cost recovery and charging for the provision of air navigation services.
3. Develop proposals addressing financial and their related organisational aspects for implementing multinational facilities and services employed by provider States in the ICAO NAT region.
4. In coordination with the NAT IMG, develop and/or assess business-case analysis of planned implementations proposed under the NAT SPG work programme.
5. Provide NAT traffic forecasts.
6. Address other issues as directed by the NAT SPG.
7. Report to the NAT SPG.

Composition

The NAT EFFG is composed of Members from Canada, Denmark, Iceland, Ireland, Norway, Portugal, the United Kingdom and the United States, IATA and IBAC and with the participation of France as an observer.

The NAT EFFG may invite other participants as and when required in order to ensure that the relevant expertise is available when addressing specific tasks or issues.

The Chairpersonship of the NAT EFFG will be reviewed by an election every four years and confirmed by the NAT SPG¹.

¹ NAT SPG Conclusion 49/27 refers.

2 — **TERMS OF REFERENCE FOR THE NAT IMG AND ITS CONTRIBUTORY GROUPS**

2:A — **NAT IMPLEMENTATION MANAGEMENT GROUP**

(NAT IMG)

Terms of Reference

The NAT IMG is responsible to the NAT SPG for the identification, development and coordinated implementation of safe and efficient programmes supporting the aviation system within the ICAO NAT Region, and will:

1. In line with the *Global Air Navigation Plan (GANP)*, *Global Aviation Safety Plan (GASP)* and *Aviation System Block Upgrades (ASBU)*, including recommending implementation priorities and updating timetables and associated milestones for NAT SPG approval.
2. Identify, detail and recommend allocation of tasks and resources required to fulfil coordinated implementation of safety and efficiency improvements affecting operations in the ICAO NAT Region and as appropriate, approve or amend the terms of reference of NAT IMG contributory bodies and to direct their work programmes.
3. In coordination with the NAT Economic, Financial and Forecast Group (NAT EFFG), develop and/or assess business-case analysis of planned implementations proposed under the NAT SPG work programme.
4. In coordination with NAT Safety Oversight Group (NAT SOG), assess the safety performance of the aviation system within the ICAO NAT Region.
5. Ensure the necessary co-ordination and/or consultation with NAT Provider States, other States, NAT Users and appropriate international organizations.
6. Propose amendments to the *North Atlantic Air Navigation Plan*, the *North Atlantic Regional Supplementary Procedures* (Doc 7030), and all other relevant NAT-developed documents as directed by the NAT SPG.
7. Address other issues as directed by the NAT SPG.
8. Provide reports and recommendations concerning the above tasks to the NAT SPG.

Composition

The NAT IMG is composed of representatives of the NAT SPG member States. In order to ensure that NAT users' views are represented and to provide valuable operational experience, NAT IMG meetings are also attended by representatives from IATA, IBAC, IFALPA and IFATCA.

The NAT IMG might invite other participants as and when required in order to ensure that the relevant expertise is available when addressing specific tasks. The Rapporteurs of the new Contributory Bodies may also be invited to attend as per agenda items.

The Chairpersonship and vice-Chairpersonship of the NAT IMG will be reviewed by an election every four years and confirmed by the NAT SPG¹.

¹ NAT SPG Conclusion 49/27 refers.

2:B — THE NAT IMG CONTRIBUTORY GROUPS

1. General principles applicable to the NAT IMG working structure

The principles listed below apply to all NAT IMG contributory bodies. They should to the extent possible be applied to task forces that the NAT IMG may set up from time to time as well as to the sub groups that the contributory bodies may establish.

2. Safety management statement

All NAT IMG contributory bodies shall support the objective of, and abide by the guiding principles of, the NAT SPG Safety Policy whilst carrying out their activities. In order to facilitate the exchange of safety management information, all reports of NAT IMG contributory groups shall clearly identify safety management related issues.

3. Working methods

The NAT IMG working groups will meet face-to-face at least once a year and at other times as required by the work programme. Yearly meeting dates and the requirement for additional face-to-face meetings will be as approved by the NAT IMG.

The working groups will make every reasonable effort to use other means such as teleconference and electronic correspondence to reduce the frequency of face-to-face meetings. Work will be carried out as required using such other means between face-to-face meetings in order to expeditiously carry their business.

4. Rapporteurship

The Rapporteur of each NAT IMG working group will be nominated from amongst the NAT SPG member States by the NAT IMG. The rapporteurship of each group will be reviewed at least once every two years. Keeping in mind the need to support continuity, changes will be made only when necessary and efforts will be made to avoid changing multiple Rapporteurs in the same year.

5. Formulation of recommendations to the NAT IMG

5.1. Recommendations to the NAT IMG are to be formulated as draft NAT IMG Decisions.

5.2. If NAT SPG action will be required, the NAT IMG will take the necessary action to draft a proposed NAT SPG Conclusion as appropriate.

5.3. The guidance for drafting of NAT SPG Conclusions in Section 1 shall also apply for NAT IMG Decisions.

2:C — NAT PROCEDURES AND OPERATIONS GROUP

(NAT POG)

Terms of Reference

The Procedures and Operations Group develops proposals for new and amended procedures supporting air navigation services provision and aircraft operations in the ICAO NAT Region. This function is carried out under the direction, and to support the work programme, of the NAT IMG. The following on-going tasks are required to carry out this function:

1. Developing proposed procedures and guidance material to respond to planned technological changes and CNS/ATM implementations affecting operations in the ICAO NAT Region.
2. Developing proposed amendments so as to maintain the currency of the procedures and guidance detailed in: *ICAO Regional Supplementary Procedures - North Atlantic Region* (NAT SUPPs, Doc 7030), NAT Operations Bulletins and documents promulgated by the NAT SPG.
3. Developing proposals to respond to identified deficiencies in the safety or efficiency of NAT operations.
4. Commenting on the procedural and operational aspects of safety management material presented to support proposed changes affecting operations in the ICAO NAT Region.
5. Providing reports on, and recommendations arising from, the above tasks to the NAT IMG.
6. Addressing other tasks as directed by the NAT IMG.

Composition

Experts to address the foregoing tasks may be nominated by: NAT SPG member States, Spain, EUROCONTROL, IATA, IBAC, IFALDA and IFALPA.

Working methods

The group will meet face-to-face at least once a year and at other times as required by the work programme. Yearly meeting dates and the requirement for additional face-to-face meetings will be as approved by the NAT IMG.

The group will make every reasonable effort to use other means such as teleconference and electronic correspondence to reduce the frequency of face-to-face meetings. Work will be carried out as required using such other means between face-to-face meetings in order to expeditiously carry their business.

The Rapporteur of this group will be reviewed every four years by election and confirmed by the NAT IMG¹.

¹ NAT SPG Conclusion 49/27 refers

2:D — NAT TECHNOLOGY AND INTEROPERABILITY GROUP

(NAT TIG)

Terms of Reference

The Technology and Interoperability Group develops proposals to harmonise implementation and increase interoperability between systems supporting air navigation services provision and aircraft operations in the ICAO NAT Region. This function is carried out under the direction, and to support the work programme, of the NAT IMG. The following on-going tasks are required to carry out this function:

1. Developing proposed guidelines for harmonised implementation and interoperability to respond to planned technological changes and CNS/ATM implementations affecting operations in the ICAO NAT Region.
2. Developing proposed amendments so as to maintain the currency of the technical information detailed in: *ICAO Regional Supplementary Procedures - North Atlantic Region* (NAT SUPPs, Doc 7030), NAT Operations Bulletins and documents promulgated by the NAT SPG.
3. Developing proposed mechanisms for monitoring and reporting on the technical performance of CNS/ATM systems and automation supporting operations in the ICAO NAT Region.
4. Developing proposals to respond to identified deficiencies in the safety, efficiency or interoperability of CNS/ATM systems or automation supporting NAT operations.
5. Commenting on the technological aspects of safety management material presented to support proposed changes affecting operations in the ICAO NAT Region.
6. Providing reports on, and recommendations arising from, the above tasks to the NAT IMG.
7. Addressing other tasks as directed by the NAT IMG.

Composition

Experts to address the foregoing tasks may be nominated by: NAT SPG member States, ARINC, EUROCONTROL, IATA, IBAC, IFALDA, IFALPA, Inmarsat, Iridium and Sitaonair.

Working methods

The group will meet face-to-face at least once a year and at other times as required by the work programme. Yearly meeting dates and the requirement for additional face-to-face meetings will be as approved by the NAT IMG.

The group will make every reasonable effort to use other means such as teleconference and electronic correspondence to reduce the frequency of face-to-face meetings. Work will be carried out as required using such other means between face-to-face meetings in order to expeditiously carry their business.

The Rapporteur of this group will be reviewed every four years by election and confirmed by the NAT IMG¹.

¹ NAT SPG Conclusion 49/27 refers

3 — TERMS OF REFERENCE FOR THE NAT SOG AND ITS CONTRIBUTORY GROUPS

3:A — NAT SAFETY OVERSIGHT GROUP (NAT SOG)

Terms of Reference

The NAT SOG is responsible to the NAT SPG for the following activities in the NAT Region, and will:

1. Review system safety performance in the NAT Region.
2. Share data on safety-related occurrences in the NAT Region.
3. Support the development of best practices in the management of safety in the NAT Region.
4. Keep under review and, when appropriate, propose revisions to the safety Key Performance Indicators (KPI) established for the ICAO NAT Region. SKPIs should be defined and, where appropriate, new SKPIs created for the region that are more dynamic and translatable to the operations. SKPIs should be reviewed at least every three years.
5. Ensure safety-related occurrences in the NAT Region are analysed by the appropriate NAT SOG contributory groups to determine root causes.
6. Identify areas where mitigation is required and report to the NAT SPG and coordinate with NAT IMG. Assess the effectiveness of implemented mitigation measures.
7. Keep under review safety monitoring methods and analysis and recommend improvements to the process as appropriate.
8. Monitor regional safety cases under development and review completed regional safety cases prepared to support changes to the NAT air navigation system.
9. Collect data on and monitor safety KPIs.
10. Develop and present to the NAT SPG for approval the NAT Annual Safety Report in which the safety performance for the ICAO NAT Region, as well as the safety priorities and targets, consistent with the Global Aviation Safety Plan and the NAT Safety Policy, are consolidated.
11. Each State should present information of their oversight activities and local performance data annually to the NAT SOG to share best practices and lessons learnt for the benefit of other states who may be overseeing similar issues
12. Address other safety-related issues as necessary.
13. Use the fast track to advance safety concerns between formal meetings.
14. Report to the NAT SPG.

Composition

The NAT SOG is composed of representatives from the NAT SPG member States. State representatives should be in a position to address service delivery and flight operations regulatory issues in the NAT Region. To ensure that NAT stakeholders' views are represented, representatives from Spain as well as Observers from IATA, IBAC, IFALPA and IFATCA are invited to participate in the work of the NAT SOG.

Working methods

To allow for the work programme to be conducted, the NAT SOG will convene at least twice a year. The NAT SOG may meet at other times as required by the work program.

3:B — THE NAT SOG CONTRIBUTORY GROUPS

1. Formulation of recommendations to the NAT SOG

- 1.1. Recommendations to the NAT SOG are to be formulated as draft NAT SOG Decisions.
 - 1.2. If NAT SPG action will be required, the NAT SOG will take the necessary action to draft a proposed NAT SPG Conclusion as appropriate.
 - 1.3. The guidance for drafting of NAT SPG Conclusions in Section 1 shall also apply in formulation of NAT SOG Decisions.
-

3:C — NAT MATHEMATICIANS' WORKING GROUP

(NAT MWG)

Terms of Reference

The NAT MWG reports to the NAT SOG and is responsible for providing mathematical and statistical advice relating to the on-going monitoring of safety through the assessment of collision risk and any other tasks as determined by the NAT SOG. It has the following terms of reference:

1. Estimate annually the lateral and vertical occupancies (traffic densities) in the NAT Region.
2. Estimate the current lateral, longitudinal and vertical collision risks to show whether the estimated risks meet the respective target levels of safety.
3. Identify trends that may not be identified within the NAT SG Report including component elements of the collision risk model and highlight where safety improvements could prove most effective.
4. To reflect changes in operating conditions within the NAT region, review the collision risk model.
5. Collect annual NAT traffic data in order to estimate flying hours, number of flight operations, and aircraft size parameters. In addition to the annual traffic data, periodically perform other data collections (e.g. core navigation studies) in order to ensure that the parameter values within the mathematical collision risk models remain current.
6. Review other mathematical aspects as directed by the NAT SOG and/or the NAT SPG.
7. Coordinate with the NAT SG.

Composition

The NAT MWG is composed of experts from the NAT SPG member States, Spain, IATA and IFALPA. Representatives from EUROCONTROL may also be invited as observers in order to ensure consistency between related European and North Atlantic work programmes.

The Rapporteur of the NAT MWG will be chosen by the State having the risk calculation responsibility. The term limit for the MWG Rapporteur will be one calendar year from 1 July to 30 June.

Working Methods

The NAT MWG conducts its work in accordance to the NAT MWG Handbook and via correspondence to the extent possible.

3:D — NAT SCRUTINY GROUP

(NAT SG)

Terms of Reference

The NAT SG is responsible to the NAT SOG for ensuring the correct categorization of NAT Region reported occurrences for the purposes of mathematical analysis and other safety management activities. To that end, the NAT SG will:

1. For the purpose of mathematical analysis, and in close cooperation with the NAT MWG, categorise navigational errors and altitude deviations of 300ft or more occurring in NAT HLA (NAT High Level Airspace) airspace.
2. For the purpose of safety management activities, categorize reported occurrences in the NAT Region as directed by the NAT SOG.
3. Analyse occurrences in order to allow the study of trends and prevalent causes.
4. Evaluate the effect of, and provide advice and recommendations to the NAT SOG on the implemented mitigations in the NAT region.
5. Work in close co-operation with the NAT CMA to compile data necessary to conduct safety analysis in the NAT Region.
6. Keep under review the procedures for collecting and categorising occurrence reports.
7. Address other related issues as directed by the NAT SOG.
8. Report at least twice per year to the NAT SOG; the reports should include findings from all tasks of the SG (vis-à-vis ToRs). Ensure that reports are sent to the SOG at least 2 weeks prior to SOG's biannual meetings.
9. Report once per year on the categorisation of occurrences for mathematical analysis to the NAT MWG.
10. Review annually, in collaboration with NAT POG and in coordination with NAT DMO, the validity and relevance of NAT OPS 2017_002 - Oceanic Error Safety Bulletin (OESB) and of NAT OPS Bulletin 2017_005 - Sample Oceanic Checklists.

Composition

The NAT SG is composed of nominated experts from the NAT SPG member States, Spain, NAT MWG, NAT CMA, IATA, IBAC, IFALDA, IFALPA and IFATCA.

The Rapporteur of the NAT SG will be reviewed by an election every four years and confirmed by the NAT SOG¹.

Working Methods

The NAT SG conducts its work in accordance to the NAT SG Handbook and via correspondence to the extent possible.

¹ NAT SPG Conclusion 49/27 refers

4 — TERMS OF REFERENCE FOR THE NAT SPG SERVICES

4:A — NAT CENTRAL MONITORING AGENCY

(NAT CMA)

Terms of Reference

The NAT CMA is responsible to the NAT SOG for certain aspects of operations monitoring and reporting in the NAT Region. Specifically, its principle functions are:

1. Monitor the level of risk as a consequence of operational errors and in-flight contingencies as follows:
 - a) Establish and maintain a mechanism for collation and analysis of all operational errors, including vertical deviations of 90m (300ft) or more, lateral deviations, and longitudinal losses of separations;
 - b) Determine and analyse, wherever possible, the root cause of each deviation together with its magnitude and duration;
 - c) Calculate the frequency of occurrences;
 - d) Assess the overall risk (technical and operational) in the system against the overall safety objective (see Doc 9574 - *Manual on Implementation of a 300 m (1 000 ft) Vertical Separation Minimum Between FL 290 and FL 410 Inclusive*);
 - e) Initiate follow-up action with State aviation authorities as required.
2. Circulate regular reports on all operational deviations, together with such graphs and tables necessary to relate the estimated system risk to the TLS, employing the criteria detailed in Doc 9574, for which formats are suggested in Appendix A to Doc 9574;
3. Produce a quarterly report on the operational performance in the NAT Region for distribution to the NAT SPG members and other interested parties, and submit an annual report to the PIRG (NAT SPG);
4. Act as the custodian of all aircraft technical height keeping performance data collected as part of the NAT Regional monitoring process.
5. Report height deviations of aircraft observed to be non-compliant, based on the following criteria:
 - i. $TVE \geq 90\text{m (300 ft)}$;
 - ii. $ASE \geq 75\text{ m (245 ft)}$;
 - iii. $AAD \geq 90\text{ m (300 ft)}$;and take the necessary action with the relevant State and operator to determine:
 - a) the likely cause of the height deviation;
 - b) verify the approval status of the relevant operator;
 - c) recommend, wherever possible, remedial action;

6. Analyse ASE data to detect height deviation trends and, hence, to take action as in the previous item;
 - a) Investigate height-keeping performance of the aircraft in the core of the distribution:
 - the aircraft population
 - aircraft types or categories; and
 - individual airframes;
7. Provide NAT customers and State aviation authorities with height monitoring data on request;
8. Liaise with other Regional Monitoring Agencies (RMA) in order to achieve an exchange of monitoring and RVSM approvals data amongst the regions;
9. Contribute to the amendment and publication of the “NAT Minimum Monitoring Requirements” table in co-ordination with the Mathematicians Working Group and RMA Coordination Group;
10. Ensure that the requisite height monitoring is completed by operators of aircraft contained in the RVSM approvals database and to take appropriate action where necessary;
11. Establish and maintain a database of aircraft approved by the respective State authorities for operations within RVSM airspaces in that region;
12. Conduct checks of the approval status of aircraft operating in the relevant RVSM airspace, identify non-approved operators and aircraft using RVSM airspace and notify the appropriate State of Registry/State of the Operator accordingly.
13. Receive reports of non-compliance (*Performance-Based Communication and Surveillance (PBCS) Manual* (Doc 9869) refers) with RSP 180 and RCP 240 from NAT ANSPs and transmitting reports to the respective RMA associated with the State of the respective operator/aircraft;
14. Receive and maintain records of RCP and RSP approvals issued by States of Operator/Registry associated with current State responsibility and incorporating into expanded RVSM/PBCS approvals database and follow-up as appropriate instances of non-approved aircraft being identified in PBCS airspace. This would be determined by augmenting the existing monthly RVSM approvals check to incorporate a similar check against PBCS Approvals where these have been included in the flight plan but no approvals record is held by RMAs;
15. Share records of RCP and RSP approvals between RMAs in line with current sharing practices of RVSM approvals for the ability of States/ANSPs to verify that aircraft operators filing PBCS capabilities in the flight plan are authorized to do so.¹

¹ Points 13 to 15, NAT SPG Conclusion 53/9 refers

4:B — NAT DATA LINK MONITORING AGENCY

(NAT DLMA)

Terms of Reference

The NAT Data Link Monitoring Agency (DLMA) will report to the NAT TIG with respect to data link implementation, trials and operations.

It will receive and process routine and ad-hoc data and problem reports from end users and interested parties

The main tasks of the NAT DLMA are:

1. Problem analysis and resolution per D.3 of the GOLD, which includes:
 - a) A means for reporting, e.g. a web-based service;
 - b) Diagnose problems and recommend resolutions;
 - c) Co-ordinate problem reports and resolutions with other regional data link monitoring agencies.

Note 1: In the context of the ToR, provisions of D.3 and D.4 of the GOLD are mandatory.

Note 2: The entity must enter into a confidentiality agreement with those stakeholders who require it to provide problem reports. Except as authorized by individual stakeholders, all problem reports and associated documentation shall be de-identified prior to distribution to members to protect the name and/or company originating the problem report. The entity must implement and maintain a program to protect confidential and sensitive information provided by NAT stakeholders. No identified data shall be kept longer than is essential to the successful resolution of the associated problem.

Note 3: D.3 and D.4 of the GOLD Edition 2.0 are integral parts of this ToR.

4:C — NAT DOCUMENT MANAGEMENT OFFICE

(NAT DMO)

Terms of Reference

The NAT DMO supports the ICAO EUR/NAT for ensuring the currency and consistency of the documentation relating to NAT operations with the following terms of reference:

1. In coordination with the ICAO EUR/NAT Office and appropriate NAT contributory bodies, continuously review the NAT documentation to identify the need for updates, and develop amendment proposals for approval by appropriate groups, per the *NAT SPG Handbook* (NAT Doc 001).
2. Support the ICAO EUR/NAT Office with the implementation of approved proposals and their publication.

Composition

The NAT DMO service will be provided by Iceland on behalf of the NAT SPG.

5 — NAT SPG POLICIES

Note: in the title of each policy “C ##/N” stands for “NAT SPG Conclusion ##/N”¹

5:A — SAFETY RELATED POLICIES

[01] Establishment of a NAT Data Link Monitoring Agency (NAT DLMA) (C 45/17)

- a) The United States established by 31 December 2009 a NAT DLMA; and
- b) The NAT Implementation Management Group coordinates all safety related matters with the NAT Safety Oversight Group.

[02] Amendments to the list of safety key performance indicators for the ICAO NAT Region (C 48/18, C 49/02, C 51/11, C 53/15, C 55/19, C58/15)

That the list of Key Performance Indicators (KPI) in the area of safety for the ICAO NAT HLA is as follows, with applicable targets:

Table 1 - Safety Key Performance Indicators and related targets

Key Performance Indicator		Target
NAT.SKPI.01	Number of accidents	0
NAT.SKPI.02a	Number of LHD events divided by number of flight hours flown in the NAT HLA	Reduction over previous rolling three-year period of performance
NAT.SKPI.02b	Overall time of LHDs at unprotected flight level divided by total duration of flights in minutes	Reduction over previous rolling three-year period of performance
NAT.SKPI.03a	Number of Lateral deviations divided by number of flight hours flown in the NAT HLA	Reduction over previous rolling three-year period of performance
NAT.SKPI.03b	Overall time of lateral deviations on an unprotected profile divided by total duration of flights in minutes	Reduction over previous rolling three-year period of performance
NAT.SKPI.04	Number of losses of separation events divided by number of flight hours flown in the NAT HLA	Reduction over previous rolling three-year period of performance
NAT.SKPI.05a	Number of coordination errors divided by number of flight hours flown in the NAT HLA	Reduction over previous rolling three-year period of performance
NAT.SKPI.05b	Overall time of coordination errors spent at unprotected profile divided by total duration of flights in minutes	Reduction over previous rolling three-year period of performance
NAT.SKPI.06a	Collision Risk Estimate (CRE) in the vertical dimension	5×10^{-9} fapfh ²
NAT.SKPI.06b	Collision Risk Estimate (CRE) in the lateral dimension	5×10^{-9} fapfh
NAT.SKPI.07	Regional Effective Implementation (EI) score in ANS for NAT provider States	-Maintain 85% or above until 2026 -Reach 95% by 2030

¹ e.g. C 47/01 means NAT SPG Conclusion 47/01, the NAT SPG Conclusion endorsing the policy

² Fatal accidents per flight hour

[03] Lateral deviation classifications (C 48/21)

- a) The following definitions are used when classifying reports made to the NAT Central Monitoring Agency (NAT CMA):
 - i) a lateral deviation is any actual deviation from the cleared track other than those covered by the Strategic Lateral Offset Procedures (SLOP);
 - ii) a Gross Navigation Error (GNE) is a lateral deviation from a cleared track by 10 Nautical Miles (NM) or more;
 - iii) an ATC intervention is an event where the Air Traffic Controller (ATCO) caught and corrected a lateral deviation before it developed into a GNE; and
 - iv) an ATC prevention is an event where the ATCO intervention prevented a lateral deviation; and
- b) the NAT CMA initiates GNE-related follow up actions in regard to GNEs of 25 NM or more.

[04] Definition and Components of Regional Safety Cases in support of changes to the NAT air navigation systems requiring NAT SPG approval (C 53/16, C 55/19, C59/16)

That the definition and components of a regional safety case in support of changes to the NAT air navigation system requiring NAT SPG approval are as follows:

- 1) A regional safety case in support of changes to the NAT air navigation system documents safety arguments relating to a proposal for a change in a specific FIR or multiple FIRs affecting operations in more than one NAT FIR; it references ~~evidence~~ the intended plan for change, and includes the assessment of ~~safety-risk~~ hazards associated with the proposed change and common to more than one FIR in the NAT, risk controls and/or mitigations, and a monitoring plan to ensure that the effectiveness of the risk controls and mitigations is verified. A change may relate to the introduction of new operational concepts, new or modified procedures, novel separation minima, or the introduction of new systems. A regional safety case may be prepared by NAT IMG and/or a designated sub-group or project team within the NAT IMG working structure, or by one or several NAT ANSPs, and is owned by the change advocate.
- 2) Proposed regional safety case(s) prepared to support changes within the NAT Region requiring NAT SPG approval should be presented to the NAT SOG for endorsement by or through the NAT IMG, and include the following components:
 - a) Change advocate {the NAT IMG sub-group or ANSP(s) who propose the change(s)};
 - b) Description of and rationale for the proposed change(s);
 - c) Assurance that the proposed change will fit the NAT airspace system and all common aspects of the implementing FIRs have been addressed;
 - d) Regional safety assessment, including as a minimum:
 - i. identification of hazards common to the NAT region (or the FIRs affected by the change),
 - ii. ~~risk assessment~~ the Regional Safety Assessment Checklist,
 - iii. proposed risk controls and/or mitigations applicable to the NAT region;
 - e) Conclusion showing that ~~the evidence and argument demonstrate the proposed change(s) increases neither the overall risk associated with the NAT, nor increases the risks associated with any component part of the NAT system beyond acceptable levels and/or established NAT safety performance targets~~ the planned change(s) demonstrate a complete and valid safety argument, including evidence if available, that aligns with the NAT SPG safety policy for the highest level of safety performance and to meet regional safety objectives in line with national and international standards;
 - f) Required post-implementation monitoring and reversion plans;
 - g) Index or bibliography referencing supporting ~~evidence~~ plans; and

- h) Identification of necessary State approvals and/or other State requirements necessary to accommodate the change and assurance that those will be in place prior to implementation.

*Note: A template containing the full definitions and components of Safety Cases is in **Appendix A**.*

- 3) The objective of a NAT SOG review of completed regional safety cases shall provide assurance to the NAT SPG that all the established components of a regional safety case were accomplished. For a NAT SOG endorsement, the following should be taken into account:
- a) it is unlikely that a change would be implemented that allows for a timely review during routine NAT SOG meetings. In order to allow for a review without impacting the timelines for a project's deployment, the NAT SOG may choose to establish a project team to undertake the detailed review on behalf of the NAT SOG;
 - b) a proposed change will receive formal approvals or acceptance by the appropriate State Oversight Authority. The team established (optionally) to monitor regional safety cases under development and review completed regional safety cases is tasked with:
 - i. confirming the validity of given safety arguments;
 - ii. reviewing the completed Regional Safety assessment Assessment checklist Checklist to confirm the validity of the claims made and the efficacy of any proposed mitigations;
 - iii. determining whether additional data may be required to support post-implementation monitoring;
 - iv. confirming that all of the required elements of the regional safety case are completed, and
 - v. reporting back to the NAT SOG with a summary of the project team's review and their level of confidence in the proposed change
 - c) the review should include representatives affected by the change, including representatives of the change agent and the State Oversight Authority responsible for issuing the approval or acceptance. ~~that have not been directly involved with the development of the regional safety case to ensure an objective assessment.~~ To assist with the review, the Project Team task list ToRs will involve discussions with representatives of the change agent. ~~and include the State Oversight Authority responsible for issuing the approval or acceptance~~
 - d) the review should assess whether the processes and procedures documented by the change sponsor or Safety Case Project Team are/would be sufficient to uncover any significant regional impact associated with the change. This assessment has six interrelated steps:

Step 1 – Assessment of the Nature, Scope and Impact of the Proposed Change	
Review the submitted documentation to understand the change; has it been adequately described, included the context and its impact internally and externally.	
Actions	Assessment guidance
1.1 Review the documentation to determine whether it adequately describes the nature and scope of the change.	Who is making the change? What is being changed? Why is it being changed? How is it being changed?
1.2 Review the documentation to determine whether the change has considered the encompassing environment.	Have the following been considered? -People and Procedures -Equipment -Stakeholders -Physical environment -Organizational culture -Applicable rules (SARPs, Docs, Guidance, etc.) -External threats -Internal / external interfaces.

1.3 Review the documentation to determine whether it provides an adequate understanding of the change.	Is it clear? Complete? Appropriate? Consistent? Unambiguous? Does it make sense?
1.4 Review the documentation to determine whether the direct and indirect impact of the proposed change has been defined.	Do the defined impacts consider: -Direct interactions with what has been changed? -Knock-on effects from the direct interactions? -Indirect impacts through shared resources?
1.5 Review the documentation to ensure that the safety case considered the cumulative effects of the change	Have multiple changes been considered on individuals or systems?
1.6 Does the impact of the change have an effect on alignment with SARPs and PANS? Regional Guidance?	
1.7 Does the change need other NAT groups or specialist involvement? Does it affect operations in other FIRs?	Where the change has a direct or indirect impact on another part of the Regional system, additional support may need to be involved in the evaluation.
1.8 Determine whether the documentation makes a clear conclusion for the safety of the proposed change.	Are there invalidated assumptions? Is there an argument demonstrating the proposed change aligns with the NAT SPG safety policy for the highest level of safety performance and meets the regional safety objectives in line with national and international standards?

Step 2 – Identification and Assessment of Hazards

Review the mechanism to identify hazards and that appropriate representatives and subject matter experts contributed to hazard identification and mitigation.

Actions	Assessment guidance
2.1 Is the hazard and consequence identification process documented?	Confirm that this has been documented or that existing procedures have been followed
2.2 Determine who were the people involved in the process.	Evaluate whether all of the States involved were included. Have interfacing FIRs been identified and involved in the hazard identification process?
2.3 Ensure the methods used enable a comprehensive hazard and consequence identification.	Evaluate the methodology to ensure it identifies hazard and related consequences. Evaluate whether identified hazards and consequences are appropriate. Consider if any hazards or consequences have been missed. Review suitability of data used.
2.4 Confirm whether human performance related hazards and their consequences been identified.	Have the following been considered: -Competency -Fatigue -Attention Working environment Distractions - Communication -Human physiology -Human to machine interface -Stress Error tolerance.
2.5 Confirm that the identified hazards and their consequences are recorded.	Did the Safety Case Project Team use the bow tie model, event tree analysis, or fault trees, etc? Were Hazard Workshops held?
2.6 Determine whether hazards associated with external FIRs have been considered.	Ensure hazards related to internal and external interfaces have been considered.
2.7 Determine whether hazards associated with the transitional phase have been considered.	Ensure that hazards that could arise during the implementation of the change have been considered.

Step 3 – Assessment of the Regional Safety Assessment Checklist Review and evaluate the determinations made for the elements of the assessment checklist and whether they were “improved,” “degraded” or “No change”.	
Actions	Assessment guidance
3.1 Has the matrix of elements from the Regional Safety Assessment Checklist been utilized?	Do the determinations of “Improved,” “Degraded” or “No Change” seem to be applied logically?
3.2 Have appropriate answers to the Regional Safety Assessment Checklist been included in the comment section?	Has commentary been provided that supports the reasoning of the status of the elements of the checklist? Has commentary been included for all of the “degraded” elements that demonstrates them to be managed and mitigated?

Step 4 – Assessment of the Risk Mitigations Review and evaluate the risk mitigations to determine their effectiveness.	
Actions	Assessment guidance
4.1 Have the States agreed to provide the assurance that the appropriate safety risk mitigations will be implemented and documented?	Where will this be collected and/or documented?
4.2 Were concerned States, ANSPs and Subject Matter Experts adequately represented on the Project Team that developed the Regional Safety Case?	Were appropriate people involved in the decision making? (Not all States are required to participate in the Safety Case development, but that should be documented.)
4.3 Review the risk mitigations: are they complete, appropriate and achievable?	Are the mitigations reasonable and robust? Are the mitigations practical and realistic?
4.4 Determine whether the risk mitigations have created any new hazards or affected existing mitigations.	Do the mitigation actions directly or indirectly impact any existing mitigations or other safety requirements?
4.5 Have Human Factors principles been considered in the choice of risk mitigations?	Is there an over reliance on human action as a risk mitigation? Is the mitigation action fail safe and error tolerant?

Step 5 – Assessment of the Justification Assess any supporting arguments used to justify that the change is valid and does not have an intolerable impact on safety.	
Actions	Assessment guidance
5.1 Review any supporting arguments that are presented to justify that the change is safe to implement	Is it possible to reject the argument presented? Does it provide an equivalent level of safety? Confirm that any arguments are appropriate and relevant. Confirm that there is sufficient reasoning to support the change.
5.2 Confirm that transitional hazards and mitigations have been considered and addressed.	Additional hazards may be associated with the transition from the existing operation to the changed operation and will need to be identified and addressed.
5.3 Determine whether conclusions for the change have been included?	Review the Conclusions of the Safety Assessment. Ensure that the conclusion states that the change and the transitional arrangements can be implemented safely.

5.4 Was any supporting evidence included to justify that the change is safe to implement?	

Step 6 – Assessment of the Post-Implementation Monitoring, Success Criteria and Reversion Plan	
Review how the safety case plans to monitor the change implementation and verify that risks mitigations are effectively managed after the change has been completed.	
Actions	Assessment guidance
6.1 Check that the safety case has identified the critical steps and risk controls (mitigations) that will be subject to checking and who is responsible.	There may be critical steps or phases in the change that require additional monitoring. Some of the risk controls (mitigations) will be more critical than others so they should be highlighted. Critical in terms of: -Impact -Robustness of the controls (mitigations) -Number of remaining barriers in place Check who is responsible for the monitoring activities and verification checks.
6.2 Review how the Regional Safety Case intends to confirm the risk controls (mitigations) are effective.	Has an appropriate plan for checking the risk controls (mitigations) been defined? Have performance indicators been established? Are there adequate contingency plans in place?
6.3 Determine the validity of the Post Implementation Monitoring.	How are they going to monitor and review the assumptions after the change has taken place? Will there be sufficient data available to support the claims?
6.4 Review when the change will be reviewed and how frequently.	The original justifications made in the change documentation may be affected by changes in the system, environment or State.
6.5 Have Success Criteria been included?	Are NAT SKPIs identified?
6.6 Determine the validity of the Reversion Plan.	

[05] Minimum Height Monitoring Requirements for the NAT Region (C 56-2/0559/15XX)

That in order to provide an ADS-B height monitoring system for the NAT Region which meets the current safety requirements, with consideration of available manpower in the NAT Central Monitoring Agency (NAT CMA) and currently available resources, the following shall apply in the NAT Region:

- i) initially, the minimum height monitoring requirement be set at one 24-hour period of all available NAT Regional ADS-B data ~~on a rolling eight day schedule~~ per seven days, allowing for at least 60% of the NAT traffic population to be monitored on a regular basis;
- ii) ~~the monitoring be rolled over an eight day period, ensuring the capture of more individual aircraft frames and those which operate on a fixed schedule~~ the monitoring period be adjusted in line with the availability of MET files, allowing for an increase in monitoring when able; and
- iii) this recommended minimum height monitoring requirement be reviewed at regular intervals to assess the workload impact on the NAT CMA and to take advantage of technological improvements which could accommodate an increase in the monitoring rates.

[06] Data link communication log retention by ANSPs and CSPs (C 59/7)

That in order to support effective investigation of data link problem reports (PR) by the Data Link Monitoring Agency (DLMA) and other stakeholders, the NAT Air Navigation Service Providers

(ANSPs) and Communication Service Providers (CSPs) are encouraged to retain data link communication logs for a period of at least one year.

5:B — IMPLEMENTATION PLANNING POLICIES

[07] Definition of Target Level of Safety (TLS) in the NAT Region (C 27/22, C 33/06, C 47/04)

The TLS is defined for the Implementation of the Reduced VSM in the NAT Region as follows:

- a) the TLS for collision risk in the vertical dimension due to all causes be 5.0×10^{-9} fatal accidents per flight hour and that the overall collision risk in the vertical plane be assessed against this TLS; and
- b) the TLS would not be partitioned into separate components for the different types of risk. However, assessments of height-keeping performance would need to be conducted with reference to a safety constraint of 2.5×10^{-9} , as this is the value which has been used to derive the Minimum Aircraft System Performance Specification.

A TLS of 5.0×10^{-9} fatal accidents per flight hour is used for planning purposes in carrying out the work required to sustain reductions in longitudinal separation minima.

A TLS of 5×10^{-9} fatal accidents per flight hour is used for planning purposes in carrying out the work required to sustain reductions in lateral separation minima in the ICAO NAT Region.

[08] ADS-B Eligibility List for the ICAO NAT Region (C 47/06)

Canada shall maintain an eligibility list on behalf of the ICAO NAT Region detailing aircraft which, it has been confirmed, meet the requirements specified in the European Aviation Safety Agency (EASA) Acceptable Means of Compliance (AMC) 20-24 or equivalent.

[09] NAT PBCS Requirements (C 55/06)

When separation minima predicated on Required Communication Performance (RCP) 240 and Required Surveillance Performance (RSP) 180 is applied in the NAT, the following additional provisos shall apply:

- a) When the actual communication transaction time or surveillance data delivery time does not meet the 95% values, appropriate action should be taken to improve performance to an acceptable level before providing the air traffic service (ATS) function predicated on RCP/RSP;
- b) The 99.9% values provide a target value for design changes to the overall system to improve performance;

Note 1 – Guidance concerning RCP and RSP specifications, application and performance requirements, including elements to be considered when calculating the 99.9% value, can be found in the Performance-based Communication and Surveillance (PBCS) Manual (ICAO Doc 9869);

Note 2 – With regards to the 99.9% criteria, if the performance is less than 99%, contact the data link monitoring agency (DLMA), operator and/or communications service provider (CSP) to determine any action that can improve the performance;

and

- c) When the actual communication transaction time or surveillance data delivery time does not meet the 99.9% target value, the air navigation service provider (ANSP) should assess the effects of actual performance against local factors, such as increased controller workload, increases in fleet equipage and expanded use of the data link services and implement appropriate controls and mitigation measures as appropriate.
-

6 — REFERENCE DOCUMENTATION

6:A — DOCUMENTS PROMULGATED BY THE NAT SPG

These documents are intended as reference for operators and service providers in the ICAO NAT Region and for their respective regulators.

Number	Title	Current edition/version	Kept under review by	Approval/Amendments/removals approved by	Remarks
NAT Doc 001	NAT SPG Handbook	Version 2.87.0 – August- ~~July~~ 20232	ICAO Secretariat	NAT SPG*	<u>Except</u> for the following: * 1 — 18 – NAT SPG Representatives: kept up-to-date by the Secretariat upon reception of nomination to the NAT SPG. * 6 – Reference Documentation: kept up-to-date by the Secretariat, upon approval or revision of a NAT Document promulgated by the NAT SPG.
NAT Doc 002	<i>Discontinued</i>				<i>Superseded by the Pan-Regional (APAC and NAT) Interface Control Document for ATS Inter-facility Data Communication (PAN ICD AIDC)</i>
NAT Doc 003	High Frequency Management Guidance Material for the North Atlantic Region	Version 3.0 – June 2015	NAT POG in coordination with NAT TIG	NAT IMG	
NAT Doc 004	Common Aeradio Communications Interface Control Document	Version 1.5 – Nov. 2019	NAT TIG	NAT IMG	

Number	Title	Current edition/version	Kept under review by	Approval/Amendments/removals approved by	Remarks
NAT Doc 005	Discontinued				C58/1 [CORR] Integration of NAT 2030 Vision into the NAT eANP Volume III; and C58/2 [CORR] Removal of NAT Doc 005, Future ATM Concept of Operations refer.
NAT Doc 006 - Part I	Air Traffic Management Operational Contingency Plan – North Atlantic Region	Version 2.10 – August 2022 January 2023	NAT IMG	NAT SPG	
NAT Doc 006 - Part II EUR/NAT VACP	Volcanic Ash Contingency Plan – Europe and North Atlantic Regions	Version 2.0.1 – June 2021	NAT IMG and EASPG PCG in accordance with the process described in the body of the document –	Coordinated approval of main document body by both NAT SPG and EASPG PCG	
NAT Doc 006 - Part III	Space Weather Contingency Procedures – North Atlantic Region	Version 1.0 – January 2023	NAT IMG in coordination with NAT SOG	NAT SPG	

Number	Title	Current edition/version	Kept under review by	Approval/Amendments/removals approved by	Remarks
NAT Doc 007	North Atlantic Operations and Airspace Manual	Version V-2024-12 - ~~July 2024~~ January 2023 and v-2024-1, eff. 21 March 2024	NAT POG and NAT DMO, <u>Except</u> for the following: <i>Attachment 6 – Flight Level Allocation Scheme (FLAS)</i> : kept under review by the NAT POG	NAT SPG, <u>Except</u> for the following: <i>Attachment 6 – Flight Level Allocation Scheme (FLAS)</i> : revision approved by NAT IMG	Information in NAT Doc 007 complements and does not contradict, the information contained in the NAT Oceanic Errors Safety Bulletin (OESB).
NAT Doc 008 NAT ASM	Application of Separation Minima – North Atlantic Region (NAT ASM)	Version 1.120 – ~~December 2020~~ July 2023	NAT POG	NAT IMG after coordination with NAT SOG	
NAT Doc 009	<i>Discontinued</i>				<i>Integrated in NAT eANP Volume III, Companion Document, NAT GANP/ASBU Report (NAT eANP Volume III approval: NAT SPG Conclusion 53/21 refers).</i>
NAT Doc 010	Consolidated Reporting Responsibilities Handbook – North Atlantic Region	Version 2021 February 2021	NAT SOG and NAT IMG	NAT SPG	
NAT Doc 011	PBCS Monitoring and Reporting Guidance	~~Version 2022 – August 2022~~ 1st Edn, Amdt. 2, July 2023	NAT SOG and NAT IMG	NAT SPG	
NAT Doc 012	NAT TIG ATSP Analyst Handbook	Version 2023, June 2023	NAT TIG	NAT IMG	

Number	Title	Current edition/version	Kept under review by	Approval/Amendments/removals approved by	Remarks
NAT eANP Vol III (ICAO Doc 9634, Vol III)	Volume III of the electronic Air Navigation Plan – North Atlantic Region	2023 ~~2~~ – January 2022July 2023	NAT IMG and its contributory groups	NAT SPG	
NAT eANP Vol III - Part 2 and 3	GANP ASBU Implementation Status Report – NAT Region	2019 – February 2021	ICAO Secretariat in coordination with NAT IMG	NAT SPG	

Number	Title	Current edition/version	Kept under review by	Approval/Amendments/removals approved by	Remarks
NAT OPS Bulletins * YYYY_nnn	NAT Operations Bulletins	The NAT OPS Bulletins Checklist lists the currently valid NAT OPS Bulletins.	Content is managed by originators. Originators are noted on the cover pages. Bulletins that are originated by the NAT SPG are to be periodically reviewed for validity and accuracy by the appropriate NAT contributory bodies as part of their work programme.	NAT IMG and/or NAT SOG, as appropriate.	• NAT Ops Bulletins are used to distribute information on behalf of the North Atlantic Systems Planning Group (NAT SPG). The material contained therein may be developed within the working structure of the NAT SPG or be third party documents posted at the request of a NAT SPG Member State. • As far as possible, the content of OPS Bulletins should be moved to other NAT Documents, e.g. NAT Doc 007. • Bulletins should, as far as practicable, be used to address specific issues of temporary nature, e.g. support ongoing implementation projects. • As far as possible, validity dates should be indicated. • NAT OPS Bulletins are reference documents only and should not be seen to be equivalent to Standards and Recommended Practices (SARPS), PANS or SUPPs.

* All currently valid NAT OPS Bulletins and Checklist are at: www.icao.int/EURNAT/EUR & NAT Documents, then NAT Documents, then [NAT Ops Bulletins](#).

Number	Title	Current edition/version	Kept under review by	Approval/Amendments/removals approved by	Remarks
	NAT OESB - NAT Oceanic Errors Safety Bulletin	NAT OPS Bulletin 2017_002_rev5 4	NAT SG	NAT SOG	<i>The NAT Oceanic Error Safety (OES) Bulletin (NAT OESB) is used to distribute information on best practices used to avoid errors when operating in the NAT Region. The NAT OESB is mainly addressed to the attention of pilots, dispatchers, industry and training centers. It complements and does not contradict, the guidance detailed in the current edition of North Atlantic Operations and Airspace Manual (NAT Doc 007).</i>
	NAT OESB Supplements - NAT Sample Oceanic Checklists	NAT OPS Bulletin 2017_005_Rev1	NAT SG	NAT SOG	<i>The NAT Sample Oceanic Checklist (NAT SOC) is a companion document of the NAT OESB.</i>

APPENDIX A — NAT REGIONAL SAFETY CASE TEMPLATE

*(C 55/19 - NAT SPG/55 June 2019
C59/16~~xx~~ – NAT SPG/59 June 2023)*

NAT Regional Safety Case

[TITLE]

[DATE]

Document Change Page

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- E. Conclusion of Safety ~~Assessment~~ Argument
- F. Post-implementation Monitoring, Success Criteria and Reversion Plan
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- H. State Approvals/Requirements

Section 3. NAT Safety Case Terms and Definitions

Section 4. Appendices

Section 1. Executive Summary

This section should clearly define the purpose of the regional change proposal including a summary of the hardware/software system, operation, or procedures that constitutes the change. If applicable, include elements of the issues that make it particularly unique or challenging in the NAT region.

Section 2. NAT Safety Case Components

This section should adequately address the definition and components of a regional safety case in support of changes to the NAT air navigation system requiring NAT SPG approval outlined in NAT SPG Conclusion 53/16 and documented in NAT SPG Handbook, NAT Doc 001.

A. Change Advocate(s)

List the NAT SPG sub-group(s) or Air Navigation Service Provider(s) proposing the NAT change.

B. Description, ~~of and~~ Rationale and Objectives for Proposed Change

Clearly describe the proposed NAT change. Include ~~and~~ the rationale for the proposed change and state the objectives to be achieved by the change.

C. NAT Airspace System Assurance

Provide assurance that the proposed change will fit the NAT airspace system and that all common aspects of the implementing FIRs have been addressed.

D. Regional Safety Assessment

It is recognized that a uniform safety assessment process is not applicable across the region because individual service providers and safety personnel conduct safety assessments via different processes within their individual safety management systems. These individual SMS processes are subject to State review and approvals, therefore, these approvals should be used to support the NAT regional safety assessment.

NOTE: These individual State approval letters are an important part of the regional safety case process and should be included in Section H of the Safety Case.

In this section, ~~Describe the regional safety assessment~~ Hazard Analysis methodology for the NAT region (or the FIRs affected by the change) and include, as a minimum: identified hazards, hazard effects and hazard causal factors common to the affected area; the regional risk mitigations; the identification of monitoring actions; and the Regional Safety Assessment Checklist. ~~, the identification of hazards common to the NAT region (or the FIRs affected by the change), the risk assessment, and the proposed risk controls and/or mitigations applicable to the NAT region.~~

~~The following~~ This Regional Safety Assessment ~~assessment checklist~~ Checklist is provided as a guide and contains issues commonly referenced within the NAT region. When the change sponsors complete the ~~assessment~~ checklist from a regional perspective and determine that a ~~barrier~~ element is “improved”, “degraded” or “no change” ~~doesn't change~~, their commentary should support the case for implementation. They should demonstrate that the impacts of any degraded elements are managed or mitigated.

Threat (T1)			
1. An ATM ground system issue -Does the proposed change affect:			
1.1 Data quality/accuracy?	Improved	Degraded	No change
1.2 Alerts/ indications?	Improved	Degraded	No change
1.3 Communications speed or quality?	Improved	Degraded	No change
1.4 Contingency facilities	Improved	Degraded	No change
1.5 Contingency or fallback procedures?	Improved	Degraded	No change
1.6 System design or testing methodology?	Improved	Degraded	No change
1.7 Cyber vulnerability to ground systems?	Improved	Degraded	No change
Threat (T1) Overall assessment	Improved	Degraded	No change
Comments:			

Threat (T2)			
2. An airborne environmental/technical issue -Does the proposed change affect:			
2.1 The format of messages received on the flight deck?	Improved	Degraded	No change
2.2 The usability/reliability of CPDLC?	Improved	Degraded	No change
2.3 The design and location of flight deck hardware?	Improved	Degraded	No change

2.4 Flight planning accuracy?	Improved	Degraded	No change
2.5 Pre-flight procedures/checks?	Improved	Degraded	No change
2.6 Procedures for the management of emergencies?	Improved	Degraded	No change
2.7 The operation or availability of ACAS?	Improved	Degraded	No change
2.8 Procedures for the management of weather/contingency?	Improved	Degraded	No change
2.9 Cyber risk to airborne systems?	Improved	Degraded	No change
Threat (T2) Overall assessment	Improved	Degraded	No change
Comments:			

Threat (T3)			
3. The actions of ATC -Does the proposed change affect:			
3.1 ATC understanding of system messages/alerts/indications?	Improved	Degraded	No change
3.2 ATC understanding of flight crew requests?	Improved	Degraded	No change
3.3 ATC understanding of controlling priorities?	Improved	Degraded	No change
3.4 ATC understanding of coordination requirements?	Improved	Degraded	No change
3.5 ATC understanding of operational procedures?	Improved	Degraded	No change
3.6 ATC understanding of the consequences of system inputs?	Improved	Degraded	No change
3.7 ATC workload?	Improved	Degraded	No change
Threat (T3) Overall assessment	Improved	Degraded	No change
Comments:			
Threat (T4)			
4. The actions of flight crew -Does the proposed change affect:			
4.1 Crew understanding of the clearance received?	Improved	Degraded	No change
4.2 Crew understanding of standard operating procedures?	Improved	Degraded	No change
4.3 The selection of correct profile (screen/hardware layout)?	Improved	Degraded	No change
4.4 Crew understanding of weather/technical contingency procedures?	Improved	Degraded	No change
4.5 Crew understanding of emergency procedures?	Improved	Degraded	No change
4.6 Flight deck workload	Improved	Degraded	No change
Threat (T4) Overall assessment	Improved	Degraded	No change
Comments:			

Recovery (R1)			
5. ATCO response -Does the proposed change affect:			
6.1 Conformance alerts?	Improved	Degraded	No change
6.2 ATCO situational awareness or techniques?	Improved	Degraded	No change
6.3 Communications speed/reliability?	Improved	Degraded	No change
6.4 ATCO workload/capacity	Improved	Degraded	No change
6.5 ATCO Team resource management? (TRM)	Improved	Degraded	No change
6.6 The Ability for adjacent sectors/centres to identify and intervene?	Improved	Degraded	No change
6.7 ATCO training/basic knowledge.	Improved	Degraded	No change
Recovery (R1) Overall assessment	Improved	Degraded	No change
Comments:			

Recovery (R2)			
6. Pilot Response -Does the proposed change affect:			
6.1 Pilot Situational awareness?	Improved	Degraded	No change
6.2 SLOP usage? (strategic lateral offset procedure)	Improved	Degraded	No change
6.3 Flight deck crew resource management? (CRM)	Improved	Degraded	No change
6.4 Function or operation of ACAS?*	Improved	Degraded	No change
6.5 Pilot training/basic knowledge?	Improved	Degraded	No change
Recovery (R2) Overall assessment	Improved	Degraded	No change
Comments:			

E. Conclusion of Safety AssessmentArgument

Provide a conclusion showing that the Regional Safety Case demonstrates a complete and valid safety agreement, including evidence if available, that aligns with the NAT SPG safety policy for the highest level of safety performance and to meet regional safety objectives in line with national and international standards. This conclusion shall demonstrate that the objectives of the Regional Safety Case are being met, and that the proposed change does not introduce 'degraded' elements; or where degraded elements are identified, they are justified and robustly mitigated. Also, this conclusion shall include confirmation, from the Regional perspective, that the proposed change is safe, should be introduced and shall be appropriately monitored, post introduction.

~~Provide a conclusion showing that the evidence and argument demonstrate the proposed change(s) increases neither the overall risk associated with the NAT, nor increases the risks associated with any component part of the NAT system beyond acceptable levels and/or established NAT safety performance targets.~~

F. Post-implementation Monitoring, Success Criteria and Reversion Plan

Describe the post-implementation monitoring plan, Success Criteria and reversion plan – for the identified hazards. These should include reference to NAT SKPIs and an expected timeline for transition. -This section may also include information on required or proposed monitoring activities to be carried out by the NAT region.

G. Supporting EvidenceArgument

List the relevant supporting ~~evidence~~–argument related to the proposed change(s). Important ~~evidence~~–plans necessary to support a NAT Safety Case review should be included in Section 4 of this document. Include any available evidence that might enrich the Safety Case.

H. State Approvals/Requirements

Identify and document the necessary State approvals and/or other State requirements necessary to accommodate the change and assurance that those will be in place prior to implementation. Document where and how these approvals will be housed for use and historical purposes.

Section 3. NAT Safety Case Terms and Definitions

Term	Definition	Source
Assessment	An evaluation based on engineering, operational judgement, and/or analysis methods. (An appraisal of procedures or operations based largely on experience and professional judgement.)	ESARR4
Change Proponent	The State/organization within the NAT that is proposing or sponsoring a change or means to address an identified existing safety issue.	
Risk Control	Activities that ensure that safety policies, procedures, and processes minimize the risk of an aviation accident or incident.	SM ICG ²
Hazard	A condition or an object with the potential to cause or contribute to an aircraft incident or accident	ICAO Annex 19
Hazard Analysis	Analysis performed to identify hazards, hazard effects, and hazard causal factors used to determine system risk.	SM ICG
Hazard Identification	A process to establish a list of all hazards relevant to the activity and the causes/threats that could release them	SM ICG
Risk Mitigation	The process of incorporating defences, preventive controls or recovery measures to lower the severity and/or likelihood of a hazard's projected consequence.	ICAO 9859 Safety Management Manual
Monitoring	Tracking and keeping hazard information under systematic review.	FAA 8000.72
Risk Analysis	Process whereby possible consequences of hazards are objectively characterized for their severity and probability. The process can be qualitative and/or quantitative.	SM ICG
Risk Assessment	The identification, evaluation, and estimation of the level of risk.	SM ICG
Safety Assessment	A systematic, comprehensive evaluation of an implemented system to show that the safety requirements are met.	CAP728
Safety Case	A documented body of evidence that provides a demonstrable and valid argument that a system is adequately safe for a given application and environment over its lifetime.	CAP760, SM ICG
Safety Risk	The predicted probability and severity of the consequences or outcomes of a hazard.	ICAO Annex 19
Safety Performance Target	The State or service provider's planned or intended target for a safety performance indicator over a given period that aligns with the safety objectives. See Safety Performance Indicator.	ICAO Annex 19
Safety Performance Indicator	A data-based parameter used for monitoring and assessing safety performance. See also Safety	ICAO Annex 19
Severity	The extent of loss or harm associated with consequences of a hazard.	SM ICG
Likelihood	The frequency, in quantitative or qualitative terms, that an unsafe event may occur.	SM ICG
Acceptable Risk	The level of risk that individuals or groups are willing to accept given the benefits gained. Each organization will have its own acceptable risk level, which is derived from its legal and regulatory compliance responsibilities, its threat profile, and its business/organizational drivers and impacts.	SM ICG
NAT SOG endorsement	The NAT SOG monitoring of a regional safety case and review of a completed regional safety case is intended to provide assurance to the NAT SPG that identified risk has been managed, mitigations have or will be implemented and that adequate provision are made for post-implementation monitoring to verify that the defined level of safety on a regional basis continues to be met. A proposed change will receive formal approvals or acceptance by the appropriate State Oversight Authority	

² Safety Management International Collaboration Group

Section 4. Appendices

Provide relevant supporting evidence related to the proposed change(s) to support a NAT Safety Case review, e.g. Concept of Operations.

LIST OF ACRONYMS

AAD	Assigned Altitude Deviation
ADS	
ADS–B	Automatic Dependent Surveillance – Broadcast
AMC	Acceptable Means of Compliance
ANP	Air Navigation Plan
ASBU	Aviation System Block Upgrade
ASE	Altimetry System Error
ATC	Air Traffic Control
ATCO	Air Traffic Controller
ATM	Air Traffic Management
CNS	Communications, Navigation and Surveillance
Doc 10004	<i>Global Aviation Safety Plan (GASP)</i>
Doc 10037	<i>ICAO Global Operational Data Link (GOLD) Manual</i>
Doc 7030	<i>ICAO Regional Supplementary Procedures (SUPPs)</i>
Doc 9574	<i>Manual on Implementation of a 300 m (1 000 ft) Vertical Separation Minimum Between FL 290 and FL 410 Inclusive</i>
Doc 9750	<i>Global Air Navigation Plan (GANP)</i>
Doc 9869	<i>Performance-Based Communication and Surveillance (PBCS) Manual</i>
EANPG	European Air Navigation Planning Group
EANPG COG	EANPG Programme Coordinating Group
EASA	European Aviation Safety Agency
EUR/NAT	European and North Atlantic
FIR	Flight Information Region
FLAS	Flight Level Allocation Scheme
GANP	<i>Global Air Navigation Plan (Doc 9750)</i>
GASP	<i>Global Aviation Safety Plan (Doc 10004)</i>
GOLD	<i>ICAO Global Operational Data Link Manual (Doc 10037)</i>
IAOPA	International Council of Aircraft Owners and Pilot Associations
IATA	International Air Transport Association
IBAC	International Business Aviation Council
IFAIMA	International Federation of Aeronautical Information Management Association
IFALPA	International Federation of Air Line Pilots' Associations
IFATCA	International Federation of Air Traffic Controllers' Associations
KPI	Key Performance Indicator
NAT CMA	North Atlantic Central Monitoring Agency
NAT DLMA	North Atlantic Data Link Monitoring Agency
NAT DMO	North Atlantic Document Management Office
NAT EFFG	North Atlantic Economic, Financial and Forecast Group
NAT HLA	NAT High Level Airspace
NAT IMG	North Atlantic Implementation Management Group
NAT MWG	North Atlantic Mathematicians' Working Group
NAT POG	North Atlantic Procedures and Operations Group
NAT SDR	<i>North Atlantic Services Development Roadmap (NAT Doc 009) - DISCONTINUED</i>

NAT SG	North Atlantic Scrutiny Group
NAT SOC	NAT Sample Oceanic Checklist
NAT SOG	North Atlantic Safety Oversight Group
NAT SPG	North Atlantic Systems Planning Group
NAT TIG	North Atlantic Technology and Interoperability Group
NFTP	NAT Fast Track Procedure
NM	Nautical Miles
OESB	Oceanic Errors Safety Bulletin
PAN ICD AIDC	<i>Pan-Regional (APAC and NAT) Interface Control Document for ATS Inter-facility Data Communication</i>
PBCS	Performance-Based Communication and Surveillance
PfA	Proposal for amendment
PIRG	Planning and Implementation Regional Group
RMA	Regional Monitoring Agency
RVSM	Reduced Vertical Separation Minimum
SLOP	Strategic Lateral Offset Procedures
SUPPs	<i>ICAO Regional Supplementary Procedures (Doc 7030)</i>
ToR	Terms of Reference
TVE	Total Vertical Error
VSM	Vertical Separation Minimum

— **END** —

APPENDIX J — PROPOSAL FOR AMENDMENT TO THE *NAT REGIONAL SUPPLEMENTARY PROCEDURES* (NAT SUPPs, DOC 7030) RELATED TO SECTION 6.2.2. (LONGITUDINAL SEPARATION)

(paragraph 5.4.4 refers)

1	2	3	4	5
Current baseline provisions	Amendment proposed and approved by NAT SPG/57 for processing	Rationale/Notes provided to SPG/57	Changes proposed at POG/15	Rationale
6.2.2 Longitudinal		No change is proposed.		
(P-ATM – Chapter 5)		No change is proposed.		
	6.2.2.1 Longitudinal separation between aircraft shall be applied in accordance with PANS-ATM sections 5.4.2 and 5.11 with the following exceptions:	New lead-in paragraph to match the principles described in paragraph 6.2.		
	a) When appropriate, the more restrictive definition of same direction 0-89° and opposite direction 90-180° may be used instead of the same track, crossing track and reciprocal track definitions in PANS-ATM section 5.4.2.1.5.	General statement to allow application of same direction and opposite direction as has been the practice for some NAT ANSPs for a long time.		
	b) The 15 minute separation minima in PANS-ATM sections 5.4.2.2.1.1 a), 5.4.2.2.1.2 a), 5.4.2.2.2.1 a) and 5.4.2.2.2.2 a) shall, when direct controller pilot VHF voice communication is not available, be applied as follows: 1. between turbojet aircraft, and 2. between other than turbojet aircraft and any other aircraft provided the following conditions are satisfied:	NAT Doc 008 3.4.2 C.	~~b) The 15 minute separation minima in PANS-ATM sections 5.4.2.2.1.1 a), 5.4.2.2.1.2 a), 5.4.2.2.2.1 a) and 5.4.2.2.2.2 a) shall, when direct controller pilot VHF voice communication is not available, be applied as follows: 1. between turbojet aircraft, and 2. between other than turbojet aircraft and any other aircraft provided the following conditions are satisfied:~~	This is no longer needed as it was only meant to distinguish between the application between turbojet and other than turbojet which is proposed for removal based on work of the SASP which states that separation should not be based on method of propulsion

1	2	3	4	5
Current baseline provisions	Amendment proposed and approved by NAT SPG/57 for processing	Rationale/Notes provided to SPG/57	Changes proposed at POG/15	Rationale
	i) the aircraft are equipped with GNSS; and ii) the aircraft are in communication via a third party VHF. This separation minima shall also apply to opposite direction aircraft that satisfy the same conditions.	NAT Doc 008 3.4.7.B.	i) the aircraft are equipped with GNSS; and ii) the aircraft are in communication via a third party VHF. This separation minima shall also apply to opposite direction aircraft that satisfy the same conditions.	
	c) The 10 minute separation minima in PANS-ATM sections 5.4.2.2.1.1 b) and 5.4.2.2.1.2 b) shall, when direct controller pilot VHF voice communication is not available, be applied only to turbojet aircraft and only when the aircraft that have ADS-C periodic contracts with a maximum reporting interval of 20 minutes or are being tracked by an ATS surveillance system.	NAT Doc 008 3.4.2 D. Text in blue: PFA NAT SPG approved by correspondence in November 2022.	b) The 10 minute separation minima in PANS-ATM sections 5.4.2.2.1.1 b) and 5.4.2.2.1.2 b) shall, when direct controller pilot VHF voice communication is not available, be applied only to turbojet aircraft and only when the aircraft that have ADS-C periodic contracts with a maximum reporting interval of 20 minutes or are being tracked by an ATS surveillance system.	
	d) The 10 minute separation minima in PANS-ATM sections 5.4.2.2.2.1 b) and 5.4.2.2.2.2 b) shall, when direct controller pilot VHF voice communication is not available, be applied only to turbojet aircraft and only when: i) the aircraft have ADS-C periodic contracts with a maximum reporting interval of 20 minutes or are being tracked by an ATS surveillance system; or	NAT Doc 008 3.4.2 E. Text in blue: PFA NAT SPG approved by correspondence in November 2022.	c) The 10 minute separation minima in PANS-ATM sections 5.4.2.2.2.1 b) and 5.4.2.2.2.2 b) shall, when direct controller pilot VHF voice communication is not available, be applied only to turbojet aircraft and only when: i) the aircraft have ADS-C periodic contracts with a maximum reporting interval of 20 minutes or are being tracked by an ATS surveillance system; or	Removes the requirement to use separations based on aircraft propulsion.

1	2	3	4	5
Current baseline provisions	Amendment proposed and approved by NAT SPG/57 for processing	Rationale/Notes provided to SPG/57	Changes proposed at POG/15	Rationale
	ii) both aircraft are turbojet GNSS equipped aircraft and that both aircraft have reported their position within 20 minutes of the time when the clearance to climb or descend is issued.		ii) both aircraft are turbojet GNSS equipped aircraft and that both aircraft have reported their position within 20 minutes of the time when the clearance to climb or descend is issued.	
	e) The 10 minute separation minimum in PANS-ATM section 5.4.2.2.3 shall, when DCPC VHF voice communication is not available, be applied only to turbojet aircraft and only after the aircraft have passed each other and have reported over a common point.	NAT Doc 008 3.4.7 C.	d) The 10 minute separation minimum in PANS-ATM section 5.4.2.2.3 shall, when DCPC VHF voice communication is not available, be applied only to turbojet aircraft and only after the aircraft have passed each other and have reported over a common point.	Removes the requirement to use separations based on aircraft propulsion.
	f) The 5 minute and 3 minute separation minima in PANS-ATM sections 5.4.2.2.1.1 c) and d) shall only be applied when direct controller pilot VHF voice communication is available.	This PANS-ATM provision is added for completeness.	e) The 5 minute and 3 minute separation minima in PANS-ATM sections 5.4.2.2.1.1 c) and d) shall only be applied when direct controller pilot VHF voice communication is available.	Lettering only
	g) The 5 minute separation minima in PANS-ATM section 5.4.2.2.2.1 c) shall only be applied between GNSS equipped aircraft and can be applied on tracks that diverge up to 89°.	NAT Doc 008 3.4.2 H.	f) The 5 minute separation minima in PANS-ATM section 5.4.2.2.2.1 c) shall only be applied between GNSS equipped aircraft and can be applied on tracks that diverge up to 89°.	Lettering only
6.2.2.1 Minimum longitudinal separation based on time between turbo-jet aircraft shall be:	6.2.2.1 Minimum longitudinal separation based on time between turbo jet aircraft shall be: The following Longitudinal separation between aircraft shall be applicable in the NAT region when the longitudinal	New lead-in paragraph.		

1	2	3	4	5
Current baseline provisions	Amendment proposed and approved by NAT SPG/57 for processing	Rationale/Notes provided to SPG/57	Changes proposed at POG/15	Rationale
	separation minima in section 6.2.2.1 does not apply:			
a) 15 minutes; or	~~a) 15 minutes; or~~	This separation minima is covered in 6.2.2.1 b).		
b) 10 minutes, provided the Mach number technique is applied whether in level, climbing or descending flight; and the aircraft concerned have reported over a common point to follow continuously diverging tracks until some other form of separation is provided; and: 1) at least 10-minute longitudinal separation exists at the point where the tracks diverge; and 2) at least 5-minute longitudinal separation exists where lateral separation is achieved; and 3) lateral separation will be achieved at or before the next significant point (normally ten degrees of longitude along track(s)) or, if not, within 90 minutes of the time the second aircraft passes the common point or within 1 112 km (600 NM) of the common point, whichever is estimated to occur first.	~~a) 10 minutes, provided the Mach number technique is applied whether in level, climbing or descending flight; and the aircraft concerned have reported over a common point to follow continuously diverging tracks until some other form of separation is provided; and:~~ 1) at least 10-minute longitudinal separation exists at the point where the tracks diverge; and 2) at least 5-minute longitudinal separation exists where lateral separation is achieved; and 3) lateral separation will be achieved at or before the next significant point (normally ten degrees of longitude along track(s)) or, if not, within 90 minutes of the time the second aircraft passes the common point or within 1 112 km (600 NM) of the common point, whichever is estimated to occur first.	Numbering change. NAT Doc 008 3.4.2 F		

1	2	3	4	5
Current baseline provisions	Amendment proposed and approved by NAT SPG/57 for processing	Rationale/Notes provided to SPG/57	Changes proposed at POG/15	Rationale
<i>Note.— The minima contained in 6.2.2.1 b) are in addition to those found in the PANS-ATM, 5.4.2.4.</i>	~~<i>Note.— The minima contained in 6.2.2.1 b) are in addition to those found in the PANS-ATM, 5.4.2.4.</i>~~	This is covered in the lead-in paragraph 6.2.2.2.		
6.2.2.2 Minimum longitudinal separation based on time between non-turbo-jet aircraft shall be 30 minutes.	~~6.2.2.2b) Minimum longitudinal separation based on time between a non-turbo-jet aircraft and any other aircraft shall be 30 minutes.~~	NAT Doc 008 3.4.2 B and 3.4.7.A. Text amended for clarification.	~~6.2.2.2b) Minimum longitudinal separation based on time between a non turbo jet aircraft and any other aircraft shall be 30 minutes.~~	This removes the 30 min standard.
6.2.2.3 Performance-based longitudinal separation minima shall be: a) 93 km (50 NM) between aircraft operating within the control area of the New York Oceanic East FIR in accordance with the provisions in 5.4.2.9 of the PANS-ATM provided that the following conditions are met: 1) communication – CPDLC RCP 240 in accordance with 3.1.1.1; 2) navigation – RNP 10 or RNP 4 in accordance with 4.1.1.1 or 4.1.2.1; and 3) surveillance – ADS-C RSP 180 in accordance with 5.1.1.1.	~~6.2.2.3 Performance-based longitudinal separation minima shall be: a) 93 km (50 NM) between aircraft operating within the control area of the New York Oceanic East FIR in accordance with the provisions in 5.4.2.9 of the PANS-ATM provided that the following conditions are met: 1) communication – CPDLC RCP 240 in accordance with 3.1.1.1; 2) navigation – RNP 10 or RNP 4 in accordance with 4.1.1.1 or 4.1.2.1; and 3) surveillance – ADS-C RSP 180 in accordance with 5.1.1.1.~~	NAT Doc 008 3.4.4.A. 1. This separation minima is specified in PANS-ATM 5.4.2.9. 2. Each country specifies in its AIP which separation minima it is using.		
b) 55.5 km (30 NM) between aircraft operating within the control area of the New York Oceanic East FIR and Santa Maria Oceanic FIR in accordance with the provisions in	~~b) 55.5 km (30 NM) between aircraft operating within the control area of the New York Oceanic East FIR and Santa Maria Oceanic FIR in accordance with the provisions in 5.4.2.9 of the PANS-ATM and~~	NAT Doc 008 3.4.4.B. 1. This separation minima is specified in PANS-ATM 5.4.2.9.		

1	2	3	4	5
Current baseline provisions	Amendment proposed and approved by NAT SPG/57 for processing	Rationale/Notes provided to SPG/57	Changes proposed at POG/15	Rationale
5.4.2.9 of the PANS-ATM and provided that the following conditions are met: 1) communication – CPDLC RCP 240 in accordance with 3.1.1.1; 2) navigation – RNP 4 in accordance with 4.1.2.1; and 3) surveillance – ADS-C RSP 180 in accordance with 5.1.1.1.	~~provided that the following conditions are met:~~ ~~1) communication – CPDLC RCP 240 in accordance with 3.1.1.1;~~ ~~2) navigation – RNP 4 in accordance with 4.1.2.1; and~~ ~~3) surveillance – ADS-C RSP 180 in accordance with 5.1.1.1.~~	2. Each country specifies in its AIP which separation minima it is using.		
c) 5 minutes between aircraft operating in the Gander Oceanic FIR, Reykjavik Oceanic FIR, Shanwick Oceanic FIR and Santa Maria Oceanic FIR provided that the following conditions are met; 1) communication – CPDLC RCP 240 in accordance with 3.1.1.1; 2) navigation – RNP 10 or RNP4 in accordance with 4.1.1.1 or 4.1.2.1; and 2) surveillance – ADS-C RSP 180 in accordance with 5.1.1.1.	~~e) 5 minutes between aircraft operating in the Gander Oceanic FIR, Reykjavik Oceanic FIR, Shanwick Oceanic FIR and Santa Maria Oceanic FIR provided that the following conditions are met;~~ ~~1) communication – CPDLC RCP 240 in accordance with 3.1.1.1;~~ ~~2) navigation – RNP 10 or RNP4 in accordance with 4.1.1.1 or 4.1.2.1; and~~ ~~2) surveillance – ADS-C RSP 180 in accordance with 5.1.1.1.~~	NAT Doc 008 3.4.2.I. 1. This separation minima is specified in PANS-ATM 5.4.2.9. 2. Each country specifies in its AIP which separation minima it is using.		

APPENDIX K — PROPOSED AMENDMENTS TO THE *APPLICATION OF SEPARATION MINIMA NORTH ATLANTIC REGION* (NAT DOC 008)

(paragraph 5.4.4 refers)

Starts on next page



NAT Doc 008

APPLICATION OF SEPARATION MINIMA

NORTH ATLANTIC REGION

NAT ASM

***~~1st Edition – Amendment 11 – January 2023~~ 1st Edition –
Amendment 12 – July 2023***

Prepared by the ICAO European and North Atlantic Office

Published on behalf of the North Atlantic Systems Planning Group (NAT SPG)

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Foreword

The Application of Separation Minima – North Atlantic Region (NAT Doc 008) is published on behalf of the North Atlantic Systems Planning Group (NAT SPG) and represents the separation methods and minima that will be applied to aircraft transiting the ICAO North Atlantic (NAT) Region based on agreement by the ICAO NAT Region Air Traffic Service providers. It contains definitions, general rules pertaining to the application of separation minima, separation minima in the vertical, lateral, and longitudinal planes applicable to aircraft operating in the ICAO NAT Region, and airspace reservations. It mainly applies to the separation of aircraft that are communicating via a radio station or via CPDLC. Separation standards as specified in the PANS-ATM may also be applied when aircraft are in Direct Controller Pilot VHF voice Communication.

This document is specifically designed for, and provides guidance to, operational air traffic control personnel. It serves as a written and pictorial interpretation of separation rules and their application, its overall objective being a common application of separation minima throughout the ICAO North Atlantic Region.

Other ICAO documentation, such as the NAT Regional Supplementary Procedures (Doc 7030) and Procedures for Air Navigation Services-Air Traffic Management (Doc 4444) should be read in conjunction with this document.

More information can be obtained electronically on the ICAO EUR/NAT website:

www.icao.int/EURNAT/ [under “EUR & NAT Documents” – “*NAT Documents*”]

Record of Amendments to NAT Doc 008 – NAT ASM

Amendments to the NAT ASM are approved by the North Atlantic Implementation Management Group (NAT IMG) on behalf of the NAT SPG. The space below is provided to keep a record of such amendments.

The NAT SPG, at its 49th meeting, confirmed that approval of changes to this document was the responsibility of the NAT IMG, provided the changes were coordinated with the NAT SOG (*NAT SPG/49 Report*, paragraph 6.3.6 refers)

Amendments to the NAT ASM containing the following changes:	
Edition 2005- Version 1.0	• New definitions added • Table of acronyms added • ICAO Doc references updated to reflect the most current editions • Part I of the previous edition re-structured for clarity • Separation minima for supersonic aircraft have been removed • Recent changes to longitudinal separation minima - the removal of non-MNPS turbojet longitudinal separation minima - updates to other than turbojet longitudinal separation minima • Clarification on the application of RVSM minima between formation flights - formation flights of two aircraft with station-keeping equipment (only C-17s) can be provided RVSM separation - all other formation flights will not be provided RVSM minima • Airspace reservation minima has been incorporated into Chapter 3 • Part II of the previous edition concerning automation has been removed
Edition 2008 Version 2.0	• Definition of Mach number technique updated to refer to true Mach number • Longitudinal separation minimum applicable only to MNPS aircraft corrected • Cross reference corrected <i>(approved at NAT SPG/43 – June 2007)</i> • Application of reduced longitudinal separation of 5 minutes for climb/descent between GNSS equipped aircraft: <i>Paragraph 3.4.2 G added (following NAT IMG/32 endorsement – Nov2008)</i>
Edition 2009 Version 3.0	• Paragraph 3.2.1 updated to include vertical separation minimum from supersonic aircraft in accordance with NAT SUPPs 6.2.4.2 • Paragraph 3.4.2 updated to consolidate longitudinal separation minima and ensure consistency with associated Doc 4444 and NAT SUPPs provisions. Editorial revisions for clarity. • New paragraph 4.4.4 added to clarify direction regarding conflict prediction calculations. Subsequent paragraphs renumbered. • Text in diagram accompanying (new) paragraph 4.4.6 amended for consistency with (new) 3.4.2E.2.b. • (New) paragraph 4.4.7 and the explanatory text in the accompanying diagrams corrected.

Amendments to the NAT ASM containing the following changes:	
As of November 2010, the NAT ASM is published as <i>Application of Separation Minima – North Atlantic Region</i> (NAT ASM, NAT Doc 008)	
1 st Edition November 2010	• Definition for Same Identical Track added and definitions for Mach Number Technique, Opposite Direction Aircraft and Same Direction Aircraft updated. • Provisions for the application of longitudinal separation using Mach number technique (paragraphs 3.4.2 and 3.4.7) updated to refer to “same identical track” where appropriate. • Paragraphs 4.4.3 and 4.4.8 updated to take account of revised definitions for Same Direction aircraft and Opposite Direction aircraft respectively.
Amendment 1 June 2011	• Foreword updated to correctly identify how to obtain NAT documents. • Paragraph 3.2.1 E. Note 1 amended to correctly reflect operational practices related to the continuous climb or descent through MNPS airspace by aircraft which are not MNPS approved. • Superfluous paragraph 3.4.7 deleted, as it repeats provisions contained in 3.4.2. • First two examples of the application of the Gentle Slope Rules reinstated into paragraph 4.3.9. The final two examples, which were identical to the (former) first two examples, deleted.
Amendment 2 June 2013	• Cover page, headers and footers formats harmonized with NAT Doc 001. • Foreword updated to indicate to what this applies. • In paragraph 3.3.1: - Item G inserted, about provision for 50NM lateral separation within New York OCA for aircraft authorised for NAV 10 or RNP 4, and subsequent Items renumbered; - in Item I (formerly H), sub-item 2 inserted, about provision for 30NM lateral separation within New York OCA. • In paragraph 3.4.2: - Item D broken down to insert sub-item 2, about provisions for 15min longitudinal separation of other than turbojet aircraft; - Items E and F inserted, about provisions for 10min longitudinal separation, and subsequent Items renumbered; - in Item G (formerly E) paragraph references updated for consistency. • Paragraphs 3.4.3 and 3.4.4 inserted, about actions to take for specific cases, and subsequent Items renumbered. • In paragraph 3.4.6 (formerly 3.4.4), Item C broken down to insert sub-item 2, about provisions for 15min longitudinal separation of other than turbojet aircraft, and subsequent Items renumbered. • In paragraph 4.3.9, last word: typo corrected. • In paragraphs 4.4.5 and 4.4.9, explanation text of figures enhanced with mention that separation could be reduced depending on aircraft equipage and reporting capability. • In paragraph 4.4.11, mention that separation could be reduced depending on aircraft equipage and reporting capability. <i>(approved at NAT IMG/42, Report paragraph 7.2.5 and Appendix W refer)</i>
Amendment 3 November 2014	• In paragraph 3.3.1 <i>(approved at NAT IMG/45, NAT IMG Decision 45/8 refers, and NAT SOG/11 Summary of Discussions, paragraphs 3.7 through 3.14 refer)</i> - Item G corrected, about provision for 50NM lateral separation for aircraft authorised for NAV 10 or RNP 4.

Amendments to the NAT ASM containing the following changes:	
Amendment 4 June 2015	• In paragraph 3.3.1 (<i>approved at NAT IMG/46, NAT IMG Decisions 46/09 and 46/12 refer, and NAT SOG/12 Summary of Discussions, paragraphs 5.10 through 5.14 refer</i>) - Item A.2 amended, to read “... within New York OCA and Santa Maria OCA” - Item I added, about provision for 20NM lateral separation while one aircraft climbs/descends through the level of another aircraft, with a navigational performance of RNP 2 or a GNSS equipage. • In paragraph 3.4.4 (<i>approved at NAT IMG/46, NAT IMG Decision 46/09 refers, and NAT SOG/12 Summary of Discussions, paragraphs 5.13 and 5.14 refer</i>) - Item A. and B. amended, to read “... within New York OCA and Santa Maria OCA”
Amendment 5 June 2016	• Inserted a NAT Separation Implementation Table as Appendix A (<i>approved at NAT IMG/48, NAT IMG Decision 48/11 refers, and approved at NAT SOG/14 Decision 14/02 refers</i>)
Amendment 6 September 2016	• In paragraph 4.11 (<i>approved at NAT POG/02 Separation Implementation Table as Appendix A (approved at NAT IMG/48, NAT IMG Decision 48/11 refers, and approved at NAT SOG/14 Decision 14/02 refers)</i>)
Amendment 7 April 2017	• In paragraph 3.4.2, Item E. cross-references amended • In paragraphs 4.4.5 and 4.4.9, cross-references amended • Appendix A NAT Separation Implementation Table updated (<i>approved at NAT IMG/50, NAT IMG Decision 50/6 refers, and approved at NAT SOG/16 Summary of Discussions para 4.32 refers</i>)
Amendment 8 September 2018	• Update to the references to HLA and MNPS airspace and certifications; • Align some separation minima descriptions with ICAO documents; • Include of all separation minima applied by the NAT ANSPs; • Correct references to compulsory speed assignment (OWAFS Project Team and ICAO Documents); • Correct the separation minima applied in Santa Maria OCA; • Update the Table of Separation Minima, to take account of the PBCS implementation on March 2018.
Amendment 9 December 2019	• New paragraph 3.4.11 and updates to Appendix A, <i>NAT Table of Separation Minima, Lateral non-intersecting</i> and <i>NAT Table of Separation Minima, Longitudinal Distance Based</i> related to the incorporation of GNSS separation minima on T9 and T290; and • Amendment to paragraph 3.4.2 D. related to usage of 10 Minute Longitudinal Separation Between Aircraft On Same Tracks.

Amendments to the NAT ASM containing the following changes:	
Amendment 10 November 2020	• Add definition CURRENT FLIGHT PLAN. • Update definition of MACH NUMBER TECHNIQUE to remove ‘turbojet’ due 5 November 2020 PANS ATM (ICAO Doc 4444) amendment. • Update definition of OCEANIC ENTRY POINT and OCEANIC EXIT POINT to reflect NAT Doc 007 V.2020-2.1 update. • General update to ACRONYM list including removal of ‘ASEPS’. • General update in relation to ‘MNPS v NAT HLA.’ • Revised 3.2.1 Note 2 to reflect renaming of airspace as NAT HLA. • Remove 90 NM separation from 3.3.1.C. Section renumbered accordingly. • Inserted in 3.3.1 new bullets I. and J to include 19 NM & 15 NM lateral spacing using ATS surveillance system where direct controller-pilot VHF voice communication is not available. Section renumbered accordingly. • Revised 3.4.2 bullets F and G to remove ‘between turbojet aircraft.’ • Inserted in 3.4.4 new bullets D and E to include 17 NM & 14 NM longitudinal separation using ATS surveillance system where direct controller-pilot VHF voice communication is not available. • Renumbering of 3.4.8 as new bullet D in 3.4.7. Section renumbered accordingly. • Inserted in 3.4.7 new bullet E to add 5 NM opposite direction separation provided surveillance position reports have demonstrated aircraft have passed. Section renumbered accordingly. • Revised 4.5.1 wording to clarify Mach Number Technique. • Update Appendix A Table of Separation Minima NAT Separation Implementation Table of Separation Minima: to add separations using ATS surveillance system where direct controller-pilot VHF voice communication is not available, general update to contents, update usage by ANSP, edit format and update timelines.
Amendment 11 December 2022	• Amend paragraph 3.4.2.D so that the 10 minutes longitudinal separation is also applicable to all aircraft under ATS surveillance.

Amendments to the NAT ASM containing the following changes:	
Amendment 12 July 2023	In order to remove the distinction between turbojet and non-turbojet aircraft when it pertains to separation, the following amendments have been made: • Paragraph 3.4.2 B deleted to remove the 30 minutes longitudinal separation; • Paragraph 3.4.2.C 2 deleted, C 1 rewritten; • Paragraph 3.4.2 D delete reference to turbojet. • 3.4.4 A and B “turbojet” requirement removed, making the provision applicable to all aircraft types; • 3.4.6 A and B “turbojet” requirement removed, making the provision applicable to all aircraft types; • 3.4.7 A deleted; • 3.4.7 B 1 and 2 deleted; • 3.4.7 C reference to turbojet deleted; • 4.4.5 updated to remove turbojet and reference and associated conditions for “other than turbojet” aircraft. 2nd diagram deleted; • 4.4.6 turbojet deleted in text associated with 2nd diagram; • 4.4.9 turbojet deleted in text associated with first 3 diagrams. 4th diagram and associated text deleted; • 4.4.10 turbojet deleted in text associated with both diagrams; • 4.4.11 deleted; and • The Tables in Appendix A amended to reflect these changes.

CHAPTER 1. – DEFINITIONS/ACRONYMS

1.1 DEFINITIONS

AIRSPACE RESERVATION - A defined volume of airspace that, by agreement between the appropriate ATS authority and a requesting agency, is temporarily reserved for exclusive use by the requesting agency.

AIR TRAFFIC CONTROL CLEARANCE - Authorization for an aircraft to proceed under conditions specified by an air traffic control unit. For convenience, the term “air traffic control clearance” is frequently abbreviated to “clearance” when used in appropriate contexts.

COMMON POINT - A point on the surface of the earth common to the tracks of two aircraft, used as a basis for the application of separation (e.g. significant point, waypoint, navigation aid, fix).

CRUISE CLIMB - An aeroplane cruising technique resulting in a net increase in altitude as the aeroplane mass decreases.

CRUISING LEVEL - A level maintained during a significant portion of a flight.

CURRENT FLIGHT PLAN - The flight plan, including changes, if any, brought about by subsequent clearances

DIVERGING TRACKS – Tracks downstream of the common point whose angular divergence is equal to or less than 90 degrees.

FLIGHT LEVEL - A surface of constant atmospheric pressure that is related to a specific pressure datum, 1013.2 hectopascals (hPa), and is separated from other such surfaces by specific pressure intervals

FORMATION FLIGHT - More than one aircraft which, by prior arrangement between the pilots, operate as a single aircraft with regard to navigation and position reporting. Separation between the aircraft within the formation remains the responsibility of the flight leader and the pilots of the other aircraft in the flight, including periods when aircraft within the formation are manoeuvring to attain separation from each other to effect individual control and during join-up and break-away.

LATERAL SEPARATION - Lateral separation is the specified spacing between aircraft expressed in terms of distance or angular displacement between tracks.

LONGITUDINAL SEPARATION - Longitudinal separation is the specified interval between aircraft expressed in units of time or distance along track.

HIGH LEVEL AIRSPACE - A portion of the ICAO North Atlantic Region airspace between FL285 and FL420 within the oceanic control areas of Bodø Oceanic, Gander Oceanic, New York Oceanic East, Reykjavik, Santa Maria and Shanwick, excluding the Shannon and Brest Ocean Transition Areas.

MACH NUMBER TECHNIQUE - The term used to describe the technique of clearing aircraft operating along the same identical track or continuously diverging tracks to maintain specified true Mach numbers in order to maintain adequate longitudinal separation between successive aircraft at, or climbing or descending to, the same level.

MOVING AIRSPACE RESERVATION - An airspace reservation whose position in space changes with time.

NAMED POINT - A reporting point identified by a name as well as by latitude and longitude.

OCEANIC ENTRY POINT - Oceanic Entry point is generally a “named” waypoint, on or close to the FIR boundary where the aircraft enters an oceanic control area.

Note: For aircraft entering the Reykjavik CTA from Edmonton, at or north of 82N, the Oceanic Entry Point can be a Lat/Long position on the boundary.

OCEANIC EXIT POINT - Oceanic Exit point is generally a “named” waypoint, on or close to the FIR boundary where the aircraft leaves the last oceanic control area.

Note: Routes involving more than one OCA may result in multiple Oceanic Entry and Exit Points.

OTHER MEANS - Position information derived from advanced ATC automation systems that take into account multiple sources of information namely voice reports, ADS and/or CPDLC reports, estimates and weather information, may be the basis for applying separation standards.

OPPOSITE DIRECTION AIRCRAFT - Aircraft operating on tracks whose angular differences are from 90° up to and including 180°.

PASSING POINT - The point where aircraft are at the minimum distance from each other and from which longitudinal separation is calculated. This may or may not coincide with the common point.

REDUCED VERTICAL SEPARATION MINIMUM – The application of 1000 feet vertical separation from FL290 thru FL410 between approved aircraft in RVSM designated airspace.

SAME DIRECTION AIRCRAFT - Aircraft operating on tracks whose angular differences are from 0° up to but not including 90°.

SAME IDENTICAL TRACK – Aircraft paths whose projections on the earth’s surface are exactly the same.

SIGNIFICANT POINT - A significant point is a NAVAID, a fix derived from a NAVAID(s), a named point, or geographical coordinate(s) expressed in degrees of latitude, longitude or both, established for the purpose of providing separation, as a reporting point or to delineate a route of flight.

STATIONARY AIRSPACE RESERVATION - An airspace reservation whose position in space remains fixed with relation to the surface of the earth.

STEP CLIMB - A technique in which higher altitudes or flight levels are flight planned or achieved at a specified point or time.

STEEP TRACKS - Parallel tracks which are not laterally separated because the tracks exceed the allowable change in latitude for any ten-degree interval of longitude.

TRACK - The great circle projection on the earth’s surface of the path of an aircraft, the direction of which path at any point is usually expressed in degrees from North (true, magnetic, or grid).

VERTICAL SEPARATION - Vertical separation is the specified spacing of aircraft expressed in altitudes or flight levels.

1.2 ACRONYMS

ADS	AUTOMATIC DEPENDENT SURVEILLANCE
ADS-B	AUTOMATIC DEPENDANT SURVEILLANCE - BROADCAST
ADS-C	AUTOMATIC DEPENDANT SURVEILLANCE - CONTRACT
ATC	AIR TRAFFIC CONTROL
ATS	AIR TRAFFIC SERVICE
CPDLC	CONTROLLER/PILOT DATA LINK COMMUNICATIONS
CTA	CONTROL AREA
FIR	FLIGHT INFORMATION REGION
FL	FLIGHT LEVEL
GNSS	GLOBAL NAVIGATION SATELLITE SYSTEM
HLA	HIGH LEVEL AIRSPACE
ICAO	INTERNATION CIVIL AVIATION ORGANIZATION
MNT	MACH NUMBER TECHNIQUE
MNPS	MINIMUM NAVIGATION PERFORMANCE SPECIFICATIONS
NAT	NORTH ATLANTIC
OCA	OCEANIC CONTROL AREA
NM	NAUTICAL MILES
PANS-ATM	PROCEDURES FOR AIR NAVIGATION SERVICES-AIR TRAFFIC MANAGEMENT (Doc 4444)
RCP	REQUIRED COMMUNICATION PERFORMANCE
RNP	REQUIRED NAVIGATION PERFORMANCE
RSP	REQUIRED SURVEILLANCE PERFORMANCE
RVSM	REDUCED VERTICAL SEPARATION MINIMUM
VHF	VERY HIGH FREQUENCY

CHAPTER 2. – SEPARATION

2.1 Separation is the generic term used to describe action on the part of ATC in order to keep aircraft, operating in the same general area, at such distances from each other that the risk of their colliding with each other is reduced. Separation can be effected in two planes, horizontal and vertical. Separation in the horizontal plane can be achieved either longitudinally (by spacing aircraft behind each other at a specified distance, normally expressed in flying time) or laterally (by spacing aircraft side by side, but again at a specified distance from each other).

2.2 The required separation between aircraft is generally expressed in terms of minima, i.e. in distances which should not be infringed. Separation minima for the ICAO North Atlantic Region are specified in firm values of distance; horizontally in nautical miles (NM) or degrees of latitude; vertically in feet or flight levels, or in values of time between the moment a preceding aircraft passes over a given point and that time when the next aircraft is allowed to pass over the same point.

2.3 An air traffic control clearance shall not be given which would reduce the spacing between aircraft to less than the applicable separation minimum.

2.4 Where the type of separation or minimum used to separate aircraft cannot be maintained, action shall be taken to ensure that another type of separation or another minimum exists or is established prior to the time when the previously used separation would be insufficient.

2.5 The **PANS-ATM (Doc 4444)**, Chapter 5.11, permits the lateral and longitudinal separation minima, as detailed in this publication, to be reduced in the following circumstances:

5.11.1 Provided an appropriate safety assessment has shown that an acceptable level of safety will be maintained, and after prior consultation with users, the separation minima detailed in 5.4.1 and 5.4.2 may be reduced in the following circumstances:

5.11.1.1 As determined by the appropriate ATS authority as appropriate:

a) when special electronic or other aids enable the pilot-in-command of an aircraft to determine accurately the aircraft's position and when adequate communication facilities exist for that position to be transmitted without delay to the appropriate air traffic control unit; or

b) when, in association with rapid and reliable communication facilities, information of an aircraft's position, derived from an ATS surveillance system, is available to the appropriate air traffic control unit; or

c) when special electronic or other aids enable the air traffic controller to predict rapidly and accurately the flight paths of aircraft, and adequate facilities exist to verify frequently the actual aircraft positions with the predicted positions; or

d) when RNAV-equipped aircraft operate within the coverage of electronic aids that provide the necessary updates to maintain navigation accuracy.

5.11.1.2 In accordance with regional air navigation agreements when:

a) special electronic, area navigation or other aids enable the aircraft to closely adhere to their current flight plans; and

b) the air traffic situation is such that the conditions in 5.11.1.1 a) regarding communications between pilots and the appropriate ATC unit or units need not necessarily be met to the degree specified therein.

Note.— Attention is drawn to the guidance material contained in the Air Traffic Services Planning Manual (Doc 9426) regarding conditions governing the reduction of separation minima and to the Manual on Airspace Planning Methodology for the Determination of Separation Minima (Doc 9689).

CHAPTER 3. – SEPARATION MINIMA

3.1 INTRODUCTION

3.1.1 In defining appropriate minima the primary consideration is the accuracy with which the relevant parameters can be measured. Thus vertical minima depend on the accuracy of the altimetry system, lateral minima on navigational accuracy and longitudinal minima on the quality of meteorological information available.

3.2 VERTICAL SEPARATION MINIMA

3.2.1 Minimum vertical separation between aircraft, airspace reservations, and between airspace reservations and other aircraft shall be:

- A. 4000 feet at or above FL 450 between supersonic aircraft, and between supersonic aircraft and any other aircraft, or
- B. 2000 feet at or above FL 290 between a formation flight and any other aircraft, or
- C. 2000 feet at or above FL 290, or
- D. 1000 feet from FL 290 to FL 410 inclusive between RVSM aircraft, or
- E. 1000 feet below FL 290.

Note 1: Non-RVSM aircraft may be cleared to climb or descend through the RVSM-designated flight levels provided that the aircraft will carry out a continuous climb or descent through all RVSM-designated flight levels.

Note 2: Non-RVSM aircraft may also, under specific circumstances, be granted exemptions to operate in RVSM airspace. Such aircraft shall be vertically separated from other traffic by the non-RVSM separation minimum of 2000 feet. Aircraft must also be NAT HLA MNPS approved in order for this to apply within NAT HLA.

Note 3: Formation flights are considered to be non-RVSM. Such flights shall be vertically separated from other traffic by the non-RVSM separation minimum of 2000 feet within the RVSM designated flight levels.

Note 4: Two RVSM approved aircraft with station-keeping equipment operating as a formation flight on the same route, at the same altitude with less than 4000' longitudinal separation are considered to be one aircraft for the purpose of separation. 1000 feet vertical separation can be applied between these and other RVSM approved aircraft. Currently, only formation flights of two C-17 aircraft qualify. NAT ANSP should prior co-ordinate all C-17 formation flights. Apply 2000 feet vertical separation when requested so as to meet domestic RVSM requirements.

Note 5: RVSM minima shall not be applied between any aircraft and an airspace reservation.

Note 6: Under certain circumstances, ATS units may temporarily apply increased vertical separation. (e.g. in areas where greater than moderate turbulence has been reported).

3.3 LATERAL SEPARATION MINIMA

3.3.1 Lateral separation is applied between route segments. Segments may be wholly or partly separated but for aircraft to be laterally separated both must be within the separated segments or segment parts.

The following lateral separation minima apply to all aircraft and include both moving and stationary airspace reservations:

- A.** *120 NM or 2 degrees* between aircraft operating entirely outside NAT HLA other than as prescribed below; or
- B.** *120 NM*:
 - 1. between the closest tracks of any aircraft for which a moving airspace reservation is reserved; or
 - 2. between the track of an aircraft operating under the control of the ATC unit concerned and the closest track of any aircraft for which a moving airspace reservation is reserved; or
 - 3. between the track of an aircraft operating under the control of the ATC unit concerned or as part of a moving airspace reservation and the nearest limit of the reserved airspace of the stationary airspace reservation, when the aircraft does NOT meet the required navigation specification and the requesting agency has NOT guaranteed to confine its activities to the requested airspace; or
 - 4. between the boundaries of stationary airspace reservations other than those contained in 3.3.1.F; or
- C.** *60 NM or 1 degree* between MNPS aircraft provided a portion of the route is within, above, or below NAT HLA; or
- D.** *60 NM*:
 - 1. between the closest tracks of any aircraft for which a moving airspace reservation is reserved provided all aircraft or formation flights meet the required navigation specification; or
 - 2. between the track of an aircraft operating under the control of the ATC unit concerned and the track of any of a formation flight for which a moving airspace reservation is reserved, provided at least one aircraft in the formation and the aircraft operating under the control of the ATC unit meet the required navigation specification, and a portion of the route of the aircraft is above, within, or below NAT HLA; or
 - 3. between the track of an aircraft operating under the control of the ATC unit concerned and the closest track of any of the aircraft for which a moving airspace reservation is reserved, provided all aircraft meet the required navigation specification, and a portion of the route of the aircraft is above, within, or below NAT HLA; or
 - 4. between the track of an aircraft operating under the control of the ATC unit concerned or as part of a moving airspace reservation and the nearest limit of the reserved airspace of the stationary airspace reservation, provided the aircraft meets the required navigation specification, a portion of the route of the aircraft is above, within, or below NAT HLA, and the requesting agency has NOT guaranteed to confine its activities to the requested airspace; or
 - 5. between the track of an aircraft operating under the control of the ATC unit concerned or as part of a moving airspace reservation and the nearest limit of the reserved airspace of the stationary airspace reservation, when the aircraft does NOT meet the required navigation specification and the requesting agency has guaranteed to confine its activities to the requested airspace; or
 - 6. between the boundaries of stationary airspace reservations provided the requesting agencies have guaranteed to confine their activities to the requested airspace; or

Note: A formation flight where the lead aircraft in the formation meets the required navigation specification is deemed to meet the requirements for the application of 60 NM.

- E. 50 NM:** between aircraft operating within Bodø OCA (only non-intersecting), Reykjavik OCA, New York East OCA and Santa Maria OCA and authorized RNAV (RNP) 10 or RNP 4; or

Note: The application of 50NM lateral separation in Reykjavik OCA is based on an operational trial between NAT HLA MNPS approved aircraft on intersecting and non-intersecting tracks.

- F. 30 NM:**

1. between the track of an aircraft operating under the control of the ATC unit concerned or as part of a moving airspace reservation and the nearest limit of the reserved airspace of the stationary airspace reservation, provided the aircraft meets the required navigation specification, a portion of the route of the aircraft is above, within or below NAT HLA, and the requesting agency has guaranteed to confine its activities to the requested airspace; or
2. between aircraft operating entirely within New York OCA, authorized RNP 4, CPDLC RCP240, ADS-C RSP180, and successfully logged on to CPDLC and ADS-C with a 5 NM lateral deviation event contract established; or

- G. 23 NM:** between aircraft operating entirely within Gander OCA, Reykjavik OCA, Santa Maria OCA and Shanwick OCA, authorized RNP 4, CPDLC RCP240, ADS-C RSP180, and successfully logged on to CPDLC and ADS-C with a 5 NM lateral deviation event contract established; or

- H. 20 NM:** applied while one aircraft climbs/descends through the level of another aircraft, a navigational performance of RNP 2 or a GNSS equipage shall be prescribed for both aircraft; or

- I. 19 NM:** lateral spacing between parallel or non-intersecting tracks where direct controller-pilot VHF voice communication is not available utilizing positioning information derived from an ATS surveillance system, provided the following requirements are met:

- a) Navigational performance of RNP 4 or RNP 2 shall be prescribed;
- b) the communication system shall satisfy RCP 240;
- c) an alternate means of communication shall be available so as to allow the controller to intervene and resolve a conflict within a total of nine minutes, should normal means of communications fail, and

Note.— The total time specified in c) includes the four minutes allocated to RCP 240.

- d) route conformance monitoring shall be ensured by the use of ATS surveillance system lateral deviation alerts with a warning threshold normally set at a maximum 3 NM.
 - 1) Warning thresholds greater than 3 NM may be set, provided lateral separation minima 19 NM are increased by 1 NM for each 1 NM that the warning threshold is increased; and

ATS surveillance systems shall provide for the display of alerts in a clear and distinct manner, to enable immediate action by the controller in the event of a lateral deviation.

- J. 15 NM:** The separation in **I.** above may, if so prescribed by the appropriate ATS authority, be reduced, but not below 27.8 km (15.0 NM), provided either:

- a) the density of traffic in the airspace, as measured by occupancy, is less than 0.6; or

- b) the proportion of total flight time spent by aircraft off the cleared track does not exceed the following:
 - 2) for aircraft deviating 13.0 km (7.0 NM) or more off the cleared track, 3×10^{-5} per flight hour; and
 - 3) for aircraft deviating 20.4 km (11.0 NM) or more off the cleared track, 1×10^{-5} per flight hour.
- K. 15 NM: a navigational performance of RNP 2 or a GNSS equipage shall be prescribed for both aircraft. Direct controller pilot VHF voice communication shall be maintained; or
- L. 7 NM: applied while one aircraft climbs/descends through the level of another aircraft, a navigational performance of RNP 2 or a GNSS equipage shall be prescribed for both aircraft. Direct controller pilot VHF voice communication shall be maintained.

3.3.2 The above minima when expressed in terms of degrees are nominal values; the specific method of applying them using the Earth's coordinate system (the "gentle-slope" rule) provides slightly lower lateral distances. This issue is discussed in more detail in section 4.3 Lateral Separation Minima.

3.4 LONGITUDINAL SEPARATION MINIMA

3.4.1 Longitudinal separation shall be applied so that the spacing between the estimated positions of the aircraft being separated is never less than a prescribed minimum.

3.4.2 Longitudinal separation minima for aircraft flying along same/intersecting tracks shall be applied by ensuring that throughout the period where lateral separation does not exist (see Section 4.3 Lateral Separation) the aircraft are separated by a time interval equal to or greater than:

- A. 60 minutes between moving airspace reservations, or

Note: This separation shall be ensured in the airspace reservation approval process. Apply longitudinal separation so that 60 minutes will be maintained with respect to any approved "Approval Void if Aircraft Not Airborne by (AVANA)" times. Minimum longitudinal separation is applied between the latest time of the first reservation against the earliest time of the second reservation.

- B. 15 minutes ~~30 minutes between other than turbojet aircraft and any other aircraft, or~~

~~1. 15 minutes between turbojet aircraft, and~~

~~2. between other than turbojet aircraft and any other aircraft provided the following conditions are satisfied:~~

~~a) the aircraft are equipped with GNSS; and~~

~~b) the aircraft are in communication via a third party VHF.~~

- C. 10 minutes between aircraft on same/intersecting tracks, whether in level, climbing or descending flight, provided the aircraft have ADS-C periodic contracts with a maximum reporting interval of 20 minutes or are being tracked by an ATS surveillance system.

Note: this application satisfies the PANS-ATM 5.4.2.2.1 b), 5.4.2.2.2.1 b), 5.4.2.2.1.2 b) and 5.4.2.2.2 b) requirements that GNSS permits frequent determination of position and speed.

- D.** ~~10 minutes~~ between same direction ~~turbojet~~ aircraft in climbing or descending flight while vertical separation does not exist, provided that both aircraft are GNSS equipped and that both aircraft have reported their position within 20 minutes of the time when the clearance to climb or descend is issued.

Note: this application satisfies the PANS-ATM 5.4.2.2.2 b) requirement that navigation aids permit frequent determination of position and speed.

- E.** 10 minutes provided the Mach Number Technique is applied as prescribed in paragraphs 3.4.8 and 3.4.9 and Section 4.5 whether in level, climbing or descending flight, provided:

1. that when the succeeding aircraft is maintaining a true Mach number higher than the preceding aircraft the provisions of 4.5.2 to 4.5.5 shall be applied, and
2. the aircraft concerned have reported over a common point and follow:
 - a) the same identical track; or
 - b) continuously diverging tracks until some other form of separation is provided, and
 - i) at least 10 minutes longitudinal separation exists at the point where the tracks diverge, and
 - ii) at least 5 minutes longitudinal separation exists where lateral separation is achieved, and
 - iii) lateral separation will be achieved at or before the next significant point (normally ten degrees of longitude along track(s)) or, if not, within 90 minutes of the time the second aircraft passes the common point or within 600 NM of the common point, whichever is estimated to occur first.
3. If the aircraft have not reported over a common point, it is possible to ensure, by radar, ADS-B or other means that the appropriate time interval will exist at the common point from which they either follow the same identical track or continuously diverging tracks.

- F.** Between 9 and 5 minutes inclusive provided the Mach number technique is applied as prescribed in paragraphs 3.4.8 and 3.4.9~~3.4.5 and 3.4.6~~ and Section 4.5, whether in level, climbing or descending flight, provided:

1. the aircraft concerned have reported over a common point and follow:
 - a) the same identical track, or
 - b) continuously diverging tracks until some other form of separation is provided.
2. the preceding aircraft is maintaining a true Mach number greater than the following aircraft in accordance with the following table:
 - 9 minutes, if the preceding aircraft is Mach 0.02 faster than the following aircraft;
 - 8 minutes, if the preceding aircraft is Mach 0.03 faster than the following aircraft;
 - 7 minutes, if the preceding aircraft is Mach 0.04 faster than the following aircraft;
 - 6 minutes, if the preceding aircraft is Mach 0.05 faster than the following aircraft;
 - 5 minutes, if the preceding aircraft is Mach 0.06 faster than the following aircraft.
3. if the aircraft have not reported over a common point, it is possible to ensure, by radar, ADS-B or other means that the appropriate time interval will exist at the common point from which they either follow the same identical track or continuously diverging tracks.

- G.** 5 minutes between climbing or descending same direction aircraft while vertical separation does not exist, provided that the level change is commenced within 10 minutes of the time the second aircraft has reported over a common point; or

Note 1: Both aircraft must be GNSS equipped.

Note 2: When issuing the clearance through third party communication or CPDLC, a restriction must be added to the clearance to ensure that the 10 minute condition is satisfied.

Note 3: To facilitate application of the procedure where a considerable change of level is involved, a descending aircraft may be cleared to some convenient level above the lower aircraft, or a climbing aircraft to some convenient level below the higher aircraft, to permit a further check on the separation that will be obtained while vertical separation does not exist.

- H.** 5 minutes between aircraft operating entirely within Gander OCA, Reykjavik OCA, Santa Maria OCA and Shanwick OCA, authorized RNP 4 or 10, CPDLC RCP240, ADS-C RSP180, and successfully logged on to CPDLC and ADS-C.

Note: The application of this separation minimum is also dependent on conditions stated in the PANS ATM, paragraphs 5.4.2.9.4, 5.4.2.9.5, 5.4.2.9.6, 5.4.2.9.7 and 5.4.2.9.8.

3.4.3 During the application of 3.4.2.C, when an ADS-C periodic report is not received, the controller shall take action within 3 minutes to establish communication. If communication has not been established within 6 minutes of the time the report should have been received, the controller shall take action to apply an alternative form of separation.

3.4.4 Longitudinal separation minima for aircraft flying along same/intersecting tracks shall be applied by ensuring that throughout the period where lateral separation does not exist (see Section 4.3 Lateral Separation) the aircraft are separated by a distance interval equal to or greater than:

- A.** 50 NM: between ~~turbojet~~ aircraft operating entirely within New York OCA and authorized RNAV (RNP) 10 or RNP 4, CPDLC RCP240, ADS-C RSP180, and successfully logged on to CPDLC and ADS-C; or
- B.** 30 NM: between ~~turbojet~~ aircraft operating entirely within New York OCA and Santa Maria OCA, authorized RNP 4, CPDLC RCP240, ADS-C RSP180, and successfully logged on to CPDLC and ADS-C.
- C.** 20 NM: between aircraft on the same track, provided separation is checked by obtaining simultaneous GNSS readings from the aircraft at frequent intervals to ensure that the minimum will not be infringed.
- D.** 17 NM: between aircraft operating on same tracks or crossing tracks applied provided that the relative angle between the tracks is less than 90 degrees within Gander OCA, Shanwick OCA and Santa Maria OCA, authorized RNP 4 or RNP 2, CPDLC RCP240, successfully logged on to CPDLC and utilizing position information derived from an ATS surveillance system.
- E.** 14 NM: between aircraft operating on same tracks or crossing tracks applied provided that the relative angle between the tracks is less than 45 degrees within Gander OCA, Shanwick OCA and Santa Maria OCA, authorized RNP 4 or RNP 2, CPDLC RCP 240, successfully logged on to CPDLC and utilizing position information derived from an ATS surveillance system.

3.4.5 The minimum longitudinal separation between a moving airspace reservation and other (non-reservation) aircraft shall be the applicable longitudinal minima as contained in paragraph 3.4.2 above. Minimum longitudinal separation may be applied between aircraft operating under the control of the ATC unit concerned and the first and last aircraft operating within a moving airspace reservation.

3.4.6 Longitudinal separation minima for aircraft flying along the same track climbing or descending through the level of another aircraft that are separated by a distance interval equal to or greater than:

- A.** 15 NM: between ~~turbojet~~ aircraft operating entirely within the New York OCA with a Figure of Merit (FOM) of 6 or better and successfully logged on to CPDLC and ADS-C conducting an ADS-C Climb/Descent Procedure (CDP);

Note: The application of this separation minimum is also dependent on conditions stated in the PANS ATM, paragraphs 5.4.2.8.1 and 5.4.2.8.2.

- B.** 15 NM: between ~~turbojet~~ aircraft operating entirely within the New York OCA where the manoeuvring aircraft is equipped with both ADS-B in and out.

Note: The application of this separation minimum is also dependent on conditions stated in the PANS ATM, paragraphs 5.4.2.7.1, 5.4.2.7.2, 5.4.2.7.3, 5.4.2.7.3.1, 5.4.2.7.3.2 and 5.4.2.7.3.3.

3.4.7 Longitudinal separation between aircraft flying along opposite direction tracks (and not laterally separated) cannot apply throughout. Vertical separation must therefore be ensured during a period equal to the appropriate minimum stated below prior to and after the aircraft are estimated to meet:

- ~~**A.** 30 minutes for other than turbojet aircraft, or~~

- ~~**B.**~~ **A.** 15 minutes.÷

- ~~1. for turbojet aircraft, and~~

- ~~2. for other than turbojet aircraft provided the following conditions are satisfied:~~

- ~~a) the aircraft are equipped with GNSS; and~~

- ~~b) a) the aircraft are in communication via a third party VHF; or~~

- ~~**C.**~~ **B.** 10 minutes for ~~turbojet~~ aircraft provided that the aircraft have passed each other and have reported over a common point.

- ~~**D.**~~ **C.** Opposite direction aircraft on reciprocal tracks may be cleared to climb or descend to or through the levels occupied by another aircraft provided ADS-C reports show that the aircraft have passed each other by the applicable separation minimum in 3.4.2,H, and in 3.4.4.A and B.

- ~~**E.**~~ **D.** Opposite direction aircraft on reciprocal tracks may be cleared to climb or descend to or through the levels occupied by another aircraft, provided that surveillance position reports have been received from both aircraft demonstrating the aircraft have passed each other by 5 NM.

3.4.8 When assigned, any aircraft shall adhere to the true Mach number approved by ATC and shall request ATC approval before making any changes thereto. If it is essential to make an immediate temporary change in the Mach number (e.g. due to turbulence), ATC shall be notified as soon as possible that such a change has been made.

3.4.9 If it is not feasible, due to aircraft performance, to maintain the last assigned true Mach number during en-route climbs and descents, pilots of aircraft concerned shall advise ATC at the time of the climb/descent request.

CHAPTER 4. – APPLICATION OF SEPARATION

4.1 INTRODUCTION

4.1.1 With the possible exception of vertical, the application of separation is a far more difficult subject to address than the minima. In this edition of the NAT ASM a new approach is adopted, the automated application is described first, then the manual one. This reflects the increased level of automation in NAT centres.

4.2 VERTICAL SEPARATION

Overview

4.2.1 Vertical separation is obtained by requiring aircraft to operate at different flight levels (or altitudes). While aircraft are normally restricted to maintain a single flight level, cruise climbs between two levels (or above a level) may also be employed to enhance efficiency.

4.2.2 During a cruise climb, the aircraft shall be considered to occupy all levels specified in the cruise climb clearance.

4.2.3 An aircraft at a cruising level shall normally have priority over other aircraft desiring that cruising level. When two or more aircraft are at the same cruising level, the preceding (leading) aircraft shall normally have priority.

Level changes

4.2.4 An aircraft's change in cruising level may be subject to constraints on its commencement (time or place), completion (time or place) and rate (feet per minute).

4.2.5 The type of constraint should reflect the form of separation which is being replaced by (or is replacing) vertical separation; time being used for longitudinal and place for lateral separation.

4.2.6 When an aircraft is cleared for a change in flight level, the aircraft concerned is considered to occupy all flight levels involved in the change unless specific flight level reports are received.

4.2.7 An aircraft may be cleared to a level previously occupied by another aircraft after the latter has reported vacating it, except when:

- a) severe turbulence is known to exist;
- a) the higher aircraft is effecting a cruise climb; or
- b) the difference in aircraft performance is such that less than the applicable separation minimum may result; in which case such clearance shall be withheld until the aircraft vacating the level has reported at or passing another level separated by the required minimum.

4.2.8 In all cases, the applicable vertical separation minima must be established prior to the loss of horizontal separation and be maintained until either lateral or longitudinal separation is regained.

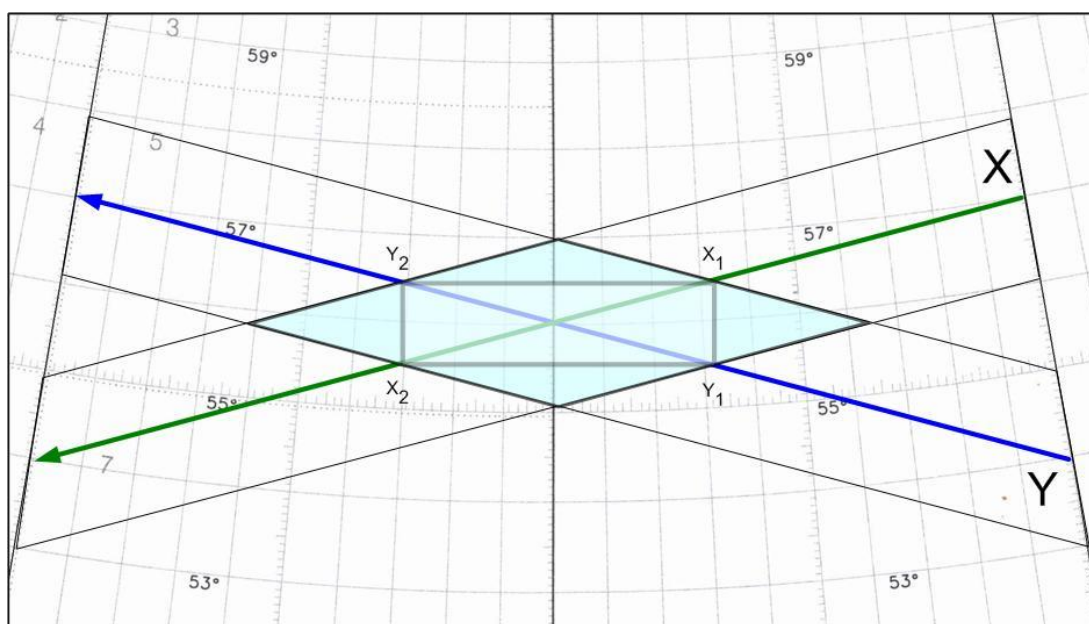
4.3 LATERAL SEPARATION

Overview

4.3.1 The. PANS-ATM (Doc 4444), states in paragraph 5.4.1.1.1 that "lateral separation shall be applied so that the distance between those portions of the intended routes for which the aircraft are to be

laterally separated is never less than an established distance to account for navigational inaccuracies plus a specified buffer.

4.3.2 As the following diagram makes clear, lateral separation exists between the segments on which the aircraft are operating, independent of the actual location of the aircraft along those segments (which is a longitudinal consideration). In the diagram below (variations on which will be met in the ensuing sections) aircraft “X” and “Y” are laterally separated when at least one of the aircraft is outside of the area of conflict – namely outside the shaded area.



4.3.3 As described above, several lateral separation minima are published for the ICAO NAT Region, namely 120 NM or 2 degrees, 90 NM or 1 1/2 degrees, 60 NM or 1 degree where the earth’s coordinate system is used to define tracks and effect separation, 50NM and 23NM.

4.3.4 On a flat earth, and if all tracks ran due east/west, this would indeed be a true equivalence. On the spherical Earth it is not, even tracks along adjacent parallels are separated by less than 60 NM.

4.3.5 In order to bridge this gap between the formal specification and the real world, the ICAO NAT Region has adopted “gentle slope” rules that ensure that the actual separation never falls below distances which vary with latitude but never fall short of 50.5 NM.

4.3.6 The application of the gentle slope rule varies from centre to centre, some allow it only to be used between segments anchored at major meridians spaced 10 degrees apart, others allow extrapolation from points (typically navaids) located between such meridians to the nearest major meridian to establish the slope.

4.3.7 It is important to realize that lateral separation is measured between the routes and segments along which two aircraft fly, not between the aircraft themselves.

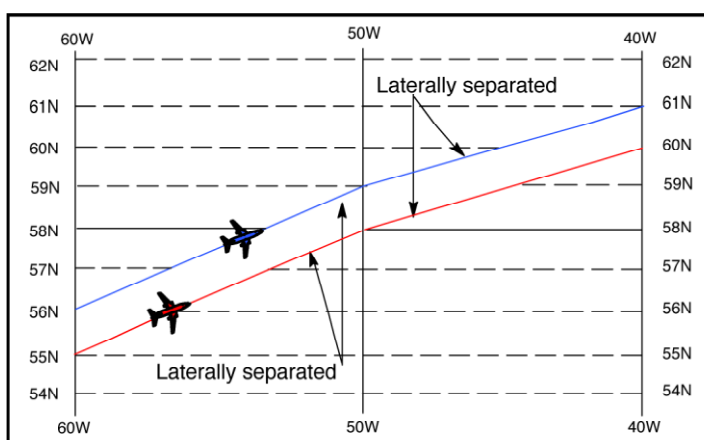
4.3.8 In order to increase safety, a “Strategic Lateral Offset” procedure has been implemented. Pilots have the authority to offset from the centre line of their cleared route up to 2 NM right-of-course. Pilots are not required to notify ATC when applying a Strategic Lateral Offset manoeuvre and the calculation of non-radar lateral separation need not take this into consideration.

Gentle Slope Rules

4.3.9 In the manual application of the lateral separation minima specified in section 3.3, tracks may be spaced with reference to their difference in latitude, using one degree instead of 60 NM, one and one-half degrees instead of 90 NM, and two degrees instead of 120 NM, provided that in any interval of ten degrees of longitude the change in latitude of one of the tracks does not exceed:

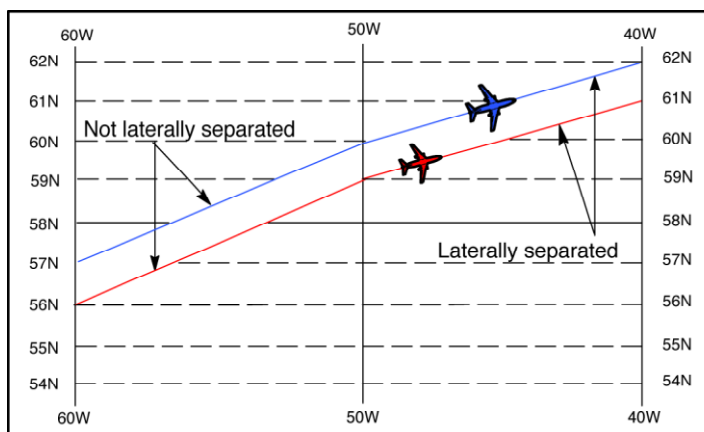
- A. three degrees at or south of 58° North; or
- B. two degrees north of 58° North and south of 70° North; or
- C. one degree at or north of 70° North and south of 80° North.

Note: The “degrees to nautical miles” relativities contained in this paragraph do not apply to applications involving airspace reservations.



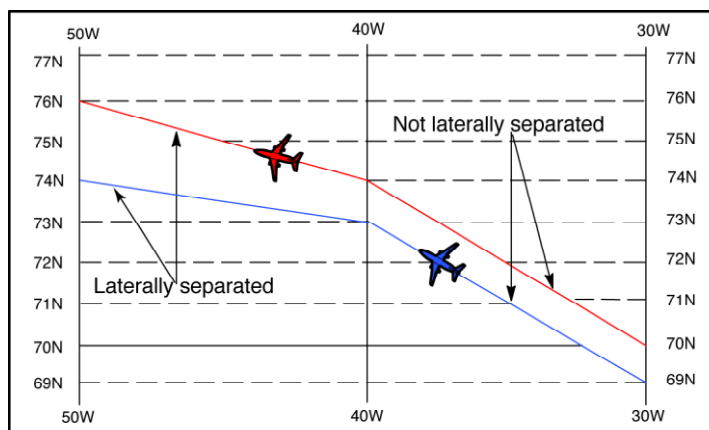
-- From 60°W to 50°W, the tracks are laterally separated because at least one of the tracks meets the maximum 3° change in latitude for a 10° interval of longitude permitted south of 58°N.

-- From 50°W to 40°W, the tracks are laterally separated because at least one of the tracks meets the maximum 2° change in latitude for a 10° interval of longitude permitted north of 58°N and south of 70°N.



-- From 60° to 50°W, the tracks are not laterally separated because both tracks exceed the maximum 2° change in latitude for a 10° interval of longitude permitted north of 58°N and south of 70°N.

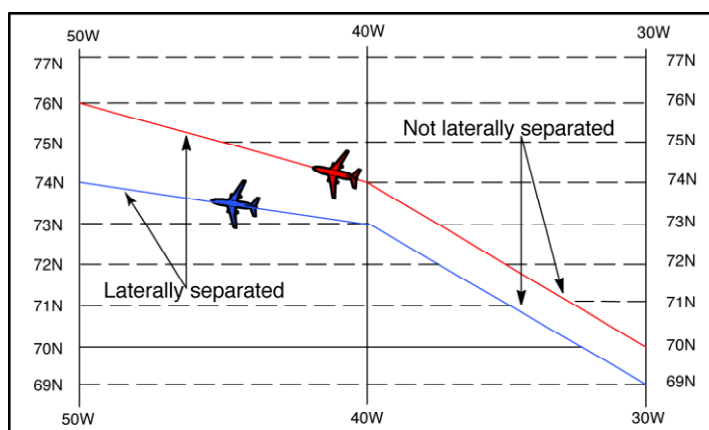
-- From 50° to 40°W, the tracks are laterally separated because at least one of the tracks meets the maximum 2° change in latitude for a 10° interval of longitude permitted north of 58°N and south of 70°N.



-- From 30° to 40°W, the tracks are not laterally separated because both tracks exceed the maximum 1° change in latitude for a 10° interval of longitude permitted at or 70°N and south of 80°N.

-- Lateral separation exists when the "north" aircraft passes 40°W.

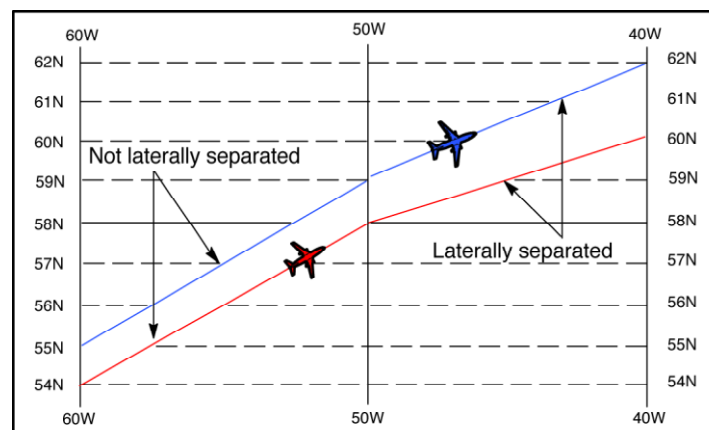
-- From 40° to 50°W, the tracks are laterally separated because at least one of the tracks meets the maximum 1° change in latitude for a 10° interval of longitude permitted at or north of 70°N and south of 80°N.



-- From 30° to 40°W, the tracks are not laterally separated because both tracks exceed the maximum 1° change in latitude for a 10° interval of longitude permitted at or north of 70°N and south of 80°N.

-- Lateral separation exists when both aircraft have passed 40°W.

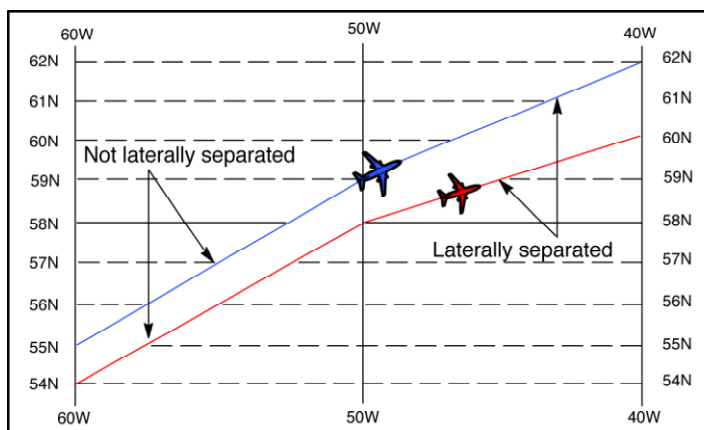
-- From 40° to 50°W, the tracks are laterally separated because at least one of the tracks meets the maximum 1° change in latitude for a 10° interval of longitude permitted at or north of 70°N and south of 80°N.



-- From 60° to 50°W, the tracks are not laterally separated because both tracks exceed the maximum 3° change in latitude for a 10° interval of longitude permitted at or south of 58°N.

-- Lateral separation exists when the "north" aircraft passes 50°W.

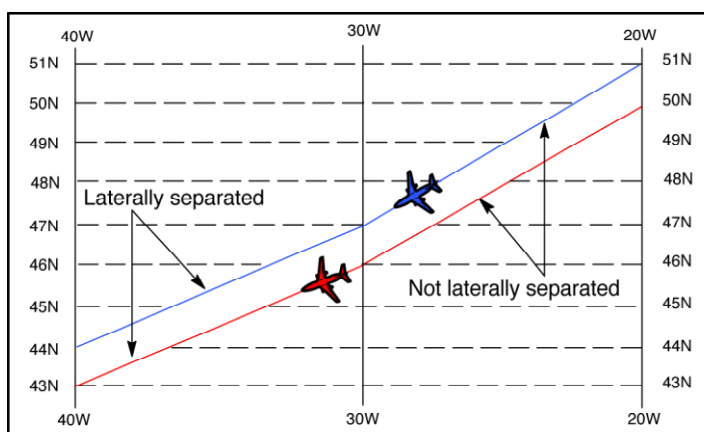
-- From 50° to 40°W, the tracks are laterally separated because at least one of the tracks meets the maximum 2° change in latitude for a 10° interval of longitude permitted between north of 58°N and south of 70°N.



-- From 60° to 50°W, the tracks are not laterally separated because both tracks exceed the maximum 3° change in latitude for a 10° interval of longitude permitted at or south of 58°N.

-- Lateral separation exists when both aircraft have passed 50°W.

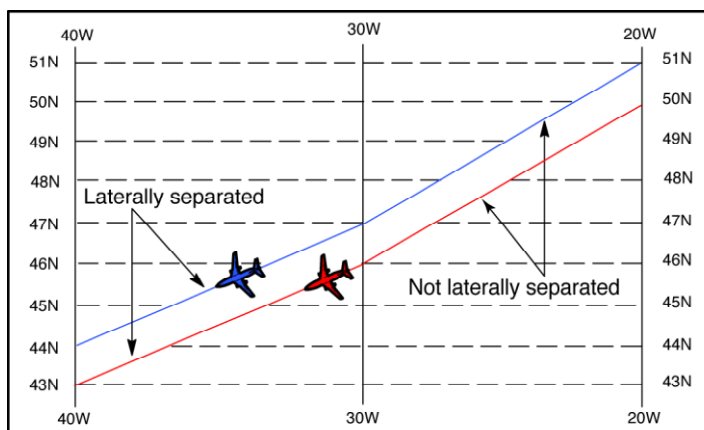
-- From 50° to 40°W, the tracks are laterally separated because at least one of the tracks meets the maximum 2° change in latitude for a 10° interval of longitude permitted north of 58°N and south of 70°N.



-- From 20° to 30°W, the tracks are not laterally separated because both tracks exceed the maximum 3° change in latitude for a 10° interval of longitude permitted south of 58°N.

-- Lateral separation exists when the "south" aircraft passes 30°W.

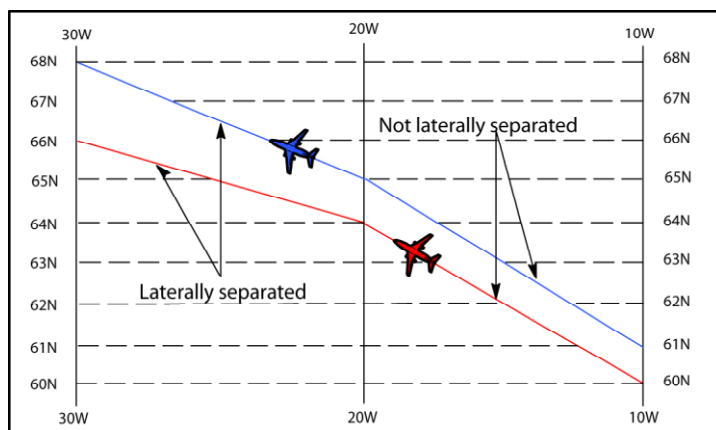
-- From 30° to 40°W, the tracks are laterally separated because at least one of the tracks meets the maximum 3° change in latitude for a 10° interval of longitude permitted south of 58°N.



-- From 20° to 30°W, the tracks are not laterally separated because both tracks exceed the maximum 3° change in latitude for a 10° interval of longitude permitted south of 58°N.

-- Lateral separation exists when both aircraft have passed 30°W.

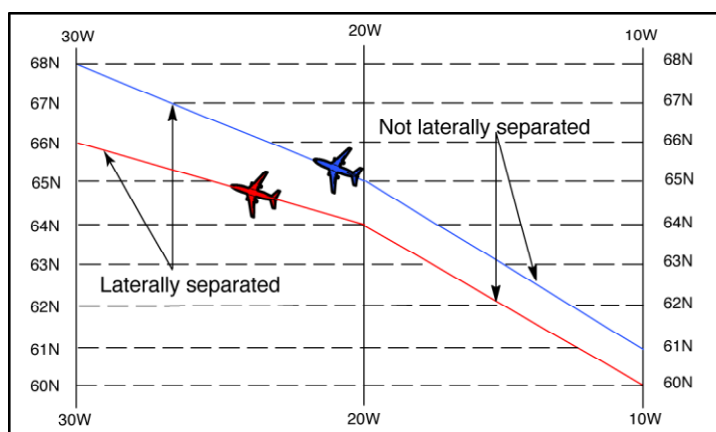
-- From 30° to 40°W, the tracks are laterally separated because at least one of the tracks meets the maximum 3° change in latitude for a 10° interval of longitude permitted south of 58°N.



-- From 10° to 20°W, the tracks are not laterally separated because both tracks exceed the maximum 2° change in latitude for a 10° interval of longitude permitted north of 58°N and south of 70°N.

-- Lateral separation exists when the "north" aircraft passes 20°W.

-- From 20° to 30°W, the tracks are laterally separated because at least one of the tracks meets the maximum 2° change in latitude for a 10° interval of longitude permitted north of 58°N and south of 70°N.

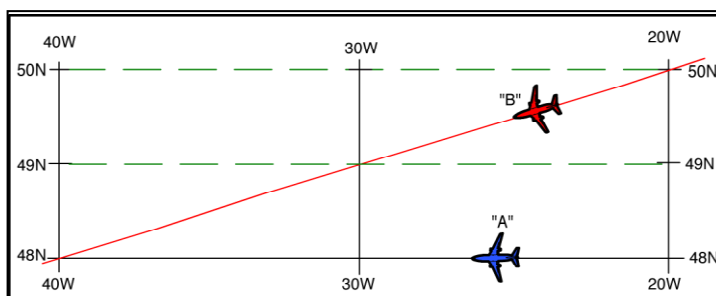


-- From 10° to 20°W, the tracks are not laterally separated because both tracks exceed the maximum 2° change in latitude for a 10° interval of longitude permitted north of 58°N and south of 70°N.

-- Lateral separation exists when both aircraft have passed 20°W.

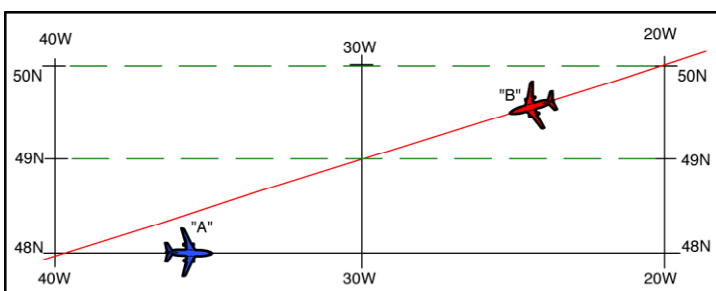
-- From 20° to 30°W, the tracks are laterally separated because at least one of the tracks meets the maximum 2° change in latitude for a 10° interval of longitude permitted north of 58°N and south of 70°N.

4.3.10 For tracks where the spacing falls below the appropriate criteria, lateral separation exists up until the time that an aircraft on one of the tracks reaches the appropriate criterion (60 NM or 1°, 90NM or 1 1/2°, 120 NM or 2°) as measured perpendicularly from the other track.



60 NM or 1°

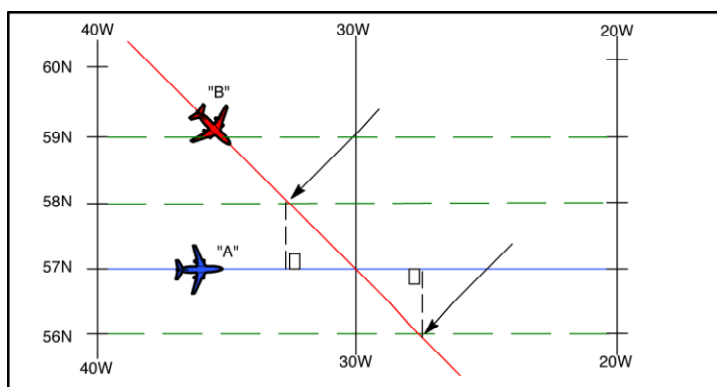
Lateral separation exists until aircraft "B" reaches 49°N.



60NM or 1°

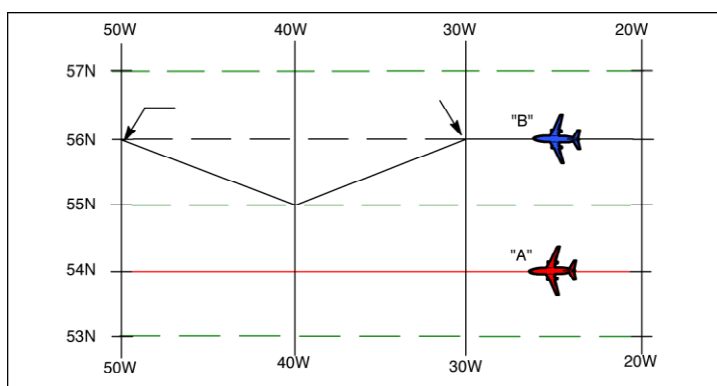
Lateral separation exists until aircraft "B" reaches 49°N.

4.3.11 If longitudinal separation does not exist, vertical separation must be established prior to the second aircraft reaching the appropriate lateral minimum and be maintained until another form of separation is established.



Lateral separation exists until aircraft "B" reaches 58°N, and is regained after aircraft "B" passes 56°N.

60 NM or 1°



Lateral separation exists until aircraft "B" reaches 30°W, and is regained after aircraft "B" passes 50°W.

120 NM or 2°

4.3.12 At or north of 80° North, or where the above rates of change of latitude are exceeded, the required lateral separation minima must be ensured by reference to the track spacing expressed in nautical miles.

4.4 LONGITUDINAL SEPARATION

Overview

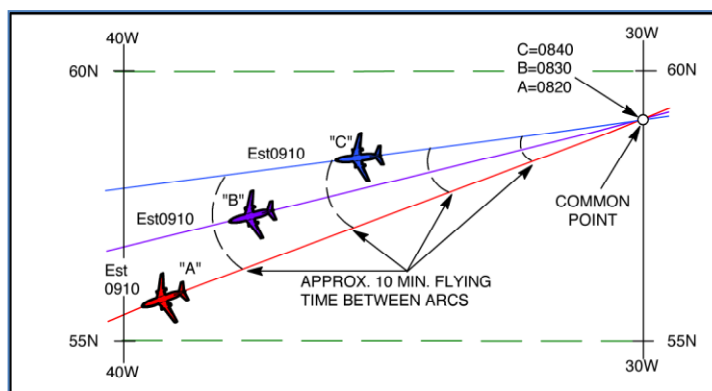
4.4.1 Longitudinal separation shall be applied so that the spacing between the estimated positions of the aircraft being separated is never less than a prescribed minimum.

4.4.2 Conflict prediction calculations, whether automated or manual, will extend to an exit point, or into an adjacent Control Centre's airspace to a mutually agreed limit.

Same Direction

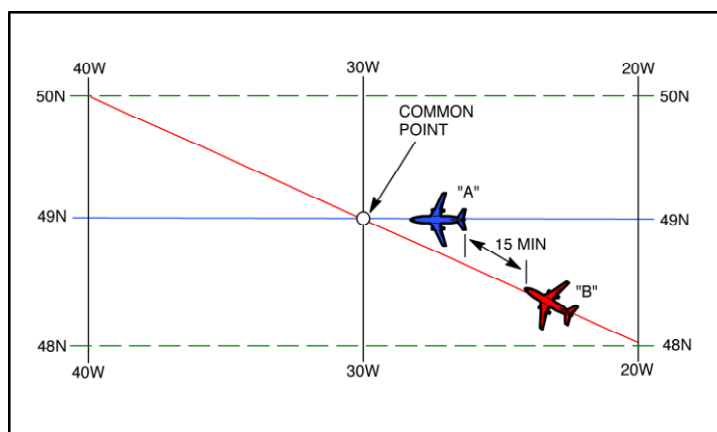
4.4.3 The application of same direction minima is for same direction aircraft, unless otherwise specified.

4.4.4 Where automated conflict prediction capability exists, longitudinal separation calculations for same direction aircraft should be centered around a common point instead of successive degrees of longitude/latitude. The common point may be a real common point if the aircraft tracks intersect or a system calculated common point if the aircraft tracks do not intersect. In this way, a consistent application of longitudinal separation will be achieved (see figure below).



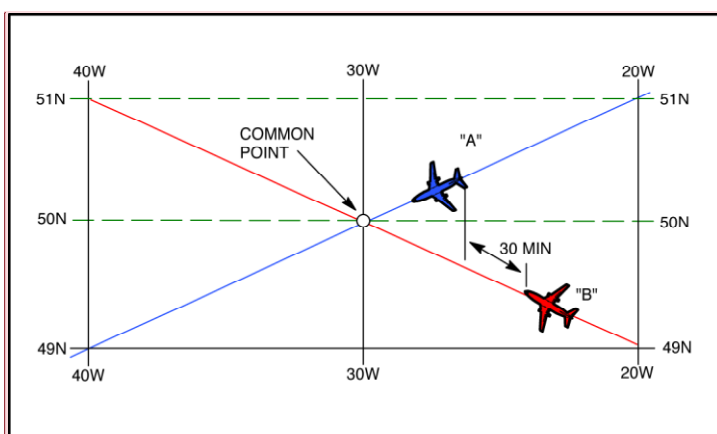
4.4.5 For aircraft that have not reported over a common point and will follow tracks which intersect, the following longitudinal separation is required:

Both Aircraft Have Not Reported Over A Common Point



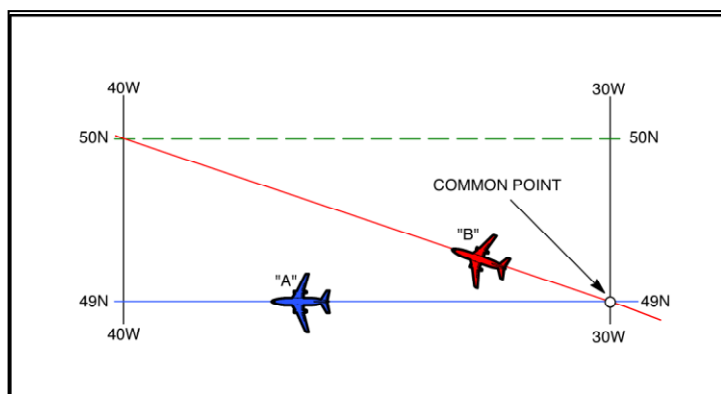
For ~~turbojet~~ aircraft, at least 15 minutes longitudinal separation between the aircraft must be maintained between 20° W and 30° W. This separation may be reduced to 10 minutes provided 3.4.2-C or 3.4.2-D is met.

Note: Some ANSPs may restrict same direction minima to angular differences from 0° up to but not including 45°.

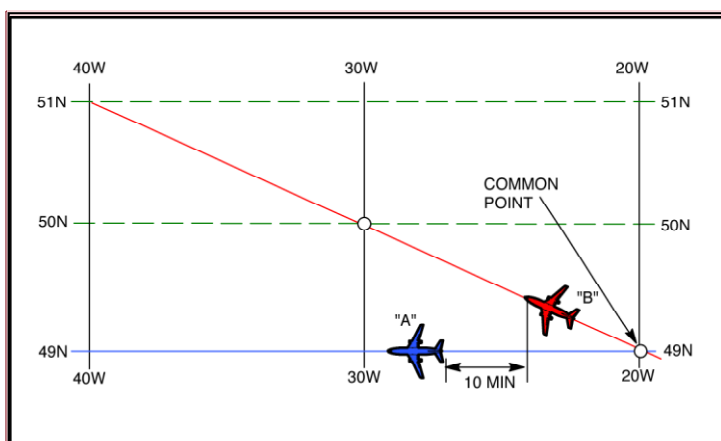


~~For other than turbojet aircraft, at least 30 minutes longitudinal separation between the aircraft must be maintained. This separation may be reduced to 15 minutes if the aircraft are equipped with GNSS and are communicating via a third party VHF.~~

4.4.6 For ~~turbojet~~ aircraft that have reported over a common point and are following tracks which have intersected, 10 minutes longitudinal separation is required at the point where the tracks diverge, provided the Mach Number Technique is applied, and at least 5 minutes longitudinal separation exists where the required lateral separation is achieved, in accordance with the requirements contained in paragraph 3.4.2.E.2.b).



At least 10 minutes longitudinal separation exists at 30° W. The diverging aircraft continue to be separated provided that at least 5 minutes longitudinal separation exists where lateral separation is achieved.

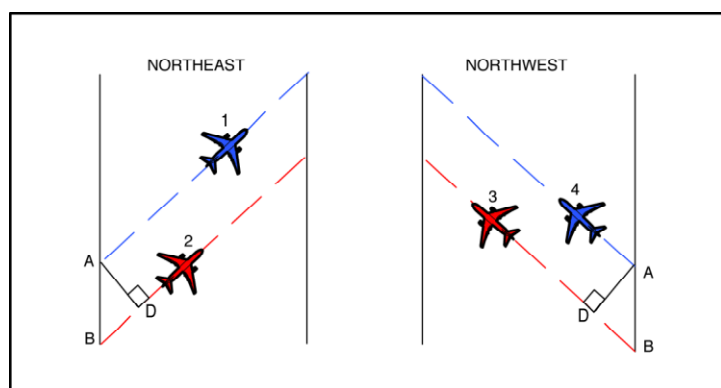


For turbojet aircraft that have reported over a common point provided the Mach Number Technique is applied and are following tracks which have intersected, 10 minutes longitudinal separation is required.

[BS2]

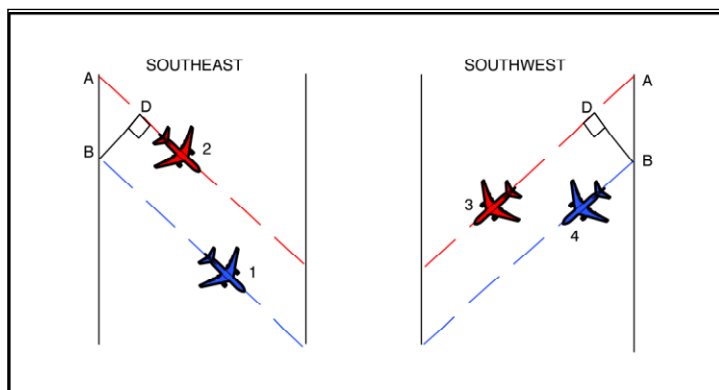
4.4.7 Where aircraft are operating on different parallel tracks which are not laterally separated because the tracks exceed the allowable change in latitude for any ten degree interval of longitude (in accordance with paragraph 4.3.9), it may be necessary to apply an additional time increment to ensure that sufficient longitudinal separation is maintained. In the northwest example below, separation must be ensured at points “A” and “D”. In the southwest example below, separation must be ensured at points “B” and “D”. The requirement to apply an additional time increment is directly related to the alignment of the tracks and which aircraft passes the relevant meridian first.

Steep Parallel Tracks—Tracks Not Laterally Separated



In the “Northeast” illustration (aircraft 1 passes point A first), the required longitudinal separation minima may be applied either at point B or D.

In the “Northwest” illustration (aircraft 3 passes point B first), apply the required longitudinal separation minima at point A plus the time required to fly distance B to D.



In the “Southeast” illustration (aircraft 1 passes point B first), the required longitudinal separation minima may be applied either at point A or D.

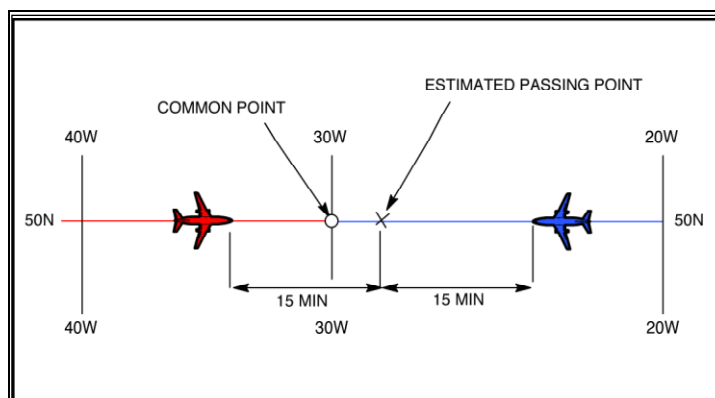
In the “Southwest” illustration (aircraft 3 passes point A first), apply the required longitudinal separation minima at point B plus the time required to fly distance A to D.

Opposite Direction

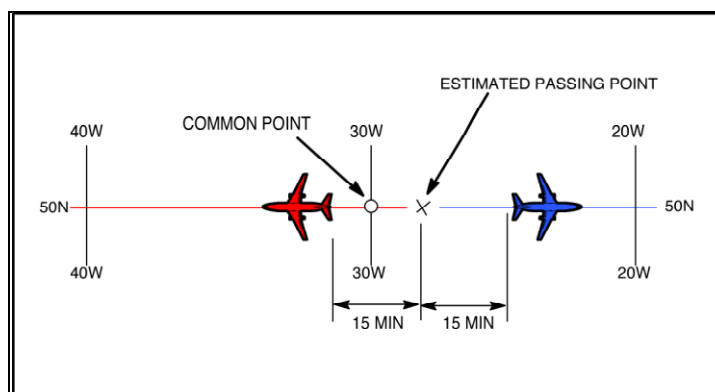
4.4.8 The application of opposite direction minima is for opposite direction aircraft, unless otherwise specified.

4.4.9 For aircraft in level, climbing or descending flight which have not reported over a common point that will follow opposite direction tracks, maintain vertical separation as follows:

Opposite Direction—Both Aircraft Have Not Reported Over A Common Point

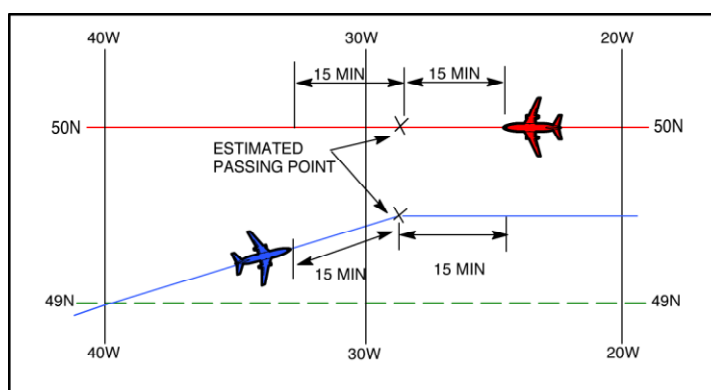


Establish vertical separation between ~~turbojet~~ aircraft at least 15 minutes prior to the estimated passing point.

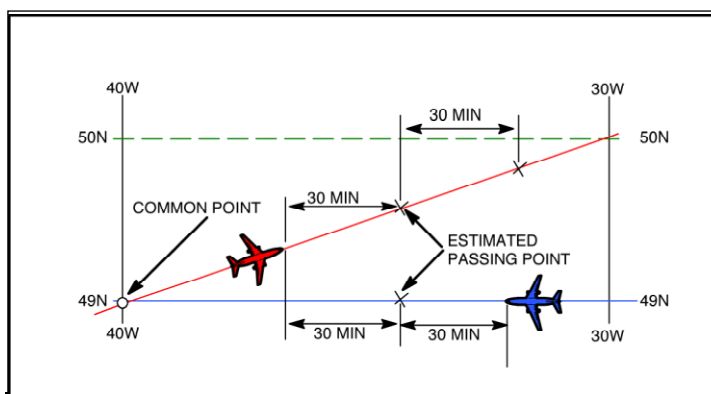


Maintain vertical separation between ~~turbojet~~ aircraft at least 15 minutes after the estimated passing point.

Opposite Direction—Both Aircraft Have Not Reported Over A Common Point



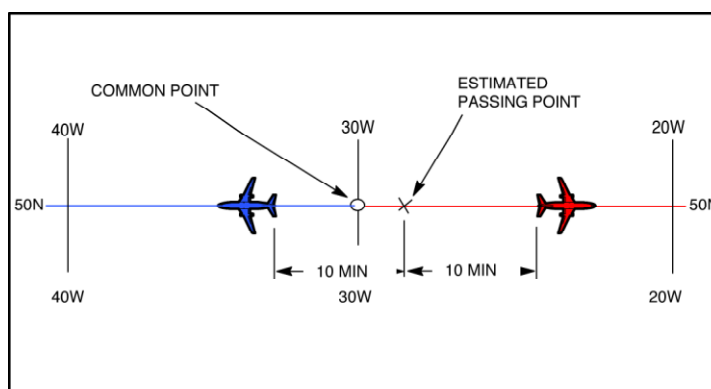
Establish vertical separation between ~~turbojet~~ aircraft at least 15 minutes prior to the estimated passing point, and maintain vertical separation for at least 15 minutes after the estimated passing point.



~~Establish vertical separation between other than turbojet aircraft at least 30 minutes prior to the estimated passing point, and maintain vertical separation for at least 30 minutes after the estimated passing point. This separation may be reduced to 15 minutes if the aircraft are equipped with GNSS and are communicating via a third party VHF [BS3]~~

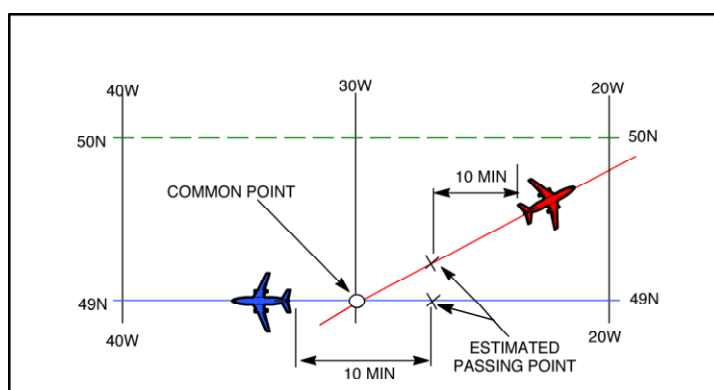
4.4.10 Maintain vertical separation between opposite direction ~~turbojet~~ aircraft for at least 10 minutes after they are estimated to have passed, provided the aircraft concerned have reported over a common point while operating in opposite directions.

Opposite Direction—Both Aircraft Have Reported Over A Common Point



Maintain vertical separation between ~~turbojet~~ aircraft until at least 10 minutes after the estimated passing point.

Opposite Direction—Both Aircraft Have Reported Over A Common Point



Maintain vertical separation between ~~turbojet~~-aircraft until at least 10 minutes after the estimated passing point.

4.4.11 For other than turbojet aircraft that will follow opposite direction tracks which are not laterally separated, 30 minutes longitudinal separation is required. This separation may be reduced to 15 minutes if the aircraft are equipped with GNSS and are communicating via a third party VHF.

4.5 MACH NUMBER TECHNIQUE

4.5.1 The Mach Number Technique as prescribed in the PANS-ATM (Doc 4444) may be used as a means of applying longitudinal separation between same track and diverging track aircraft in level flight, and between aircraft carrying out step climbs or descents and other aircraft. The latter is applicable provided that at least the minimum prescribed longitudinal separation between the climbing/descending aircraft and other affected en route aircraft exists at the time a step climb/descent clearance is issued and will continue to exist during climb/descent and at the cleared level.

Note: Application of the climb/descent procedure is based on the assumption that the last assigned Mach number will be maintained during step climbs or descents, and that in the event that is not feasible, ATC will be informed at the time of the climb/descent request or clearance.

Application of Mach Number Technique (succeeding aircraft faster)

4.5.2 Automated Conflict Prediction - Longitudinal separation at the oceanic entry point will be increased to a value as determined by automatic conflict prediction to ensure that at least 10 minutes will exist between the aircraft concerned at the oceanic exit point, where the tracks diverge, or to the mutually agreed limits.

4.5.3 No Automated Conflict Prediction - A “rule of thumb” requires an increase of separation between the aircraft concerned by one minute at the common point for each 0.01 difference in Mach numbers for each 600 NM segment of flight. When this rule of thumb is used to initially establish longitudinal separation over a common point, the expected minimum separation over subsequent points must be confirmed when calculated flight progress strip data and actual position reports become available. The following table may be used to calculate the additional separation required over a common point for use of Mach Number Technique when the succeeding aircraft is faster:

Difference in Mach	Distance to Fly/Additional Separation required at common point to ensure at least minimum separation at exit/divergence/limit point				
	001–600 NM	601–1200 NM	1200–1800 NM	1801–2400 NM	2401–3000 NM
.01	01	02	03	04	05
.02	02	04	06	08	10
.03	03	06	09	12	15
.04	04	08	12	16	20
.05	05	10	15	20	25
.06	06	12	18	24	30
.07	07	14	21	28	35
.08	08	16	24	32	40
.09	09	18	27	36	45
.10	10	20	30	40	50

Caution in the use of Mach Number Technique (succeeding aircraft faster)

4.5.4 Since for practical purposes, the value of Mach 0.01 remains constant at a given temperature, it is evident that the rate of closure between two aircraft operating at speeds differing by Mach 0.01 will be the same whether they operate at high or low Mach numbers. One minute of flight at a low speed, however, produces fewer miles of additional separation than does the same minute of flight at a higher speed. The potential for loss of separation is compounded by the fact that the slower aircraft will take longer to fly 600 miles and the closure will therefore act over a longer time.

4.5.5 Increased separation over the common point is required to compensate for the fact that the second aircraft is overtaking the first. Since the increase must take into account the relative speeds and the remaining track distance, it is necessary to verify that the required separation will, in fact, continue to exist.

Application of Mach Number Technique (preceding aircraft faster)

4.5.6 In some cases, it is possible to further reduce the longitudinal minimum applicable to Mach Number Technique. This reduction is applicable only when the required differential in Mach number exists and it is possible to determine through radar or other means that the time interval exists and will exist at the common point.

APPENDIX A
NAT Table of Separation Minima
Lateral non-intersecting

Separation Type	LATERAL Non-intersecting												Notes
	ANSP Status						Comms / Navigation / Surveillance Requirements			ICAO References			
	BIRD	ENOB	EGGX	LPPO	NY	CZQX				PANS	7030	Nat Doc 008	
							C	N	S				
60NM & Gentle Slope	-	NOW	NOW	NOW	NOW	NOW	-	MNPS	-	N/A	6.2.1.1.c	3.3.1 C & D	
50NM	NOW	NOW	-	NOW	NOW	-	-	RNP 4 or 10	-	5.4.1.2.1.6	6.2.1.1.b	3.3.1.E	
50NM	NOW	-	-	-	-	-	-	NAT HLA	-	N/A	N/A	N/A	Operational Trial in Reykjavik CTA
30NM	-	-	-	-	NOW	-	RCP 240	RNP 4	RSP 180	N/A	6.2.1.1.a	3.3.1.F.2	
23NM	NOW	-	NOW	NOW	TBC 2018	NOW	RCP 240	RNP 4	RSP 180	5.4.1.2.1.6	-	3.3.1.G	
15NM	NOW	-	NOW	-	-	-	VHF	RNP 2 / GNSS	-	5.4.1.2.1.6	-	3.3.1.K	Applied below FL285 in the Reykjavik CTA and all levels T9/T290

Separation Type	LATERAL Non-intersecting												Notes
	ANSP Status						Comms / Navigation / Surveillance Requirements			ICAO References			
	BIRD	ENOB	EGGX	LPPO	NY	CZQX				PANS	7030	Nat Doc 008	
							C	N	S				
7NM (While one aircraft is climbing – descending through level of aircraft remaining in level flight)	NOW	-	-	-	-	-	VHF	RNP 2 / GNSS	-	5.4.1.2.1.6	-	3.3.1.L	Applied only below FL285 in the Reykjavik CTA
20NM (While one aircraft is climbing – descending through level of aircraft remaining in level flight)	NOW	-	-	-	-	-	-	RNP 2 / GNSS	-	5.4.1.2.1.6	-	3.3.1.H	Applied only below FL285 in the Reykjavik CTA
19 NM ATS	-	-	NOW	NOW	-	NOW	RCP 240 VHF Communic ation not available	RNP 4 or 2	ATS Surveillan ce System	8.7.4.2.a	-	3.3.1.I	
15 NM ATS	-	-	TBC	-	-	TBC	RCP 240 VHF Communic ation not available	RNP 4 or 2	ATS Surveillan ce System	8.4.3	-	3.3.1.J	

Lateral intersecting

Separation Type	LATERAL intersecting												Notes
	ANSP Status						Comms / Navigation / Surveillance Requirements			ICAO References			
	BIRD	ENOB	EGGX	LPPO	NY	CZQX				PANS	7030	Nat Doc 008	
							C	N	S				
50NM	NOW	-	-	NOW	NOW	-	-	RNP 10	-	5.4.1.2.1.8.b	-	3.3.1.E	.
50NM (NAT HLA)	NOW	-	-	-	-	-	-	NAT HLA MNPS	-	5.4.1.2.1.8.b	N/A	3.3.1.E	Operational Trial in Reykjavik CTA
30NM	-	-	-		NOW	-	RCP 240	RNP 4	RSP 180	-	6.2.1.1.a	3.3.1.F.2	
23NM	NOW	-	NOW	NOW	TBC	NOW	RCP 240	RNP 4	RSP 180	5.4.1.2.1.8.b	-	3.3.1.G	
15NM	NOW	-	-	-	-	-	-	RNP 2 GNSS	-	5.4.1.2.1.8.b 5.4.1.2.1.9	-	3.3.1.K	Applied only below FL285 in the Reykjavik CTA

Longitudinal time based

LONGITUDINAL Time														
Same Direction / Crossing Track														
Separation Type	ANSP Status						Comms / Navigation / Surveillance Requirements			Same Level or Climbing / Descending or Both	ICAO References			Notes
	BIRD	ENOB	EGGX	LPPO	NY	CZQX					PANS	7030	Nat Doc 008	
							C	N	S					
30 minutes (other than turbojet)	NOW	NOW	NOW	NOW	NOW	NOW	-	-	-	Both	N/A	6.2.2.3.a	3.4.2.B	-
15 minutes (same direction)	NOW	-	NOW	NOW	NOW	NOW	HF	-	-	Same Level	5.4.2.2.1.1a	6.2.2.1.a		
										Climbing / Descending	5.4.2.2.2.1.a			
15 minutes (crossing tracks)	NOW	-	NOW	NOW	NOW	NOW	HF	-	-	Same Level	5.4.2.2.1.2.a			
										Climbing / Descending	5.4.2.2.2.2.a			
10 minutes (UP TO 89°)	NOW	-	-	NOW	NOW	-	HF	-	NAV AIDS/ ADS-C/GNSS	Same Level	5.4.2.2.1.1.b	-	3.4.2.D 3.4.2.C	
										Climbing / Descending	5.4.2.2.2.1.b			
10 minutes (Mach N° Technique)	NOW	-	NOW	NOW	NOW	NOW	HF	-	-	Both	5.4.2.4.3.1	6.2.2.1.b. 1 & 2 & 3	3.4.2.E	Reported common point same track or continuously diverging

LONGITUDINAL Time														
Same Direction / Crossing Track														
Separation Type	ANSP Status						Comms / Navigation / Surveillance Requirements			Same Level or Climbing / Descending or Both	ICAO References			Notes
	BIRD	ENOB	EGGX	LPPO	NY	CZQX					PANS	7030	Nat Doc 008	
							C	N	S					
Between 9 and 5 minutes (Mach Number Technique)	NOW	-	NOW	NOW	NOW	NOW	-	-	-	Both	5.4.2.4.3.2	-	3.4.2.F	Same track diverging
5 minutes GNSS	-	-	-	NOW	-	-	-			Climbing/descending	--	--	3.4.2.G	
5 minutes (UP TO 89°)	NOW	-	NOW	NOW	-	NOW	RCP 240	RNP 2 or 4 or 10	RSP 180 (Periodic 14 mins)	Both	5.4.2.9.2.b	6.2.2.3.c	3.4.2.H	

Longitudinal distance based

LONGITUDINAL Distance														
Same Direction / Crossing Track														
Separation Type	ANSP Status						Comms / Navigation / Surveillance Requirements			Same Level or Climbing / Descending or Both	ICAO References			Notes
	BIRD	ENOB	EGGX	LPO	NY	CZQX	C	N	S		PANS	7030	Nat Doc 008	
50NM (same direction)	-	-	-	-	NOW	-	RCP 240	RNP 10	RSP 180 (Periodic 27 minutes)	Both	5.4.2.9.2.b	6.2.2.2.a	3.4.4.A	
50NM (same direction)	-	-	-	-	NOW	-	RCP 240	RNP 4	RSP 180 (Periodic 32 minutes)	Both	5.4.2.9.2.b	6.2.2.2.a	3.4.4.A	
30NM (same direction)	-	-	-	NOW	NOW	-	RCP 240	RNP 2 or 4	RSP 180 (Periodic 12 minutes)	Both	5.4.2.9.2-b	6.2.2.2.b	3.4.4.B	
20 NM GNSS	-	-	NOW	-	-	-	VHF-	GNSS-	ADS - B	Same level	5.4.2.3.1 5.4.2.3.3.1a) 2	-	3.4.4.C	T9 & T290 only
ADS-C –CDP 15/25NM Climbing / Descending	-	-	-	-	NOW	--	RCP 240	HLA	ADS-C		5.4.2.8.1.b	N/A	3.4.6.A	State Letter AN 13/2.5-15/45
17 NM ATS	-	-	NOW	NOW	-	NOW	RCP 240 VHF communication not available	RNP 4	ATS Surveillance System	Both	8.7.4.2.c	N/A	3.4.4.D	

LONGITUDINAL Distance														
Same Direction / Crossing Track														
Separation Type	ANSP Status						Comms / Navigation / Surveillance Requirements			Same Level or Climbing / Descending or Both	ICAO References			Notes
	BIRD	ENOB	EGGX	LPPO	NY	CZQX	C	N	S		PANS	7030	Nat Doc 008	
14 NM ATS	-	-	NOW	NOW	-	NOW	RCP 240 VHF communication not available	RNP 4 or 2	ATS Surveillance System	Both	8.7.4.4	N/A	3.4.4.E	

Opposite direction

LONGITUDINAL														
Opposite Direction														
Separation Type	ANSP Status						Comms / Navigation / Surveillance Requirements			Same Level or Climbing / Descending or Both	ICAO References			Notes
	BIRD	ENOB	EGGX	LPPO	NY	CZQX					PANS	7030	Nat Doc 008	
							C	N	S					
30 minutes (other than turbojet)	NOW	NOW	NOW	NOW	NOW	NOW	HF	-	-	Both	-	-	3.4.7.A	-
15 minutes	NOW	NOW	NOW	NOW	NOW	NOW	HF	-	-	Both	-	6.2.2.1	3.4.7.A	

LONGITUDINAL														
Opposite Direction														
Separation Type	ANSP Status						Comms / Navigation / Surveillance Requirements			Same Level or Climbing / Descending or Both	ICAO References			Notes
	BIRD	ENOB	EGGX	LPPO	NY	CZQX					PANS	703 0	Nat Doc 008	
							C	N	S					
10 minutes (reported passed via a common point)	NOW	NOW	NOW	NOW	NOW	NOW	HF	~~HLA~~	-	Both	5.4.2.9.3		3.4.7.B	
50NM	-	-	-	-	NOW	-	RCP 240	RNP 10	RSP 180 (Periodic 27 minutes)	Both	5.4.2.9.3	-	3.4.7.C	
50NM	-	-	-	-	NOW	-	RCP 240	RNP 4	RSP 180 (Periodic 32 minutes)	Both	5.4.2.9.3	-	3.4.7.C	
30NM	-	-	-	NOW	NOW	-	RCP 240	RNP 2 or 4 or 10	RSP 180 (Periodic 12 minutes)	Both	5.4.2.9.3	-	3.4.7.C	
5 minutes	2018 TBC	-	March 2018	NOW	-	March 2018	RCP 240	RNP 2 or 4 or 10	RSP 180 (Periodic 14 Mins)	Both	5.4.2.9.3	-	3.4.7.C	
5 NM ATS	-	-	NOW	NOW	-	NOW	RCP 240 VHF commu nication not availabl e	RNP 4 or 2	ATS Surveillance System	Both	8.7.2.4.d	N/A	3.4.7.D	

— END —

**APPENDIX L — PROPOSED AMENDMENT TO THE *PBCS MONITORING AND REPORTING GUIDANCE*
(NAT Doc 011)**

(paragraph 5.5.2 refers)

Starts on next page



European and North
Atlantic Office

NAT Doc 011

PBCS MONITORING AND REPORTING GUIDANCE

NORTH ATLANTIC REGION

~~*1st Edition – Amdt. 1 – August 2022*~~ *1st Edition – Amdt. 2 – July 2023*

Prepared by the ICAO European and North Atlantic Office

Published on behalf of the North Atlantic Systems Planning Group (NAT SPG)

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Record of Amendments
to NAT Doc 011 – PBCS MONITORING AND REPORTING GUIDANCE
~~PBCS~~
~~MONITORING AND REPORTING GUIDANCE~~

Amendments to this document are approved by the North Atlantic Systems Planning Group (NAT SPG). The space below is provided to keep a record of such amendments.

The NAT SPG, at its 58th meeting, confirmed that approval of changes to this document was the responsibility of the NAT SOG and NAT IMG (C 58/18 refers).

Date	Amendments to the NAT PBCS MONITORING AND REPORTING GUIDANCE containing the following changes:
August 2022	Amendments to Chapter 2 and 4 related to the removal of the guidance concerning inclusion of aircraft with insufficient data (less than 100 data points) from the monthly non-compliance reports. (C 58/18 refers)
July 2023	Amendments to Chapter 2 and 4 to offer greater clarity on who is responsible for taking further action on under-performing airframes. The flow diagram in Chapter 1 has also been deleted.

CHAPTER 1. – INTRODUCTION

1.1 PBCS monitoring programmes not only require available infrastructure to function, but also a set of interlinking policies and procedures ~~for~~ to facilitate smooth operations between the participating organisations. Those organisations also need the competence and capability to participate in a successful monitoring program and to ensure that the data drives the appropriate actions. The transmission of data between the participating organisations and the response to the data provided are fundamental to a successful monitoring program, which should be built on coordination and cooperation between all parties. It is advisable to establish the process ahead of the implementation of performance-based operations reliant on surveillance or communications standards.

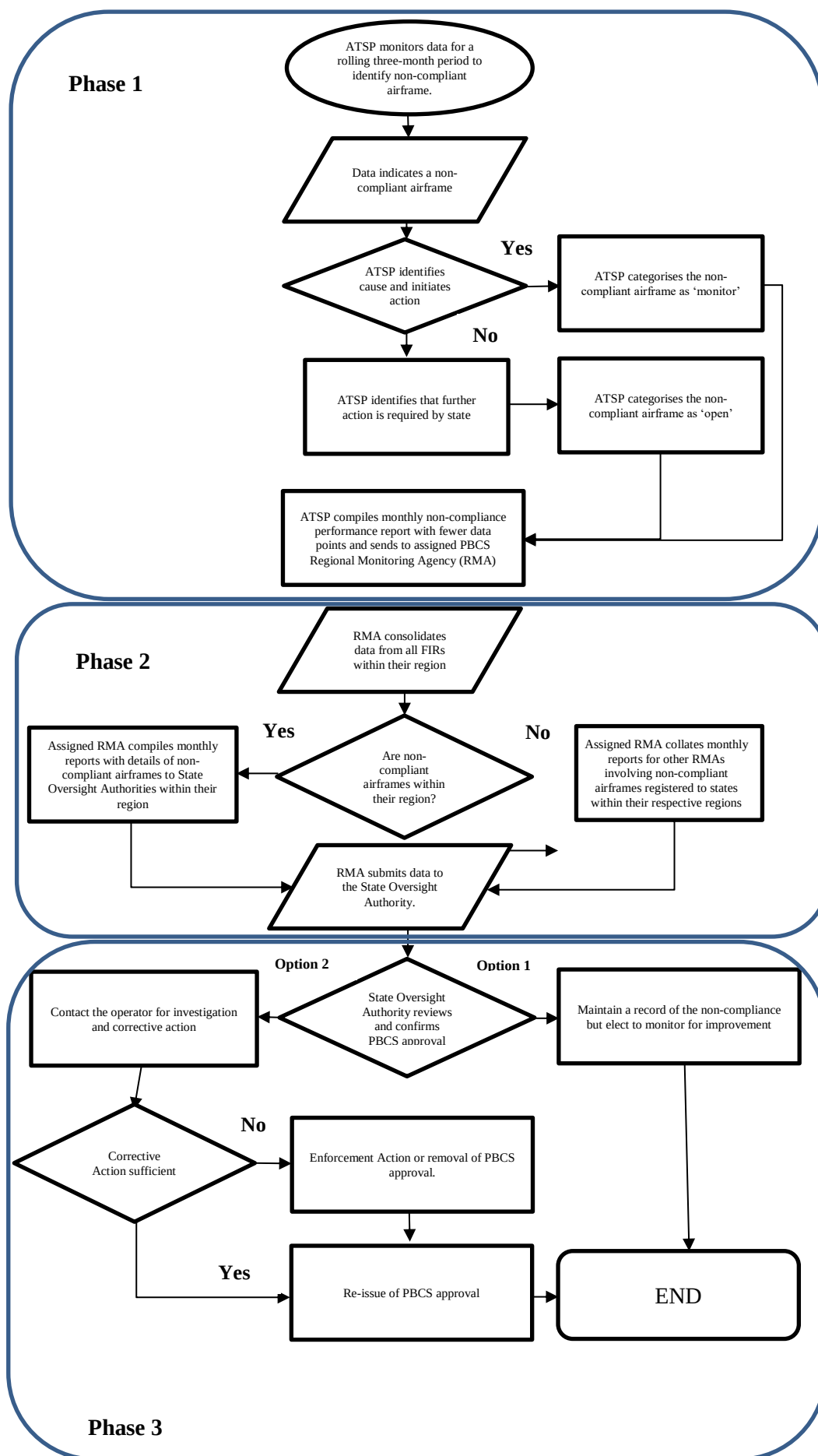
1.2 Regional monitoring systems ~~will~~ require detailed procedures for the analysis and processing of the available data and this guidance is not ~~meant~~ intended to replace those regional processes. This guidance is proposed as a means by which a common set of parameters may be applied, either regionally or globally, to give all of those involved in the monitoring programmes a means to ensure a consistent and repeatable process for the transmission and response to PBCS ~~non-compliant~~ under-performance data. It will also allow airspace users who fly in multiple FIRs and regions to gain confidence that any identified under-performance^[TK1] or non-compliance will be managed consistently, transparently, and proportionately.

1.3 ICAO Doc. 9869 *Performance-based Communication and Surveillance Manual* offers the reader guidance on the establishment of a PBCS monitoring program, with detailed guidance in Appendix D for compilation and handling of the data to support monitoring. Significant revisions are being coordinated to provide clarification in Appendix D for Edition 3, ~~scheduled for publication in the second half of 2023~~². This guidance document focuses on the reporting and filtering of under-performing~~non-compliant~~ airframes as well as guidance for State Oversight Authorities. ~~To support the reporting process outlined in the following pages, the flow diagram below represents the flow of reporting that enables the monitoring system to function. For ease, the process described is divided into three phases and reliant on the positive participation of the aircraft operators in accordance with the PBCS Global Charter, version 8, 2018:~~

Phase 1 - ATSP: This phase covers initial monitoring and reporting by the Air Traffic Service Provider (ATSP) at a local level. The ATSP is responsible for the collection, analysis and, if possible, classification of ~~non-compliant~~ under-performance data as well as the transmission of that data, in the agreed format, to the Regional Monitoring Agency (RMA).

Phase 2 - RMA: This phase captures the administration of the regional monitoring requirements and the mechanism to achieve global reporting. The RMA is responsible for the collection and collation of the data reported by ATSPs for transmission to, either, the States within their region of responsibility, or to other RMAs for transmission to States within their own regions of responsibility.

Phase 3 - State Oversight Authority: This phase covers the State Oversight Authority's role in the management of reports of under-performance~~non-compliance~~. The State Oversight Authority is responsible for the oversight of all aircraft operators ~~airframes~~ registered in their respective states and ensuring that the performance of ~~those~~ their airframes meets the required standards.



Chapter 2. – PHASE 1 – LOCAL PBCS MONITORING AND REPORTING

2.1 Every ATSP responsible for the local monitoring program should develop and document a process to compile and analyse data measuring Actual Surveillance Performance (ASP), and Actual Communication Performance (ACP), and prepare reports with underperforming^[BS4] airframes monthly. ATSPs should consider using data sets that include the data from the current month and previous two months (a rolling three-month sample) with an aim to increase the number of data points for airframes that do not operate frequently. In addition, this data will be used in the construction of regional biannual PBCS performance reports that are made available at www.fans-cra.com.

2.1.2.2 The ATSP may choose to indicate where an airframe is causing them specific concerns and/or where intervention is being requested from the State Oversight Authority.

~~2.2 The non-compliance data that is transmitted to the RMA can be classified into one of the following two categories. This classification is further explained later in this section:~~

- ~~a) **Monitor:** Where ≥ 100 data points are available and the data indicates non-compliance, but the^[TK5] airframe operator is known to be taking action to rectify the non-compliance, and~~
- ~~b) **Open:** Where ≥ 100 data points are available, and the data indicates non-compliance, and further action is required by the State Oversight Authority. (See Chapter 4. Phase 3 below)~~

2.3 The monthly data sets should be filtered with consideration for the documented regional agreements, which should include filtering out data during periods where network outage or degradation is detected.

2.4 The ATSP will first prepare a list of all airframes observed with ASP and/or ACP performance below the 95% benchmarks for RSP180 and RCP240, respectively. The ATSP will also review the airframes with performance observed below the 99.9% benchmarks, but depending on resources available, the priority is to review the cases below the 95% benchmarks for the monthly under-performance~~non-compliance~~ reporting.

2.5 The airframes that have not filed the identifiers corresponding to the appropriate RCP and RSP specifications (for example, P2 in item 10 for RCP240)^{[BT6][BT7]} and SUR/RSP180 in item 18 for RSP180) should be removed and handled separately from the under-performance~~non-compliance~~ process.

2.6 There are known statistical challenges with the size of data sets, hence it is recommended, ~~where possible,~~ to concentrate on observed ~~non-compliance~~ under-performance ~~observed~~ based on 100 or more data points for either ASP or ACP.

- a) Where data sets available are below 100 data points, e.g. airframes that do not operate frequently, these airframes should be observed over a longer period to accurately identify performance issues (e.g. biannual PBCS performance reports that are made available at www.fans-cra.com).
- b) Another known challenge that exists for most airframes is the size of data sets used to assess ACP when using a monthly reporting process. During a typical flight, most airframes will not have a large number of CPDLC transactions with ATC. Except in the case of problems related to the regular occurrence of abnormally long Pilot Operational Response Times (PORT), it is expected that the CPDLC engineered system will not underperform without a corresponding underperformance in the ADS-C engineered systems.

~~2.7 Even when 100 or more data points are available, further analysis should be done on airframes determined to be statistically non-compliant to ensure there is an actual performance issue. One commonly observed issue is when an airframe has a SATCOM problem during one flight, that does not repeat for the rest~~

~~of the flights in the monitoring period. Statistical anomalies such as this may impact the calculated performance, but do not indicate a problem requiring corrective action, unless the same problem is observed in subsequent monitoring periods.~~

2.82.7 When reporting under-performance~~non-compliance~~, an agreed standard template should be used. The template should include:

- a) Important identification details, such as where the ~~non-compliant~~ under-performance was observed, the airframe type and registration number and presumed State of Operator.
- b) The number of data points used to measure the ASP and ACP and the corresponding performance value at the 95% benchmarks for the appropriate RSP and RCP, respectively.
- c) ~~Where possible, an “issue code” that provides details of the root cause and recommendation for corrective action (see 2.11 for details).~~
- d) ~~A column used to define the category as per paragraph 2.2 above.~~

2.92.8 For ASP, filter out all airframes with fewer than 100 data points. Achieving a similar number of data points for ACP is problematic. It is expected that communications will not underperform without a corresponding underperformance in surveillance. Conclusions cannot, typically, be drawn from airframes offering a small set of data related to communications performance but operating within tolerance for ASP.

2.102.9 For the remaining data filter out all airframes that are achieving 95% in ASP or ACP for example, **95% RCP240 Benchmark:** percentage of CPDLC transactions that have ACP less than 180 seconds or **95% RSP180 Benchmark:** percentage of ADS-C messages that have ASP less than 90 seconds.

2.112.10 Following the filtering process, the remaining data is made up from airframes that are identified and reportable as under~~non-compliant~~ performing to the agency responsible for the collation or analysis of the regional data. The list of under~~non-compliant~~ performing airframes requires, if possible, classification to identify ~~, where possible, the root cause and necessary, subsequent action. Where a non-compliant airframe presents equal to or more than 100 ASP data points, the agreed non-compliance performance report for should be used.~~

2.122.11 The most observed causes for poor performance are detailed in NAT OPS Bulletin 2019_003 as revised: *Data Link Performance Improvement Options*. The “issue codes” provided in the under-performance~~non-compliant~~ reports map to the following common causes:

- a) **Delayed reports around VHF/SAT transitions** - This note is used when ADS-C or CPDLC messages are observed with delays when there is mixed media usage in the sequence of messages before, at or after the delayed messages (ex.: VHF-VHF-SAT-VHF-SAT).
- b) **Delayed reports via HF media** - This note is used when delayed ADS-C or CPDLC reports are observed to be delivered via HF data link (HFDL), or near reports delivered via HFDL. Check whether this appears to be a SATCOM failure with one flight, or a period during the flight, or more continuous, intermittent use of HFDL. Potential issue with airframe media priority settings.
- c) **Delayed reports due to Inmarsat avionics, Inmarsat satellite to satellite transition or satellite network problems** - This note is used when ADS-C or CPDLC messages are observed with delays and it is noticed that there is a switch sequence between different or same Inmarsat satellite paths (Ex.: XXF/XXH/XXF/XXH). One known area where this occurs in the NAT is at 30W longitude. If multiple airframes are observed with this same issue around the same time, there may be a network-related issue and the ATSP may want to file a report to the FANS-CRA/DLMA.

- d) **Delayed reports due to Iridium avionics (airframe) or satellite network problems** - This note is used when ADS-C or CPDLC messages are observed with delays via Iridium satellite paths (IG1, IGW1). If multiple airframes are observed with this same issue around the same time, there may be a network-related issue and the ATSP may want to elect to file a report to the FANS-CRA/DLMA.
- e) **Reported on only VHF and/or HF** - This note is used when delayed ADS-C reports or CPDLC messages are observed via VHF and/or HF only (no SATCOM). This might indicate that the SATCOM unit is defective or became unavailable during flight. Check if this issue is observed during one flight or part of one flight only, or whether it is an ongoing problem. If the problem is not observed on subsequent flights, the issue may have been addressed.
- f) **Poor ACP due to high PORT** - This note is used when it's found that the delayed CPDLC transactions are caused by long Pilot Operational Response Time (PORT).
- g) **Airframe data link connection problems detected** - This note is used when it can be identified that delays happened during periods when disconnections and reconnections have been performed. Check whether this appears to be a problem with one flight or a period during one flight, or whether it is an ongoing problem. If the problem is not observed on later flights, the issue may have been addressed.
- h) **Delays related to a specific VHF station** - This note is used when the delayed ADS-C reports and CPDLC messages are observed via a specific VHF ground station. If multiple airframes are observed with the same issue, around the same time, there may be a network issue and the ATSP should file a report to the FANS-CRA/DLMA as a VHF station issue.
- i) **FMS time before ATC uplink time** - Clock setting not synchronized with GPS - This note is used when it's found that the FMS response time is earlier than the ATC uplink time. According to airframe manufacturers this happens when the aircraft clock is set manually and is not being synchronized with a GPS source.

~~2.132.12~~ Each month the standard PBCS ATSP under-performance ~~Non-Compliance~~ Report form should be completed for each airframe determined to be under-performing ~~non-compliant, organised or~~ ordered by operator and submitted to the agency responsible for gathering and collating the regional data. ~~Each report form should clearly indicate whether the issue for aircraft with equal to or more than 100 data points is “monitor” or “open”. (see 2.2 above).~~

~~2.142.13~~ In addition to the reporting described ~~performed in 2.13~~ above, the ATSP responsible for the local monitoring program may choose to take additional courses of action as described below, to follow up on under-performance ~~non-compliance~~.

- ~~a) Where the non-compliance can be attributed to a known issue and is not causing operational impact, the ATSP may choose to continue to monitor the airframe. [TK8] In this event the issue should be identified as “monitor” in the monthly PBCS ATSP Non-Compliance Report [BS9] [BT10].~~
- a) Where an under-performance report can be attributed to a known issue and is not causing operational impact, the ATSP may choose to continue to monitor the airframe.
- a) ~~Where the ATSP has established a point of contact from the airframe operator either through their own list of contacts or through a regional contact list, the ATSP may contact and report directly to the operator directly to report and explore the identified problem. In this event the issue should be identified as “monitor” in the monthly PBCS ATSP Non-Compliance Report.~~

- b) Exceptionally, ~~where the cause of the under-performance is not known,~~ the ATSP may choose to report the problem to ~~contact~~ the Data Link Monitoring Agency (DLMA). In these circumstances, it is likely that larger volumes of data may be required to support the investigation to identify the cause. ~~In this event the issue should be identified as “monitor” in the monthly PBCS ATSP Non-Compliance Report.~~
- c) Following extended periods of unexplained under-performance, or where an operator chooses not to engage, the ATSP may choose to escalate and highlight the under-performance ~~non-compliance~~ directly with their own state, or the state of the operator. ~~In this event the issue should be identified as “open” in the monthly PBCS ATSP Non-Compliance Report and action would subsequently be expected from the State Oversight Authority.~~

2.152.14 ~~Whichever action the ATSP determines, that airframe should still be included within the report submitted to the agency responsible for regional monitoring. ~~should still contain details of that airframe and the status of the issue (i.e. insufficient data, monitor or open) to allow the states to take action or monitor trends.~~~~

Chapter 3. – PHASE 2: REGIONAL MONITORING AGENCIES (RMA) AND REPORTING

3.1 The agency assigned the task of facilitating the transmission of the ~~non-compliance~~ under-performance reports shall routinely be the RMA responsible for the ICAO region where the under-performanc~~non-compliance~~ has been observed. The RMA will have established a ~~centralised mailbox~~ nominated email address that can be used for this purpose.

3.2 It is not a requirement for the RMA to also administer the regional monitoring program, however, Planning and Implementation Regional Groups (PIRG) may choose to enlist the help of sub-groups within their organisational structure to carry out the monitoring function at a regional level and include the task in their respective work programs.

3.3 The RMA should establish agreements with ATSPs within the ICAO region they have responsibly for in order to detail the practical aspects of data collation and transmission including ~~among other things~~ ~~timelines for delivery~~. timescales

3.4 RMAs responsible for the receipt and collation of the supplied performance data will ensure that either a the State of Operator or State of Registry, as applicable, is assigned to each reported airframe.

3.5 ~~Documented~~ Agreed processes should be in place between RMAs to facilitate the development of best practices and allow for ~~the streamlining of the collation and~~ onward transmission of the under-performanc~~non-compliance~~ data to other RMA or State Oversight Authorities as applicable.

CHAPTER 4. – PHASE 3: ACTIONS AND GUIDANCE FOR STATE OVERSIGHT AUTHORITIES

4.1 State oversight authorities should designate a point of contact for any required follow up action, make those contact details available to RMAs and create an email inbox for the purposes of receiving and processing the PBCS under-performance data received from the RMA.

4.2 The State Oversight Authorities should maintain a list of contacts from the operators registered in their respective states. The contacts should have specific responsibility for PBCS operations.

4.3 The State Oversight Authority should establish a method for collating information on airframes that operate and underperform in multiple FIRs and regions^{[TK12][TK13]} to enable them to have a more complete picture of each aircraft operator's overall PBCS performance.

4.4 On receiving an under-performance report, the State Authority should ensure that the operator is approved to file PBCS identifiers for the subject airframe. ^{[TK14][TK15]} If no approval has been granted, then the state should require that the operator does not file PBCS identifiers in their flight plan.

4.5 Having established that the operator identified within a non-performance report is approved to file PBCS identifiers, the oversight authority has a variety of proportionate actions available to them depending on the scenario and in line with the principals of risk-based oversight.

4.5.1 When an under-performance report is received on an airframe for the first time in recent reporting periods, the State Authority may choose to monitor (i.e., wait for subsequent reports to be received), and take no specific action. Even when 100 or more data points are available, unless the magnitude of underperformance is substantial, more than one monitoring period is essential to ensure the statistical results have detected a true performance issue. (Some ATSPs may already include a process for monitoring to confirm underperformance issues, and where available, further supporting information may be included in their reports. ^{[TK16][TK17][TK18]}) An example of why monitoring would be the appropriate course of action is when an airframe has a SATCOM problem during one flight but is performing well on multiple other flights in a monitoring period. While the performance of that one flight with an issue could impact the performance calculated for the period, it would not indicate a problem requiring corrective action, unless the same problem was observed in subsequent monitoring periods.

4.5.2 It is possible that issues like the one described in the example above may persist for multiple monitoring periods due to the nature of the rolling 3-month data sample. Therefore, when a 2nd and possibly 3rd report of underperformance is received it may be practical to ask the aircraft operator to request the most recent data available from the reporting ATSPs to check if this is the case or if a true problem is persisting before deeming an airframe to be non-compliant. If no further under-performance reports are received after the first 1-3 reports, then no further action may be necessary by the State Authority and the active monitoring of that airframe can cease.

4.5.3 If under-performance reports continue to be received from one or more ATSPs on the airframe, the State Authority may contact the aircraft operator requesting that they start an investigation into the PBCS performance of the aircraft. Initially the State Oversight Authority may check for performance results of the aircraft in previous monitoring periods and request recent performance data from all relevant ^{[ATSPs,][TK19][TK20]}

4.5.4 If the problem continues to persist, the State Authority may choose to engage the operator and the DLMA to identify the underlying cause. If the problem only appears in one ATSP airspace, the problem may be related to a localized situation in that airspace (e.g. media transition issues). If the problem appears in multiple ATSP airspaces, there may be a technical failure on the aircraft.

4.6 For persisting problems, the State Oversight Authority should follow the following guidance in close coordination with the aircraft operator and the DLMA:

4.6.1 If the root cause of the persistent under-performance has not been identified in a reasonable time period following notification to the operator, the state should **notify** the operator not to file PBCS identifiers in their flight^[TK21] plan until identification of the root cause and completion of a satisfactory corrective action as determined by the state Oversight Authority. The State of the Operator or the State of Registry may allow the aircraft operator to continue to use CPDLC and ADS-C.

4.6.2 For airframes where the root cause of persistent under-performance has been identified and suitable recommendations made, the State Oversight Authority should continue to monitor the airframe until it is observed that corrective action has been taken by the operator, and the performance is meeting the requirements as determined by the State Oversight Authority. The State Oversight Authority should notify the operator that PBCS identifiers cannot be filed for the airframe in their flight plan until the problem is fixed, however, the State of the Operator or the State of Registry may allow the aircraft operator to continue to use CPDLC and ADS-C.

4.6.3 If the corrective actions do not improve the performance to the required level following 12 months of substandard performance, the State Oversight Authorities may choose to revoke the approval for that airframe, and the operator will need to seek reapproval for that airframe to be able to file PBCS identifiers in their flight plan again.

4.7 Oversight Authorities recognise the benefits of working in partnership with industry to identify and rectify PBCS compliance issues. This facilitates a cooperative working arrangement between the operator and the State Oversight Authority. Enforcement should be an action of last resort.

4.8 In addition, states should make use of regional PBCS monitoring reports readily available on www.fans-cra.com. While the monthly under-performance reporting focuses on airframes that have filed P2/RSP180 and have been observed with at least 100 or more data points for either ASP or ACP, the reports on the FANS-CRA website contain results for all aircraft observed to be using data link regardless of filing status and number of messages. This allows for every aircraft using data link to be monitored in every airspace where they are operating and can help to provide the State Oversight Authorities with a more holistic view of each aircraft's performance.

~~4.1 State oversight authorities should designate a point of contact for any required follow up action, make those contact details available to RMAs and create an email inbox for the purposes of receiving^[TK22] and processing the PBCS non-compliance under-performance data received from the RMA.~~

~~4.2 The State Oversight Authorities should maintain a list of contacts from the operators registered in their respective states. The contacts should have specific responsibility for PBCS operations.~~

~~4.3 It is recommended that an airframe that has been proven to is not performing to the required PBCS standard should not continue to file PBCS identifiers for an extended period. Oversight Authorities recognise the benefits of working in partnership with industry to identify and rectify^[TK23] PBCS compliance issues. This facilitates a cooperative working arrangement between the operator and the State Oversight Authority. Enforcement should be an action of last resort.~~

~~4.4 On receiving a non-compliance under-performance report, the State Authority should ensure that the operator is approved to file PBCS identifiers for the subject airframe. If no approval has been granted, then the state should require that the operator does not file PBCS identifiers in their flight^[TK24] plan.~~

~~When an under-performance report is received on an airframe for the first time in a few months period, the State Authority should categorise the airframe as **Monitor**. Even when 100 or more data points are available, further monitoring should be done on airframes determined to be statistically under-performing to ensure there is an actual performance issue. As an example, one commonly observed issue is when an airframe has a SATCOM problem during one flight, that does not repeat for the rest of the flights in the monitoring period. Statistical anomalies such as this may impact the calculated performance, but do not indicate a problem requiring corrective action, unless the same problem is observed in subsequent~~

monitoring periods. In this case the State Authority should monitor if subsequent under performance reports are received on the airframe.

If one or two further reports are received on the airframe, the State Authority should continue to monitor the aircraft because an anomaly as described in the previous paragraph may be present in 2-3 monthly reports due to the rolling three-month period. In this case the State Authority can request fresh recent data for the airframe from the reporting ANSPs to check if the problem is persisting.

If no further under performance reports are received after the first 1-3 reports, then no further action is required by the State Authority and the monitoring can be closed.

If under performance reports continue to be received from one or more ANSPs on the airframe, the State Authority should categorize the airframe as **Open**, contact the aircraft operator and start an investigation into the PBCS performance of the aircraft. The initial action should be to check where the aircraft has been flying in the last month and request recent performance data from the relevant ANSPs.

If the problem continues to persist, the State Authority should engage the operator and the DLMA in identifying what the problem may be. If the problem only appears in one ANSP airspace, the problem may be related to a localized situation in that airspace (e.g. media transition issues). If the problem appears in multiple ANSP airspaces, there may be a technical failure on the aircraft.

4.5 For persisting problems, The data transmitted to the State Oversight Authority by the RMA will be categorised as follows:

- a) **Monitor:** Where ≥ 100 data points are available and the data indicates non-compliance, but the airframe operator is known to be taking action to rectify the non-compliance, and
- b) **Open:** Where ≥ 100 data points are available, and the data indicates non-compliance, and further action is required by the State Oversight Authority.

4.6 Depending on the data, the State Oversight Authority may engage in a choice of actions:

- a) They may choose to monitor the data provided and retain the data for trend analysis.
- b) They may choose to contact the operator directly to understand the actions being undertaken to improve performance. Exceptionally, they may choose to take formal enforcement action for the operator. Although this remains a tool within their toolbox, it should be fully justified.

4.7 The path that the State Oversight Authority should follow the following guidance in close coordination with the decides to take in each instance will depend to a large degree on what the data is guiding them to do aircraft operator and the DLMA. To aid their decision making a State Oversight Authority may choose to contact the agency responsible for the provision of the PBCS non-compliance performance data or investigate PBCS performance for that airframe in multiple FIRs in support of their own performance-based oversight processes. In addition, states should make use of regional PBCS monitoring report data readily available on www.fans-era.com produced biannually. While the monthly non-compliance reporting focuses on airframes that have filed P2/RSP180 and have been observed with at least 100 ADS-C messages to analyze, the biannual reports contain results for all aircraft observed to be using data link regardless of filing status and number of messages. This allows for every aircraft using data link to be monitored in every airspace where they are operating and can help to provide the State Oversight Authorities to have a more holistic view of each aircraft's performance.

- a) For all airframes where the report indicates that the cause of the under performance has been identified and suitable recommendations made, the State Authority should continue to monitor the airframe and should also monitor the corrective action by the operator. The status of the airframe should remain **Open** until performance data shows that the problem

has been rectified ~~report would indicate “monitor”~~. If there is a delay in rectifying the problem, the State Oversight Authority may recommend that the airframe does not file PBCS identifiers in their flight plan until the problem is fixed. No action is required for such cases, unless intelligence from other sources available to the State Oversight Authority indicates there is a wider issue of non-compliance with the operator that the data supports. The data is provided for the oversight authority to monitor.

- ~~b) For airframes where the report indicates non-compliance, and the report is still “open”, contact with the operator should be required. If the performance presented suggests that ASP or ACP are both greater than 85%, the state may choose to monitor the recovery action plan of the operator. Depending on the response from the operator, the State Oversight Authority may recommend that the airframe does not file PBCS identifiers in their flight plan until a satisfactory recovery action plan has been accomplished by the operator.~~
- ~~e) if the cause of the under performance is not identified Where a state identifies performance between 85% and 95% for three contiguous reporting periods, the state should require that the operator does not file PBCS identifiers in their flight plan until completion of a satisfactory corrective recovery action plan.~~
- ~~d) Where the data suggests that the performance of an airframe is variable and no specific trend in its performance can be ascertained, the States can use the data provided with less than 100 data points to investigate further. Where performance between 85% and 95% is reported for six non-contiguous months in a rolling twelve month period then the state should require that the operator does not file PBCS identifiers in their flight plan until completion of a satisfactory recovery action plan.~~
- ~~e) Where performance of an airframe is reported to be less than 85% for any reporting period, the State Oversight Authority should require that the operator does not file PBCS identifiers in their flight plan until completion of a recovery action plan acceptable to the State Authority.~~
- ~~f) If, once the recovery action plan is complete, performance is not seen to improve to the required levels, then further investigation will be required by the operator and further recovery actions should be agreed between the State Oversight Authority and the operator of the non-compliant airframe.~~
- ~~— If the corrective recovery actions plans do not improve the performance to the required level following 12 months of substandard performance, the State Oversight Authorities may choose to revoke the approval for that airframe and the operator will need to seek reapproval for that airframe to be able to file PBCS identifiers in their flight plan again. This formal enforcement action should be a last resort.~~

~~4.8 . In addition, states should make use of regional PBCS monitoring report data readily available on www.fans.cra.com produced biannually. While the monthly under performance non-compliance reporting focuses on airframes that have filed P2/RSP180 and have been observed with at least 100 ADS-C messages to analyze, the biannual reports contain results for all aircraft observed to be using data link regardless of filing status and number of messages. This allows for every aircraft using data link to be monitored in every airspace where they are operating and can help to provide the State Oversight Authorities with a more holistic view of each aircraft's performance.~~

Chapter 5. – CONCLUSION

5.1 Regional monitoring systems will devise detailed procedures for the analysis and processing of the available data and this guidance is not ~~meant~~ intended to replace or embellish those regional processes. This guidance is proposed as a means by which a common set of parameters may be applied either regionally or globally, to give all of those involved in the monitoring programmes a means to ensure a consistent and repeatable process for the transmission and response to PBCS ~~non-compliant~~ under-performance data. It will also allow airspace users who fly in multiple FIRs and regions to gain confidence that any identified under-performances ~~non-compliance~~ will be managed consistently, transparently, and proportionately.

5.2 The success of a monitoring program, whether it be local, regional or global, relies on confidence that those contributing to it are applying a similar set of rules and triggers for action. This guidance has sought to document or formalise good practices in existence today, which make best use of experiences and positive relationships with all stakeholders. Actions by all of those involved in the process should be proportionate.

— END —

APPENDIX M — *NEW NAT TIG ATSP ANALYST HANDBOOK* (NAT DOC 012)

(paragraph 5.6.2 refers)

Starts on next page



European and North
Atlantic Office

NAT Doc 012

NAT TIG ATSP ANALYST HANDBOOK

NORTH ATLANTIC REGION

v2023 (applicable from June 2023)

Prepared by the ICAO European and North Atlantic Office

Published on behalf of the North Atlantic Systems Planning Group (NAT SPG)

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Disclaimer

This document has been prepared by the ICAO North Atlantic Technical and Interoperability Group (NAT TIG) Analysts and is intended to provide additional information on the methodology of the various activities of the NAT TIG Analysts.

This internal ICAO NAT document is primarily aimed at the analysts involved in the preparation of data provided for the NAT TIG, the FANS-CRA website and the NAT CMA. It may also be of value to those making decisions based on these assessments or readers who are interested in the details of the data preparation.

The NAT TIG takes no responsibility for the accuracy of the calculations and any consequent decisions made by non-NAT TIG members from the use of the material presented in this document. It is recommended that any data-link related questions be referred to the TIG Analysts.

The procedures and methods presented in this document represent the current thinking of the TIG Analysts based on the best evidence to date. It is quite conceivable that methods will be further developed and refined as more data becomes available which will result in a revision to the document.

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Record of Amendments
to NAT Doc 012 – NAT TIG ATSP ANALYST HANDBOOK

Amendments to this document are approved by the North Atlantic Systems Planning Group (NAT SPG). The space below is provided to keep a record of such amendments.

The NAT SPG, at its 59th meeting, confirmed that approval of changes to this document was the responsibility of the NAT IMG (C 59/20 refers).

Date	Amendments to the NAT TIG ATSP ANALYST HANDBOOK containing the following changes:

1. INTRODUCTION

1.1 The North Atlantic (NAT) Technology and Interoperability Group (TIG) Air Traffic Service Provider (ATSP) Analyst Handbook is primarily intended to serve as a summary reference document describing the metrics, methods and formats that the NAT TIG Analysts use for compiling and providing data and reports that have been agreed upon by the NAT TIG in support of data driven decision-making by the NAT IMG. This includes data on NAT equipage and FANS data link performance submitted to the semi-annual TIG meetings, the semi-annual NAT PBCS operator and airframe reports provided on the FANS-CRA website and the monthly PBCS underperformance reports submitted to the NAT CMA.

1.2 The handbook may also be of value to entities outside the Group who are curious about the methods and principles used in generating the data.

2. REPORTING RESPONSIBILITY AND DEADLINES

2.1 The responsibility for development of the semi-annual NAT data link performance and equipage reports is assigned to each ATSP member of the Analysts subgroup on a rotational basis in such a way that each ATSP prepares four (4) consecutive 6-month reports over 2 years. There should be coordination between the ATSPs with current and ensuing responsibility prior to each handoff to exchange tools, templates, and lessons learned, for the purpose of ensuring a smooth transition and uniform reporting. The sequence of the rotation is as follows:

Shanwick 2022 – 2023
 Reykjavik 2024 – 2025
 Gander 2026 – 2027
 Santa Maria 2028 – 2029
 New York 2030 – 2031
 Shanwick 2032 - 2033
 etc

2.2 The following deadlines are applicable for NAT TIG Analysts:

Action	Spring meeting	Fall meeting
ATSP analysts submit data to the compiler	January 31 st	July 31 st
The compiler submits the compiled reports in a NAT TIG WP	February 25 th	August 25 th
ATSP analysts submit the monthly reports to the NAT CMA	The 10 th day of each month	

2.3 If the deadline cannot be met, the analyst will inform the receiver (either the compiling analyst or the NAT CMA) in a timely manner.

3. DATA LINK PERFORMANCE REPORT

3.1 General

3.1.1 During NAT CNSG/8 it was agreed to report performance statistics in a common format, resulting in CNSG action 8-7 to “provide the results of GOLD performance monitoring using the common template”. The reported performance periods are January - June (autumn meeting) and July - December (spring meeting). The data is provided for Gander, Reykjavik, Santa Maria, Shanwick and New York.

3.1.2 In accordance with the monitoring requirements in ICAO Annex 11 (reference 1) paragraph 3.3.5.2, and the guidance in ICAO Doc 9869 (reference 2) section 4.5 and Appendices B, C and D, the Controller-Pilot Data Link Communication (CPDLC) and Automatic Dependent Surveillance-Contract (ADS-C) performance is measured against the applicable Required Communication Performance (RCP), and Required Surveillance Performance (RSP) specifications, RCP 240 and RSP 180, respectively. Diagrams of the end-to-end processes for ACP (Actual Communication Performance) and ASP (Actual Surveillance Performance) RSP are shown below. The performance is measured at the aggregated level for each NAT Control Area, and then broken down into performance by media type, message delivery path, uplink message type (ACP only), operator/aircraft type and registration number.

3.1.3 Two distinct data link performance reports are generated from the same data set:

- The PBCS operator and airframe report; and
- The FANS data link performance report.

3.1.4 Additionally, a data link outage report is generated, for evaluation of availability and operational impact analysis (See section 5 for further details).

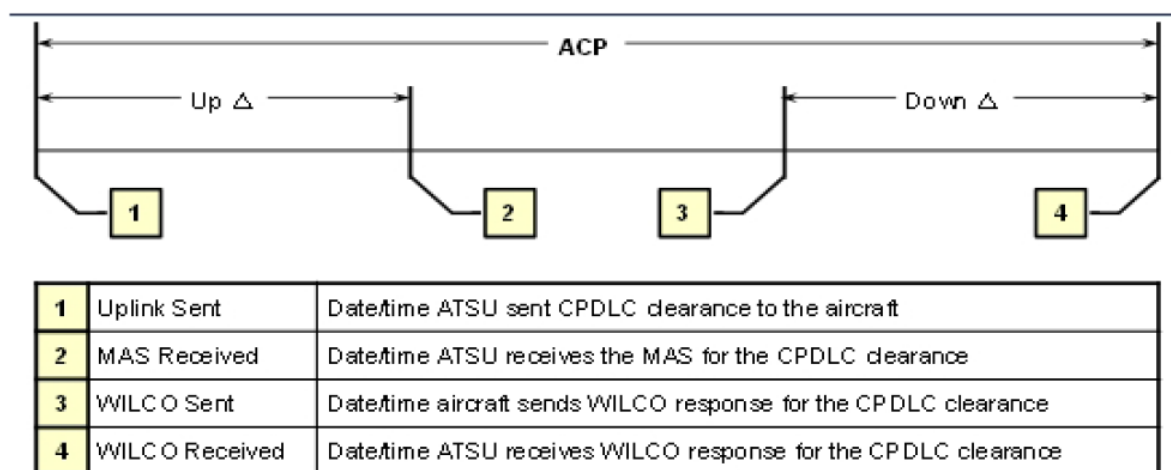


Figure 1. ACP calculation points

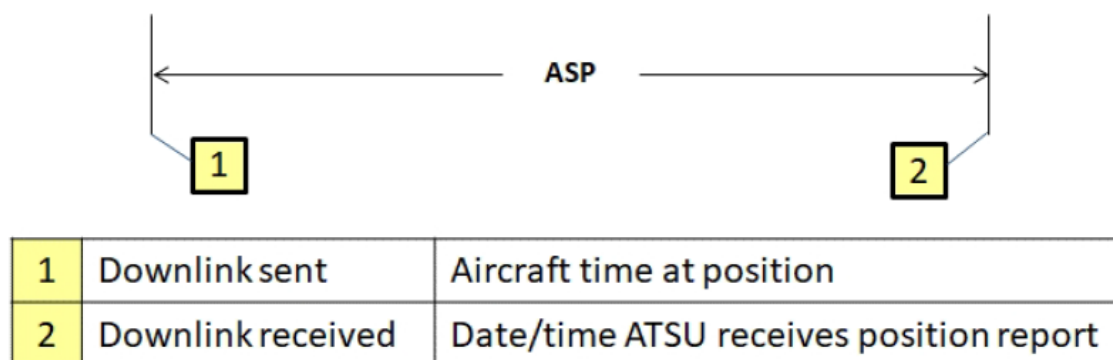


Figure 2. ASP calculation points

3.2 Data Preparation

Data preparation and processing should follow the guidance in ICAO Doc 9869 Appendix D. The measurements for ACP and ASP described in that document are shown in Figures 1 and 2 above.

Data filtering addresses known issues to provide a more accurate measurement of system performance.

3.2.1 Outage filtering

3.2.1.1 Any messages being sent or received during any period of outage or degradation detected by ATSPs (information found in section 5) should be removed from both ADS-C and CPDLC data sets.

3.2.2 ADS-C data filtering

3.2.2.2 The ATS unit may receive consecutive duplicate ADS-C reports. Only the ADS-C message with the earliest receipt time should be included in the analysis.

Also, all ADS-C delivery times less than or equal to zero should be filtered out.

3.2.3 CPDLC data filtering

3.2.3.1 CPDLC data should be filtered to:

- exclude transactions with responses other than WILCO (D0);
- transactions with responses to some uplink messages are excluded (for example UM79, UM80, UM81, UM82, UM83, UM84, UM91, UM 92 and UM169), however this filtering has not yet been harmonized between the NAT ATSPs; and
- exclude messages with PORT values equal or less than zero.

3.2.4 RSP 180 and RCP 240 benchmarks

3.2.4.1 There are four main benchmarks that are reported against to assess the performance in terms of data delivery and response time:

- 1) $ASP \leq 90$ for at least 95.0% of applicable ADS-C downlink reports.

- 2) ASP≤180 for at least 99.0% of applicable ADS-C downlink reports (actual target is 99.9% but current NAT agreement allows 99.0%).
- 3) ACP≤180 for at least 95.0% of applicable CPDLC transactions.
- 4) ACP≤210 for at least 99.0% of applicable CPDLC transactions (actual target is 99.9% but current NAT agreement allows 99.0%).

3.2.4.2 If performance is below the benchmark in **any** of the four categories, then the performance is considered underperforming.

3.3 Operator and airframe report

3.3.1 The NAT TIG analysts provide at each NAT TIG meeting, for all FANS data link equipped aircraft, semi-annual reports from each control area of the performance by airframe and operator/aircraft type combination.

3.3.2 Those reports are also combined into a single NAT report for publication on the www.FANS-CRA.com website. The performance reports made available on the FANS-CRA website are informational only and allow the airspace users to monitor their own performance.

3.3.3 The TIG analysts provide the data in the agreed format to the analyst preparing the combined report as described in section 2. The agreed template is hosted on the ICAO Portal (see Reference #1) and a sample of the data is shown in Figures 3 and 4 below.

NAT PBCS Monitoring Report by Operator/Aircraft Type Pair									
Period: January to June 2022									
Color key:									
Meets criteria 99.0%-99.9% Under criteria * Operator code is approximated based on aircraft ID. State of registry is approximated based on operator code. * Multiple entries are seen for some Operator/Aircraft Type in the same FIR because of the use of different operator codes. * Results for Operator/Aircraft Type with low counts of messages/transactions may have skewed results. Request further information from monitoring data contacts.									
State of Registry	Data Source (FIR)	Operator	Aircraft Type	ADS-C downlink Message Counts	95% RSP 180 benchmark ASP <= 90 sec	99.9% RSP 180 benchmark ASP <= 180 sec	CPDLC Transaction Counts	95% RCP 240 benchmark ACP <= 180 sec	99.9% RCP 240 benchmark ACP <= 210 sec
ALGERIA	Gander	DAH	A332	2317	99,7%	99,9%	256	100,0%	100,0%
ALGERIA	New York East	DAH	A332	211	99,5%	100,0%	11	100,0%	100,0%
ALGERIA	Santa Maria	DAH	A332	712	99,7%	100,0%	26	100,0%	100,0%
ALGERIA	Shanwick	DAH	A332	2330	99,9%	100,0%	172	98,8%	98,8%
ALGERIA	Santa Maria	DAH	GLEX	14	100,0%	100,0%	3	100,0%	100,0%
ANGOLA	Santa Maria	DTA	B77W	0			4	100,0%	100,0%
ARGENTINA	New York East	ARG	A332	3471	99,5%	99,9%	81	100,0%	100,0%
ARGENTINA	Santa Maria	ARG	A332	1987	99,2%	99,7%	83	100,0%	100,0%
ARGENTINA	New York East	ARG	XXXX	341	96,8%	98,8%	14	100,0%	100,0%
AUSTRALIA	Gander	ASY	A332	29	100,0%	100,0%	3	100,0%	100,0%
AUSTRALIA	Shanwick	ASY	A332	20	100,0%	100,0%	2	100,0%	100,0%
AUSTRALIA	Gander	ASY	C17	453	99,1%	99,6%	33	100,0%	100,0%
AUSTRALIA	Shanwick	ASY	C17	392	99,7%	100,0%	20	100,0%	100,0%
AUSTRALIA	Gander	QFA	A388	31	100,0%	100,0%	4	75,0%	75,0%
AUSTRALIA	Shanwick	QFA	A388	17	100,0%	100,0%	2	100,0%	100,0%
AUSTRIA	New York East	AOJ	CL30	67	98,5%	100,0%	7	100,0%	100,0%
AUSTRIA	Gander	AOJ	CL35	95	100,0%	100,0%	7	85,7%	85,7%
AUSTRIA	Reykjavik (south)	AOJ	CL35	105	98,1%	100,0%	22	95,5%	95,5%
AUSTRIA	Shanwick	AOJ	CL35	52	100,0%	100,0%	4	100,0%	100,0%
AUSTRIA	Santa Maria	AOJ	CL60	26	100,0%	100,0%	0		
AUSTRIA	Gander	AOJ	E550	17	94,1%	100,0%	2	100,0%	100,0%
AUSTRIA	Reykjavik (south)	AOJ	E550	2	100,0%	100,0%			
AUSTRIA	Shanwick	AOJ	E550	19	100,0%	100,0%	2	50,0%	100,0%
AUSTRIA	Gander	AOJ	FA7X	143	98,6%	98,6%	15	93,3%	93,3%
AUSTRIA	New York East	AOJ	FA7X	271	95,9%	98,5%	29	93,1%	96,6%
AUSTRIA	Santa Maria	AOJ	FA7X	60	95,0%	96,7%	8	87,5%	100,0%
AUSTRIA	Shanwick	AOJ	FA7X	169	98,2%	98,8%	9	88,9%	88,9%
AUSTRIA	Gander	AOJ	GLST	127	93,7%	99,2%	10	100,0%	100,0%
AUSTRIA	New York East	AOJ	GLST	589	96,3%	99,3%	35	91,4%	94,3%
AUSTRIA	Reykjavik (south)	AOJ	GLST	20	100,0%	100,0%	4	100,0%	100,0%

Figure 3. Sample PBCS monitoring report by operator/aircraft type combination

NAT PBCS Monitoring Report by Airframe												
Period: January to June 2022												
Color key:												
Meets criteria	* Operator code is approximated based on aircraft ID. State of registry is approximated based on operator code and registration number.											
99.0%-99.9%	* Select registration number of interest using filter. Multiple entries are seen for some registration numbers in the same FIR because of the use of different operator codes.											
Under criteria	* Results for airframes with low counts of messages/transactions may have skewed results. Request further information from monitoring data contacts.											
State of Registry	Data Source (FIR)	3-letter ICAO Operator code (where applicable)	4-letter ICAO Aircraft Type	Registration Number	ADS-C downlink Message Counts	95% RSP 180 benchmark ASP <= 90 sec	99.9% RSP 180 benchmark ASP <= 180 sec	CPDLC Transaction Counts	95% RCP 240 benchmark ACP <= 180 sec	99.9% RCP 240 benchmark ACP <= 210 sec	Filed P2/RSP180 (Y/N)	
ALGERIA	Gander	DAH	A332	7TVJA	508	98,8%	99,6%	56	100,0%	100,0%	Y	
ALGERIA	New York East	DAH	A332	7TVJA	62	98,4%	100,0%	4	100,0%	100,0%	Y	
ALGERIA	Santa Maria	DAH	A332	7TVJA	170	99,4%	100,0%	10	100,0%	100,0%	Y	
ALGERIA	Shanwick	DAH	A332	7TVJA	425	99,8%	100,0%	26	96,2%	96,2%	Y	
ALGERIA	Gander	DAH	A332	7TVJB	589	99,8%	100,0%	65	100,0%	100,0%	Y	
ALGERIA	New York East	DAH	A332	7TVJB	92	100,0%	100,0%	5	100,0%	100,0%	Y	
ALGERIA	Santa Maria	DAH	A332	7TVJB	191	99,5%	100,0%	1	100,0%	100,0%	Y	
ALGERIA	Shanwick	DAH	A332	7TVJB	610	99,8%	100,0%	46	97,8%	97,8%	N	
ALGERIA	Gander	DAH	A332	7TVJC	469	100,0%	100,0%	50	100,0%	100,0%	Y	
ALGERIA	New York East	DAH	A332	7TVJC	44	100,0%	100,0%	2	100,0%	100,0%	Y	
ALGERIA	Santa Maria	DAH	A332	7TVJC	203	100,0%	100,0%	9	100,0%	100,0%	Y	
ALGERIA	Shanwick	DAH	A332	7TVJC	404	100,0%	100,0%	27	100,0%	100,0%	N	
ALGERIA	Gander	DAH	A332	7TVJV	632	100,0%	100,0%	70	100,0%	100,0%	Y	
ALGERIA	New York East	DAH	A332	7TVJV	13	100,0%	100,0%	0			Y	
ALGERIA	Santa Maria	DAH	A332	7TVJV	135	100,0%	100,0%	5	100,0%	100,0%	Y	
ALGERIA	Shanwick	DAH	A332	7TVJV	702	100,0%	100,0%	58	100,0%	100,0%	N	
ALGERIA	Gander	DAH	A332	7TVJZ	119	100,0%	100,0%	15	100,0%	100,0%	Y	
ALGERIA	Santa Maria	DAH	A332	7TVJZ	13	100,0%	100,0%	1	100,0%	100,0%	Y	
ALGERIA	Shanwick	DAH	A332	7TVJZ	189	100,0%	100,0%	15	100,0%	100,0%	N	
ALGERIA	Santa Maria	PVT	GLF4	7TVPC	0			5	100,0%	100,0%	Y	
ALGERIA	Gander	Q7T	GLF5	7TVPG	12	100,0%	100,0%				N	
ALGERIA	Santa Maria	PVT	GLF5	7TVPG	17	100,0%	100,0%	1	100,0%	100,0%	Y	
ALGERIA	Gander	Q7T	GLF4	7TVPM	13	100,0%	100,0%	1	100,0%	100,0%	N	
ALGERIA	Santa Maria	PVT	GLF4	7TVPM	61	100,0%	100,0%	0			Y	
ALGERIA	Shanwick	GA	GLF4	7TVPM	14	100,0%	100,0%	1			N	
ALGERIA	Santa Maria	PVT	GLF4	7TVPS	39	94,9%	100,0%	0			Y	
ANGOLA	Santa Maria	DTA	B77W	D2TEK	0			4	100,0%	100,0%	Y	
ARGENTINA	Gander	PVT	GLF4	LVCAZ	14	100,0%	100,0%	1	100,0%	100,0%	N	
ARGENTINA	Shanwick	GA	GLF4	LVCAZ	15	93,3%	100,0%				N	
ARGENTINA	New York East	ARG	A332	LVPVH	459	100,0%	100,0%	23	100,0%	100,0%	N	
ARGENTINA	Santa Maria	ARG	A332	LVPVH	453	99,8%	100,0%	17	100,0%	100,0%	Y	
ARGENTINA	New York East	ARG	A332	LVPVI	301	99,7%	99,7%	14	100,0%	100,0%	N	
ARGENTINA	Santa Maria	ARG	A332	LVPVI	384	98,2%	99,2%	14	100,0%	100,0%	Y	
ARGENTINA	New York East	IGA	XXXX	LVPWW	84	98,8%	100,0%	6	100,0%	100,0%	N	

Figure 4. Sample PBCS monitoring report by airframe

3.4 FANS data link performance reports

3.4.1 The NAT analysts prepare a more detailed semi-annual FANS data link performance report for the NAT TIG containing the following data:

- ASP: control area, media type, message delivery path and aircraft type;
- ACP, ACTP and PORT: control area, media type, message delivery path, uplink elements and aircraft type;
- Filtering details; and
- Summary and conclusions.

3.4.2 The reports from each control area are combined into a single NAT PBCS report for presentation at the NAT TIG meeting. The airframe report should be provided as an Excel file.

3.4.3 TIG analysts are required to send their data to the compiler of the report before the deadlines specified in Section 2, in the format shown in Figures 5 and 6. The agreed template is on the ICAO Portal (see Reference #1).

EGGX Reporting on ADS-C Actual Surveillance Performance (ASP)				
Period: Jul 01, 2018 to Dec 31, 2018 (6 months)				
Color key:		Message Counts	95% RSP 180 Benchmark	99.9% RSP 180 Benchmark
			RSP <=90 sec	RSP <=180 sec
Meets criteria				
99.0%-99.9%				
Under criteria				
Media Type				
All		2,979,706	97.51%	99.04%
SAT		2,199,783	97.19%	98.98%
VHF		662,832	98.99%	99.50%
HF		8,879	58.27%	74.43%
Path ID				
EUA1	SAT	490,169	96.28%	98.86%
XXN	SAT	414,025	97.55%	98.84%
XXF	SAT	291,228	97.07%	98.98%
AME1	SAT	210,234	98.04%	99.27%
XXH	SAT	203,215	98.09%	99.33%
AOE2	SAT	203,014	97.84%	99.19%
IGW1	SAT	194,153	97.30%	99.12%
IG1	SAT	137,110	96.15%	98.64%

Figure 5. Sample ASP monitoring report by media type and path identifier

EGGX Reporting on CPDLC Required Communication Performance (RCP)						
Period: Jul 01, 2018 to Dec 31, 2018 (6 months)						
Color key:		Message Counts (Wilco Received)	95% RCP 240 benchmark		99.9% RCP 240 benchmark	
			ACP <=180 sec	ACTP <=120 sec	ACP <=210 sec	ACTP <=150 sec
Meets criteria						
99.0%-99.9%						
Under criteria						
Media Type						
All		157,615	96.69%	98.46%	97.46%	99.01%
SAT		132,678	96.68%	98.29%	97.58%	98.92%
VHF		17,055	98.21%	99.69%	98.44%	99.80%
HF		42	31.96%	32.47%	37.63%	42.78%
SAT - VHF		787	84.91%	93.91%	86.67%	96.66%
VHF - SAT		1,121	80.89%	91.35%	85.07%	93.98%
SAT - HF		133	51.50%	58.52%	61.72%	70.54%
HF - SAT		401	74.20%	67.95%	79.16%	74.01%
HF - VHF		2	88.57%	91.43%	94.29%	91.43%
Path IDs (uplink and downlink)						
EUA1 - EUA1	SAT	39,072	96.80%	98.40%	97.82%	98.97%
XXN - XXN	SAT	28,851	97.59%	98.96%	98.23%	99.32%
XXF - XXF	SAT	21,881	96.87%	98.44%	97.77%	99.10%
AOE2 - AOE2	SAT	11,764	97.00%	98.91%	97.96%	99.33%
IGW1 - IGW1	SAT	10,599	94.98%	97.43%	96.34%	98.66%
IG1 - IG1	SAT	7,461	93.60%	95.53%	94.92%	97.11%

Figure 6. Sample ACP monitoring report by media type and path identifier

4. EQUIPAGE REPORTING TO NAT TIG MEETINGS

4.1 The following equipage statistics are collected for each NAT TIG meeting:

- **% Filing CPDLC and ADS-C (Data Link):** either “J5,” or “J7,” was observed in field 10a of the respective ICAO flight plan AND “D1” was observed in field 10b of the respective ICAO flight plan.
- **% Filing RNP 4:** “L1” was observed in field 18 of the respective ICAO flight plan.
- **% Filing ADS-B:** “B1” or “B2” was observed in field 10b of the respective ICAO flight plan.
- **% Filing RSP180/RCP240:** “P2” was observed in field 10a AND “RSP180” was observed in field 18 after “SUR/” of the respective ICAO flight plan.

4.2 When the NAT TIG Analysts send the data to the compiler, they should use the template below. The agreed template is on the ICAO Portal (see Reference #1).

FIR	Total Flights	NAT % Filing ADS-C/CPDLC	NAT % Filing ADS-B	NAT % Filing RNP4	NAT % Filing RSP180/RCP240
Gander	109920	99.0%	99.7%	98.1%	89.7%
New York East	62115	99.0%	99.4%	97.3%	85.8%
Reykjavik (South of 62N)	75078	70.4%	94.8%	71.6%	51.3%
Santa Maria	66503	95.5%	95.7%	91.4%	78.1%
Shanwick	208240	92.1%	95.7%	92.8%	81.7%
Total	531871	92.3%	97.4%	91.9%	80.1%

Figure 7. Example of equipage reporting template

5. NETWORK OUTAGE DETECTION AND AVAILABILITY

The NAT TIG is working on ways and means to detect network outages at a Communication Service Provider (CSP) and Satellite Service Provider (SSP) level. This is required for two purposes:

- a) For calculation of data link service availability; and
- b) For removing outage periods from PBCS performance data.

5.1 Network outage detection process

5.1.1 Network outages can have an impact on an operator's performance against the RSP 180 and RCP 240 benchmarks (see Section 3). If an aircraft is operating in an Oceanic Control Area (OCA) affected by an outage, this can result in longer times associated with sending messages and could negatively impact their ASP and ACP. Hence, removing outages gives a more accurate view of performance under normal operation.

5.1.2 Network outages can be identified by three means:

- a) An outage notification by CSPs;
- b) Operational occurrence report from ATC; and
- c) Detection of delayed ADS-C messages during the post-operation monitoring.

Note: The means described in bullets b) and c) above may not always be available for use by analysts in all the ATSPs.

5.1.3 It has been observed that the start and stop times reported in the outage notifications from the CSPs do not typically correlate to the period that an ATSP experiences impact, and also that there are sometimes unreported outage periods. Therefore, the following process was developed for ATSPs to use the ADS-C messages to detect outage periods impacting their respective operations:

Note: This process is for ADS-C data only, but messages sent during identified outage periods should be removed from both ADS-C and CPDLC datasets.

1. For each Remote Ground Station (RGS), order data by the date and time the message was sent.
2. Look through the data to find the first message that does not have an ASP of 180 or less.
3. If there is an ASP that is greater than 180, then look at the row below to see if it is also greater than 180.
4. If there are 10 or more consecutive rows which have an ASP value greater than 180 and across at least 5 different aircraft registrations, then flag this period as a potential outage.
5. If the period is greater than or equal to 10 minutes (600 seconds) then this can be flagged as an outage.
6. Take the time the first message was sent during the flagged outage and the time of the last message. This will be the outage period.

5.1.4 The picture on the next page was created by NAV CANADA to illustrate this process.

5.1.5 The flagged outage periods should be excluded from the data link reporting as discussed in Section 2.

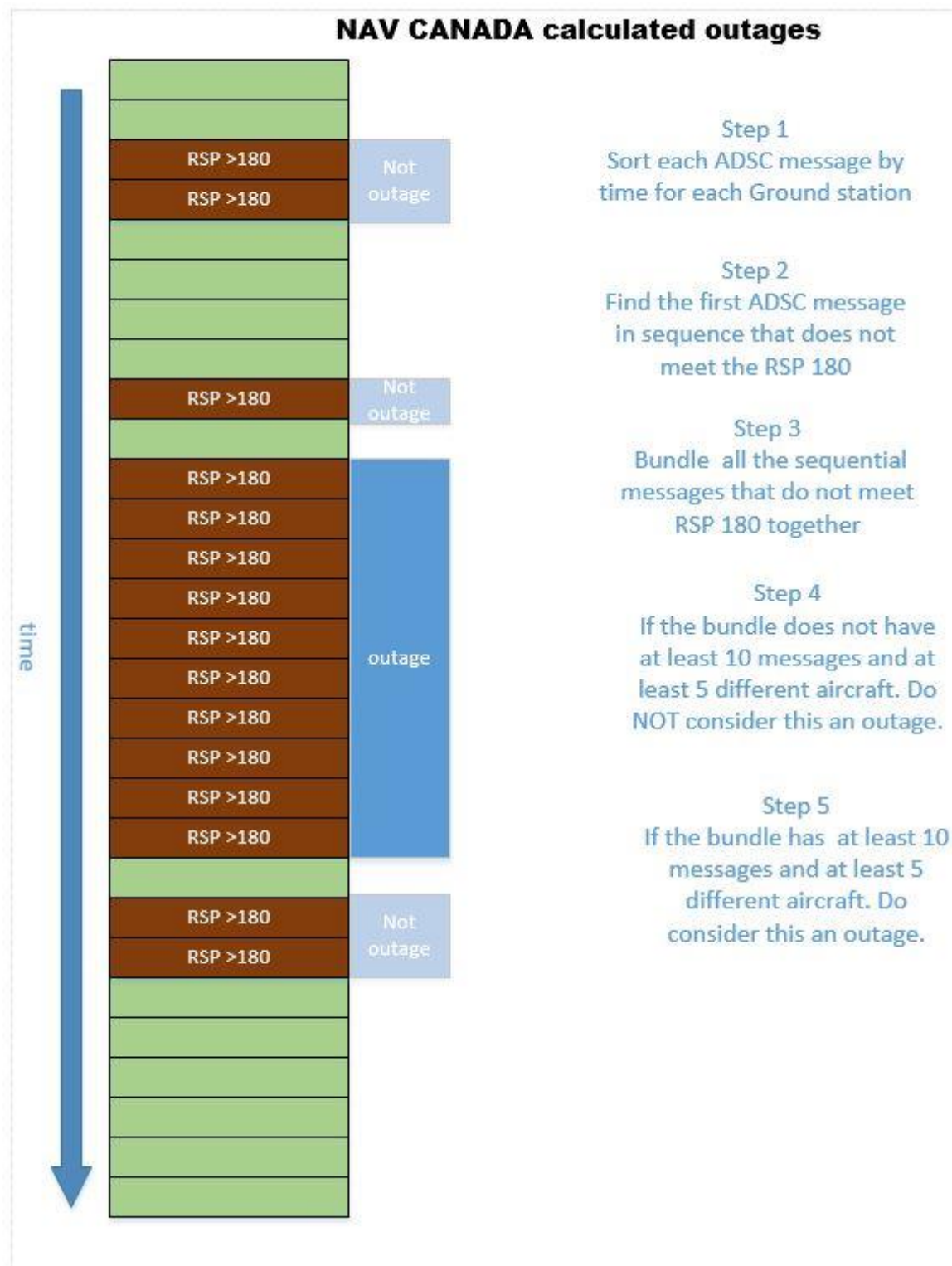


Figure 8. Visual view on logic used for outage detection

5.2 Network Availability

5.2.1 The ATSPs should collect data on CSP-notified system outages, as well as detected outages not observed or notified by the CSPs. This data should be used to evaluate the data link service availability from the ATSP perspective.

5.2.2 For each CSP-notification and ATSP-detected outage, the following information should be collected as a minimum:

- Time of CSP outage notification in YYYYMMDDHHMM format or “Not Notified” if no CSP notification was received.
- Name of CSP supplying outage notification.
- Type of outage e.g. reported media affected SATCOM VHF, HF, ALL.
- Outage start time in YYYYMMDDHHMM format.
- Outage end time in YYYYMMDDHHMM format.
- Duration of outage in minutes.

5.2.3 This data is intended to be used to determine if the local operational impact of the CSP and SSP availability is tolerable in the local operating environment of ADS-C and CPDLC. Note that only outages with duration of 10 minutes or longer should be reported and applied to the measurements for availability.

5.2.4 The availability of the Iridium service can be calculated from this data.

5.2.5 A method of calculating the availability of the Inmarsat service has not yet been determined due to the complexity of that network. The adequacy of the Inmarsat service availability must therefore be determined by qualitative methods. This is done by the NAT POG by judging the operational effects of identified outages and determining if the operational impact of outages is tolerable.

5.2.6 There is no unified established process yet in the NAT to measure availability.

5.2.7 Outage data is collected for each NAT TIG meeting. When the NAT TIG Analysts send the data to the compiler, they should use the format below. The agreed template is on the ICAO Portal (see Reference #1).

FIR	Path	Start date/time (send time of first message impacted)	End date/time (receipt time of last message impacted)	Duration (min)	Total ADS-C reports sent during period (if known)	Total ADS-C reports delayed during period (if known)	Total flights	Total flights impacted	Communication
New York	IG1	11/07/2022 15:49	11/07/2022 16:00	11.13	15	9	7	6	
New York	IG1	24/07/2022 16:14	24/07/2022 16:29	14.60	26	8	8	5	
New York	IGW1	24/07/2022 16:15	24/07/2022 16:27	11.82	34	13	14	7	
New York	IGW1	29/07/2022 15:01	29/07/2022 15:29	28.50	70	7	20	4	
New York	IG1	29/07/2022 15:11	29/07/2022 15:27	15.75	21	6	9	4	
New York	IG1	29/07/2022 16:11	29/07/2022 16:21	10.63	19	7	10	6	
New York	IG1	01/08/2022 15:01	01/08/2022 15:34	32.85	56	17	12	5	
New York	IG1	02/08/2022 15:21	02/08/2022 15:32	10.78	15	5	7	4	
New York	IG1	05/08/2022 16:05	05/08/2022 16:16	10.83	18	7	9	4	
New York	IGW1	05/08/2022 16:08	05/08/2022 16:19	10.32	24	10	9	7	
New York	AME1	07/08/2022 04:10	07/08/2022 04:41	30.48	141	26	33	12	
New York	IG1	08/08/2022 15:09	08/08/2022 15:27	17.82	34	8	13	6	
New York	IG1	12/08/2022 13:22	12/08/2022 13:37	15.00	25	6	10	4	
New York	IG1	12/08/2022 14:07	12/08/2022 14:56	48.27	109	27	22	12	
New York	IGW1	23/08/2022 23:42	23/08/2022 23:56	14.05	17	6	5	3	
New York	IG1	24/08/2022 00:28	24/08/2022 00:54	25.37	19	12	4	4	
New York	IGW1	24/08/2022 00:31	24/08/2022 00:49	18.32	11	7	4	3	
New York	XXH	29/08/2022 03:25	29/08/2022 03:49	24.10	139	20	42	9	
New York	AME1	29/08/2022 05:00	29/08/2022 05:22	21.83	96	20	34	11	
New York	XXH	29/08/2022 05:00	29/08/2022 05:31	30.27	73	15	25	9	

Figure 9. Log of network outages

6. DATA COMPILATION FOR NAT TIG MEETINGS

The NAT data link and equipage reports need to be compiled for each NAT TIG meeting. The schedule for this process is outlined in section 2. The process for compiling and preparing each report is outlined below.

6.1 Equipage Report:

6.1.1 There are two tabs for the equipage report, Month and Operator.

6.1.2 Month:

- 1) Combine all equipage reports together and label the ATSP appropriately.
- 2) Calculate the number of flights that met the equipage criteria/did not based on the total flights and the different percentage fields.
- 3) Use these totals to calculate the NAT equipage percentages for each respective field.

6.1.3 Operator:

- 1) Combine all operator reports together and label the ATSP appropriately.

6.2 Datalink Report:

6.2.1 There are a few aspects to the datalink report, including performance of airframes, filtering of datasets, outages that would have impacted service performance and performance by operator. The process for each of these areas is described below:

6.2.2 Filtering Summary:

Combine all filtering results together.

6.2.3 Outages Summary:

Combine all outages together in current template.

6.2.4 Airframe Report Summary:

- 1) Combine all airframe reports together (ADS-C and CPDLC separately) and define respective ATSP.
- 2) Join ADS-C and CPDLC reports together based on airframe registration.
- 3) Define STATE REGISTRY based on the registrations. The reference table is on the ICAO Portal (see Reference #1).
- 4) All aircraft using data link (both PBCS and non-PBCS)
- 5) should be included in the dataset to be posted on the FANS website post review.

6.2.5 Operator Report Summary:

- 1) Combine all operator reports together (ADS-C and CPDLC separately) and define respective ATSP.
- 2) Join ADS-C and CPDLC reports based on operator and aircraft type.

- 3) Define State of Registry based on operator location.

6.2.6 ATSP Summary Table:

Using the airframe report summary outlined in 6.2.3, a summary table is to be generated for an ATSP breakdown:

- 1) Filter the airframe report table to only include aircraft that filed P2/RSP180.
- 2) Use the message counts and compliance percentages to calculate the total number of messages that met the specified criteria.
- 3) Calculate the overall compliance percentages for each ATSP
- 4) Calculate the overall compliance percentages for the NAT.

6.2.7 PBCS Analysis Conclusions:

There are a few other areas that are to be compiled. These include:

- 1) Compiling the individual analysis done by the ATSPs into the respective sections for the PBCS Analysis Conclusions in the Performance Paper.
- 2) A table highlighting usage of Datalink in the NAT by airframe for the period. This is calculated using a distinct count of airframes and includes:
 - a. The total number of aircraft using datalink in one or more NAT FIRs vs the number of aircraft using Datalink and filing P2/RSP180*.
 - b. The total number of aircraft which registered more than 100 ADS-C downlink messages vs the number with over 100 ADS-C downlink messages and filing P2/RSP180†.
 - c. The subset of b) with <95% compliance
 - d. The total number of aircraft which registered more than 100 CPDLC transactions vs the number with more than 100 CPDLC transactions and filing P2/RSP80‡.
 - e. The subset of c) with < 95% compliance.

6.2.8 These results are written up in the respective draft TIG Working Papers and sent out to all other Analysts in the TIG for review before the final working paper is submitted to ICAO Paris for the TIG meeting.

If an airframe filed P2/RSP180 in any ANSP it is included in the filing figure.

* If an airframe filed P2/RSP180 in any ANSP it is included in the filing figure.

† If an airframe filed P2/RSP180 in any ANSP it is included in the filing figure.

‡ If an airframe filed P2/RSP180 in any ANSP it is included in the filing figure.

7. REPORTING TO NAT CMA

7.1 Background Information

7.1.1 NAT ATSPs are required to send reports on PBCS under-performing aircraft to the NAT CMA on a monthly basis before the 10th of each month. This is based on NAT SPG Conclusion 55/5 a) as follows:

“NAT SPG Conclusion 55/5 – Monthly PBCS reports to NAT CMA by the NAT ATSPs

That:

- a) *the NAT air navigation service providers (ATSPs) establish monthly Performance-based Communication and Surveillance (PBCS) reports to the NAT Central Monitoring Agency (CMA), by 1 July 2019, to identify fleets and aircraft that filed PBCS indicators at least once during the reporting period and were not meeting the 95% performance criteria for Required Communication Performance (RCP) 240 and Required Surveillance Performance (RSP) 180, and report to the NAT CMA using a standardized format as provided in Appendix D;”*

7.1.2 The NAT SPG Conclusion is based on the following ICAO Annex 11 provisions:

“3.3.5.2 Where RCP/RSP specifications are applied, programmes shall be instituted for monitoring the performance of the infrastructure and the participating aircraft against the appropriate RCP and/or RSP specifications, to ensure that operations in the applicable airspace continue to meet safety objectives. The scope of monitoring programmes shall be adequate to evaluate communication and/or surveillance performance, as applicable.

Note. – Guidance material relating to RCP and RSP specifications and monitoring of communication and surveillance performance is contained in the Performance-based Communication and Surveillance (PBCS) manual (Doc 9869).

3.3.5.3 Recommendation. – Arrangements should be put in place, through interregional agreement, for the sharing between regions of data and/or information from monitoring programmes.”

7.1.3 Section 4.5.2 of ICAO Doc 9896, Edition 2, PBCS Manual provides the following guidance for complying with the Annex 11 requirement:

“4.5.2.6 The ATSP should perform an analysis of ACP and ASP at an interval suitable to verify system performance, and enable continuous performance improvement by detecting where specific infrastructure, aircraft operator fleet, aircraft type, or individual aircraft is not meeting the RCP/RSP specification.

Note. – Typically, an ATSP will conduct its analysis on data taken at monthly intervals. However, the specific interval will depend on local factors, such as volume of data accumulated and confidence level in the stability of performance over time.

4.5.2.8 The ATSP should report to the regional PBCS monitoring programme any problems that may have a regional or global impact, or affect aircraft operators in its airspace, including any non-compliance with an RCP/RSP specification.”

7.1.4 NAT DOC 011, PBCS Monitoring and Reporting Guidance North Atlantic Region, was published on behalf of the NAT Systems Planning Group (SPG) to document the end-to-end reporting process. It describes the responsibilities of three parties: the ATSPs, the RMAs and the State Oversight Authorities (SOAs).

7.2 Report Generation

7.2.1 The PBCS under-performance reporting process follows the outline prescribed in NAT DOC 011. Reports are generated before the 10th of each month based on the last three calendar months of data. Reports are submitted using the template on the ICAO Portal (see Reference #1).

7.2.2 Communicating the nature of the performance issue helps non-compliant operators address the underlying causes. The reporting template includes fields for an issue code and free-text notes to create this communication channel. Issue codes identify commonly occurring performance problems and the template includes recommendations for corrective actions. ATSPs are encouraged to use these tools to describe the problem.

7.2.3 The ATSP analyses the data for the last three months measuring ASP and ACP. A rolling three-month sample is used with the aim of increasing the number of data points for airframes that do not operate frequently. It is important to note during which month(s) the performance issue has occurred in each 3-month period to avoid identifying issues that have been identified as resolved during the 2nd or 3rd month in the current sample. Data from periods of network outage or degradation is filtered out.

7.2.4 There are known statistical challenges with the size of data sets, hence it is recommended to concentrate on observed non-compliance based on 100 or more data points for either ASP or ACP.

- a) Where data sets available are below 100 data points, e.g. airframes that do not operate frequently, these airframes should be observed over a longer period to accurately identify performance issues (e.g. biannual PBCS performance reports that are made available at www.fans-cra.com).
- b) During a typical flight, most airframes will not have a large number of CPDLC transactions with ATC. Except in the case of problems related to the regular occurrence of abnormally long Pilot Operational Response Times (PORT), it is expected that the CPDLC system will not underperform without a corresponding underperformance in the ADS-C systems. Conclusions cannot, typically, be drawn from airframes offering a small set of data related to communications performance but operating within tolerance for ASP.

7.2.5 The data preparation process is as follows:

- a) Analyses ASP and ACP for the last three calendar months.
- b) For RCP 240, filter out all airframes that are achieving 95% of CPDLC transaction ACP less than 180 seconds.
- c) For RSP 180, filter out all airframes that are achieving 95% of ADS-C messages ASP less than 90 seconds.
- d) Filter out data from periods of network outage or degradation.

- e) Filter out airframes that have not filed P2 in item 10 for RCP240 and SUR/RSP180 in item 18 for RSP180.
- f) Filter out airframes that have less than 100 data points for ASP and ACP.

7.2.6 Following the filtering process, the remaining data is made up from airframes that are reportable as under-performing to the NAT CMA. The list of under-performing airframes requires, if possible, classification to identify the root cause and necessary, subsequent action. The data is entered into the template hosted on the ICAO Portal (see Reference #1).

7.2.7 The template is organized by aircraft operators, with airframes added to their aircraft operator's tab. The tab name is the operator's ICAO code. International General Aviation (IGA) flights do not have an aircraft operator and should be assigned a tab named like "PVT – C", where "C" is the ICAO registration prefix. This segmentation helps the NAT CMA to route reports to the correct State Oversight Authority.

7.2.8 *Procedure to handle airframes with multiple operators*

7.2.8.1 TBD.

7.3 **Additional analysis and processing**

7.3.1 In addition to the reporting described above, the ATSP may choose to take additional courses of action as described below, to follow up on under-performance:

- a) Where an under-performance report can be attributed to a known issue and is not causing operational impact, the ATSP may choose to continue to monitor the airframe.
- b) Where the ATSP has established a point of contact from the airframe operator either through their own list of contacts or through a regional contact list, the ATSP may contact the operator directly to report and explore the identified problem.
- c) Exceptionally, the ATSP may choose to report the problem to the Data Link Monitoring Agency (DLMA). In these circumstances, it is likely that larger volumes of data may be required to support the investigation to identify the cause.
- d) Following extended periods of unexplained under-performance, or where an operator chooses not to engage, the ATSP may choose to escalate and highlight the under-performance directly with their own state, or the state of the operator.

7.3.2 Whichever action the ATSP determines, that airframe should still be included within the report submitted to the agency responsible for regional monitoring.

7.4 **Root cause analyses:**

TBD

8. REFERENCES

- a) <https://portal.icao.int> -> NATTIG -> NATTIG Analysts Sub-Group
- b) ICAO Annex 11, Air Traffic Services
- c) ICAO Doc 9869, Performance-based Communication and Surveillance (PBCS) Manual
- d) NAT DOC 011, PBCS Monitoring and Reporting Guide

9. GLOSSARY

Airframe	A physical aircraft, usually identified by its civil registration
ATSP	Air Traffic Service Provider
ACP	Actual Communications Performance
ACTP	Actual Communication Technical Performance
ADS-C	Automatic Dependent Surveillance Contract
ASP	Actual Surveillance Performance
CMA	Central Monitoring Agency
CNSG	Communication, Navigation and Surveillance Group
CPDLC	Controller Pilot Data Link Communications
CRA	Central Reporting Agency
CSP	Communication Service Provider
DLMA	Data Link Monitoring Agency
FANS	Future Air Navigation Systems
FIR	Flight Information Region
ICAO	International Civil Aviation Organization
NAT	ICAO North Atlantic Region
OCA	Oceanic Control Area
PBCS	Performance Based Communication and Surveillance
PORT	Pilot Operational Response Time
RCP	Required Communication Performance
RGS	Remote Ground Station
RMA	Regional Monitoring Agency
RSP	Required Surveillance Performance
SPG	Systems Planning Group
SOA	State Oversight Authority
SSP	Satellite Service Provider
TIG	Technology and Interoperability Group
UM	Uplink Message
WP	Working Paper

— END —

APPENDIX N — NAT SPG FOLLOW-UP ACTIONS LIST

*(paragraph 1.2.2 refers)**Note: unless otherwise specified, x-refs are to paragraphs and Appendices of the NAT SPG Report***Table 1 - Items arising from NAT SPG/59**

ID	Description	Who	When	x-Ref
59-1	Provide regular updates on the progress of the new ACC project in the Nuuk FIR	Denmark	NAT SPG	1.7.1
59-2	Review and identify the impact of the amended NAT Vision on the work programmes of the contributory bodies and propose updates	Secretariat, Chairs and Rapporteurs	Next NAT IMG, NAT SOG and NAT EFFG	2.1.3
59-3	Coordinate and submit the name of the CM PT Lead	NAT SPG members	14 July 2023	2.1.7
59-4	Provide written assurance (confirmation) of completion of the national safety cases for OCR to the NAT SOG Secretariat	OCR implementing States	Prior to implementation	2.4.2
59-5	Following the final editorial review by the NER PT, the Operational Guidance on CSO would be made available for review by the NAT POG/16)and NAT IMG/63, before being presented to NAT SPG for approval by correspondence	Secretariat, PT lead	NAT IMG/63	2.5.3
59-6	Support the work of the ICAO Airport Economics Panel and Air Navigation Services Economics Panel (AEP/ANSEP) in order to include the economic and financial aspects of CSO on their work programme and present through through the NAT SPG reporting to the ICAO ANC	Secretariat, Chair	Report of NAT SPG/59 to ANC	2.5.5
59-7	Provide regular updates to the future meetings on the ongoing initiatives and actions taken globally, including at the UNOOSA and the COPUOS levels for the safe, sustainable and manageable integration of CSO into the NAT	Secretariat	NAT SPG	2.5.7
59-8	Provide regular updates to the NAT SPG on supersonic/hypersonic developments from groups such as ICAO's Committee on Aviation Environmental Protection (CAEP), the European concept for higher airspace operation (ECHO) and others	Secretariat	NAT SPG	3.2.3

ID	Description	Who	When	x-Ref
59-9	Provide the names of the new HMS arrangement signatories	United States	asap	4.1.1
59-10	Provide the traffic forecast 2023-2027 to enable calculations of user charges under the DEN/ICE Joint Financing Agreements	NAT EFFG	11 August 2023	4.2.2
59-11	The NAT SPG members would inform the Secretariat by 14 July 2024 about their position with regard to the ICCAIA request for an observer status	NAT SPG members	14 July 2023	6.2.1
59-12	Prepare a proposal for a more optimised schedule of meetings	NAT SPG Chair team	asap	6.3.1
59-13	Coordinate a promotional video material to mark the 60th anniversary of the NAT SPG	NAT SPG Chair team	NAT SPG/60	6.4.1

LIST OF ACRONYMS

ACC	Area Control Centre
ADS	Automatic Dependent Surveillance
ADS-B	Automatic Dependent Surveillance – Broadcast
ADT	Autonomous Distress Tracking
ANC	Air Navigation Commission
ANSP	Air Navigation Service Provider
ASE	Altimetry System Error
CAEP	Committee on Aviation Environmental Protection
CANSO	Civil Air Navigation Services Organization
COPUOS	Committee on the Peaceful Uses of Outer Space
CORSIA	Carbon Offsetting and Reduction Scheme for International Aviation
CSO	Commercial Space Operations
CSP	Communication Service Providers
DEN/ICE	Danish and Icelandic Joint Financing
DLMA	Data Link Monitoring Agency
EASPG	European Aviation System Planning Group
ECHO	European concept for higher airspace operation
EUR	(ICAO) European (Region)
EUR/NAT	European and North Atlantic
FANS	Future Air Navigation System
PR	FANS Problem Report
FDPS	Flight Data Processing Systems
FL	Flight Level
FRA	Free Route Airspace
HMS	Height Monitoring System
HMU	Height Monitoring Unit
IAOPA	International Council of Aircraft Owner and Pilot Associations
IATA	International Air Transport Association
IBAC	International Business Aviation Council
ICAO	
OPDLWG	ICAO Operational Data Link Specific Working Group
SASP	ICAO Separation and Airspace Safety Panel
ICAO Doc	
Doc 4444	<i>Procedures for Air Navigation Services – Air Traffic Management (PANS-ATM)</i>
Doc 7030	<i>Regional Supplementary Procedures (SUPPs)</i>
Doc 9634	<i>Regional Air Navigation Plan – North Atlantic (NAT eANP)</i>
ICCAIA	International Coordinating Council of Aerospace Industries Associations
IFALPA	International Federation of Air Line Pilots Association
JFA	Joint Financing Agreement
KPA	Key Performance Areas
KPI	Key Performance Indicator
LADR	Location of an Aircraft in Distress Repository
MNPS	Minimum Navigation Performance Specification
NAT	(ICAO) North Atlantic (Region)

NAT CM PT	NAT SPG Common Metrics Project Team
NAT CMA	North Atlantic Central Monitoring Agency
NAT DISTREX PT	North Atlantic Autonomous Distress Tracking Exercise with Location of an Aircraft in Distress Repository Project Team
NAT EFFG	North Atlantic Economic, Financial and Forecast Group
NAT IMG	North Atlantic Implementation Management Group
NAT MHP PT	NAT MNPS/HLA & PBN Approval Project Team
NAT NER PT	North Atlantic New Entrant Readiness Project Team
NAT POG	North Atlantic Procedures and Operations Group
NAT SOG	North Atlantic Safety Oversight Group
NAT SPG	North Atlantic Systems Planning Group
NAT TIG	North Atlantic Technology and Interoperability Group
NAT ASR	NAT Annual Safety Report
NAT DMO	North Atlantic Document Management Office
NAT eANP	<i>Regional Air Navigation Plan – North Atlantic (Doc 9634)</i>
NAT HLA	NAT High Level Airspace
NAT SUPPs	<i>Regional Supplementary Procedures – North Atlantic Region (Doc 7030)</i>
NDB	Non-Directional Beacons
OCA	Oceanic Control Area
OCR	Oceanic Clearance Removal
OEM	Original Equipment Manufacturer
OPDLWG	ICAO Operational Data Link Specific Working Group
PANS	<i>Procedures for Air Navigation Services</i>
PANS-ATM	<i>Procedures for Air Navigation Services – Air Traffic Management (Doc 4444)</i>
PBCS	Performance Based Communications and Surveillance
PR	FANS Problem Report
RCC	Rescue Coordination Centres
RVSM	Reduced Vertical Separation Minima
SAF	Sustainable Aviation Fuels
SAR	Search and Rescue
SARPs	Standards and Recommended Practices
SASP	ICAO Separation and Airspace Safety Panel
SAT	South Atlantic
SAT IMG	South Atlantic Implementation Management Group
SAT SOG	South Atlantic Safety Oversight Group
SKPI	Safety Key Performance Indicator
SUPPs	<i>Regional Supplementary Procedures (Doc 7030)</i>
ToR	Terms of Reference
UN	United Nations
UNOOSA	United Nations Office of Space Affairs

— END —